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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

SYLLABUS REVISION

Name of School-Faculty of Education

Department/Program- Science/B.Sc & M.Sc

2017-18 TO 2021-22

www.sssutms.co.in

Opp.Oilfed Plant, Bhopal-Indore Road,Sehore (M.P), Pin - 466001



(+91) 07562-292740 | 7562292720



Sri Satya Sai University of Technology and Medical Sciences

(Established under Govt. of M.P. Registered under UGC 2(F) 1956)

Bhopal-Indore Road, Opp. Pachama oilfed plant, Pachama, Dist.-Sehore M.P. PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@ssutms.co.in

MINUTES OF BOARD OF STUDIES MEETING

Name of Department:- Department of Science

Minutes of Board of Studies Committee Meeting, held on Date 12/11/2017

The Board of Studies Committee Meeting was held in the room of Dr. Kanchan Shrivastava Dean, Faculty of Education SSSTMS following members were present.

1. Dr.Kanchan Shrivastava ,Prof. Department of Economics
2. Dr. Deepak Mital, Asst.Prof. Department of Science
3. Dr.Neelam Tripathi, Asst.Prof. Department of Science
4. Dr.Gajraj Singh, Asst.Prof. Department of Commerce
5. Dr. Reshma Arya, Asst.Prof. Department of History
6. Dr.Abhilasha Pathak, Asst.Prof. Department of Sociology
7. Mr. Abhishek Kuroliya, Asst.Prof. Department of Computer Science
8. Mr.Zuber Khan , Asst.Prof. Department of Maths
9. Mrs.Shobha Vyash Asst.Prof. Department of Hindi
10. Dr. Tabassum Khan ,Professor , Hindi
11. Ms.Khushboo Vaidya, Asst.Prof. Department of Microbiology

The chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda: 1 Discussion of all UG yearly and all PG semester wise Scheme & syllabus UG 1st to IIIrd Year and PG 1st to IVth Semester.

Discussion: In The BOS Meeting, the proposed All PG and UG course was discussed for academic session 2017-18.

Registrar
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Resolution: It is resolved that the new syllabus and scheme of all UG yearly and all PG semester wise Scheme & syllabus UG 1st to IIIrd Year and PG 1st to IVth Semester approved .

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairperson)



Registrar
Sri Sathya Sai University of Technology
& Medical Sciences, Shoranur (M.P.)



Sri Satya Sai University of Technology & Medical Science (M.P)

Annual Scheme

B.Sc. Biology III year

Sl No	Paper Code	Subject Name	Theory		CCE/Internal		Practical		Project/Internship		Total
			Max	Min	Max	Min	Max	Min	Max	Min	
1	BSCB(Y-301)	Chemistry Paper-I (Physical Chemistry)	28	10	5	2					100
		Chemistry Paper-II (Inorganic Chemistry)	29	10	5	2					
		Chemistry Paper-III (Organic Chemistry)	28	10	5	2					
2	BSCB(Y-302)	Biology Paper-I (Plant physiology and Biochemistry)	40	13	10	4					100
		Botany Paper-II (Cell Biology Genetics & Biotechnology)	40	13	10	4					
3	BSCB(Y-303)	Zoology Paper-I (Biotechnology, Immunology, Biological Tools and Techniques)	40	13	10	4					100
		Zoology Paper-II (Ecology, Animal Behavior and Pollution, Microbiology and Toxicology)	40	13	10	4					
4	FC(Y-304A)	Foundation Course Paper-I (Moral Value and Language-III)	80	26	20	8	-	-			100
	FC(Y-304B)	Foundation Course Paper-II (Basics of Computer App. Information Technology)	80	26	20	8	-	-			100
6	BSCB(Y-301D)	Chemistry: Practical					50	17			50
7	BSCB(Y-302C)	Botany: Practical					50	17			50
8	BSCB(Y-303G)	Zoology: Practical					50	17			50
9	BSCB(Y-305)	Project/Internship							100	33	100

Sri Satya Sai University of Technology & Medical Science (M.P)



Annual Scheme

B.Sc. Computer Science III Year

Sl No	Paper Code	Subject Name	Theory		CCE/Internal		Practical		Project/Internship		Total
			Max	Min	Max	Min	Max	Min	Max	Min	
1	BSCC(Y-301)	Computer Science Paper-I(Database Management System)	40	13	10	4					100
		Computer Science Paper-III(Operating System)	40	13	10	4					
2	BSCC(Y-302)	Physics Paper-I(Quantum Mechanics and Spectroscopy)	40	13	10	4					100
		Physics Paper-II(Solid State Physics and Devices)	40	13	10	4					
		Mathematics Paper-I(Linear Algebra And Numerical Analysis)	40	13	10	4					150
		Mathematics Paper-II(Real and Complex Analysis)	40	13	10	4					
		Mathematics Paper-III(Statistical Methods)	40	13	10	4					
4	FC(Y-304A)	Foundation Course Paper-I(Moral Value and Language-III)	80	26	20	8					100
5	FC(Y-304B)	Foundation Course Paper-II (Basics of Computer App.Information Technology)	80	26	20	8					100
6	BSCC(Y301C)	Computer Science: Practical					50	17			50
7	BSCC(Y302C)	Physics :Practical					50	17			50
8	BSCC(Y-305)	Project/Internship							100	33	100

Sri Sai University of Technology & Medical Science (M.P)



Annual Scheme

B.Sc. Mathematics III year

Sl. No	Paper Code	Subject Name	Theory		CCE/Internal		Practical		Project/Internship		Total
			Max	Min	Max	Min	Max	Min	Max	Min	
1	BSCM(Y-301)	Chemistry Paper-I(Physical Chemistry)	28	10	5	2					100
		Chemistry Paper-II(Inorganic Chemistry)	29	10	5	2					
		Chemistry Paper-III(Organic Chemistry)	28	10	5	2					
2	BSCM(Y-302)	Physics Paper-I(Quantum Mechanics and Spectroscopy)	40	13	10	4					100
		Physics Paper-II(Solid State Physics and Devices)	40	13	10	4					
3	BSCM(Y-303)	Mathematics Paper-I(Linear Algebra And Numerical Analysis)	40	13	10	4					150
		Mathematics Paper-II(Real and Complex Analysis)	40	13	10	4					
		Mathematics Paper-III(Statistical Methods)	40	13	10	4					
4	FC(Y-304A)	Foundation Course Paper-I(Moral Value and Language-III)	80	26	20	8	-	-	-	-	100
		Foundation Course Paper-II(Basics of Computer App.Information Technology)	80	26	20	8	-	-	-	-	
6	BSCM(Y-301D)	Chemistry: Practical					50	17			50
7	BSCM(Y-302C)	Physics :Practical					50	17			50
8	BSCM(Y-305)	Project/Internship							100	33	100


 Registrar
 Sri Satya Sai University of Technology
 & Medical Sciences Sarva (M.P)

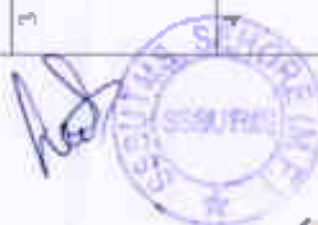


Sri Satya Sai University of Technology & Medical Science (M.P)

Annual Scheme

B.Sc. Microbiology III year

Sl No	Paper Code	Subject Name	Theory		CCE/Internal		Practical		Project/Internship		Total
			Max	Min	Max	Min	Max	Min	Max	Min	
1	BSCMB(Y-301)	Chemistry Paper-I(Physical Chemistry)	28	10	5	2					100
		Chemistry Paper-II(Inorganic Chemistry)	29	10	5	2					
		Chemistry Paper-III(Organic Chemistry)	28	10	5	2					
2	BSCMB(Y-302)	Botany Paper-I (Plant physiology and Bio chemistry)	40	13	10	4					110
		Botany Paper-II (Cell Biology Genetics & Bio Technology)	40	13	10	4					
3	BSCMB(Y-303)	(Microbiology Paper-I Applied and Environment Microbiology)	40	13	10	4					100
		Microbiology Paper-II (Immunology and Medical Microbiology)	40	13	10	4					
4	FCY-304A)	Foundation Course Paper-I (Moral Value and Language -III)	80	26	20	8					100
		Foundation Course Paper-II(Basics of Computer App.Information Technology)	80	26	20	8					
6	BSCMB(Y-301D)	Chemistry: Practical			50	17					50
7	BSCMB(Y-302C)	Botany :Practical			50	17					50
8	BSCMB(Y-303C)	Microbiology: Practical			50	17					50
9	BSCMB(Y-303)	Project/Internship							100	33	100



Sri Satya Sai University of Technology & Medical Science, Puttaparthi (M.P)

Faculty of Science
Class: B.Sc. (Microbiology)
Third Year
Subject- Chemistry
Paper-I (Physical Chemistry)
Code- BSCMB(Y-301)

UNIT - I

- A. **Elementary Quantum Mechanics:** Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect.
De-Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, and particle in a one-dimensional box.
- B. **Molecular orbital theory:** Basic ideas-criteria for forming M.O. from A.O., construction of M.O.'s by LCAO- H_2 ion, calculation of energy levels from wave functions, physical picture of bonding and antibonding wave functions, concept of σ , σ^* , π , π^* orbitals and their characters. Hybrid orbitals sp , sp^2 , sp^3 ; calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H_2 ion, comparison of M.O. and V.B. models.

UNIT - II

Spectroscopy:

Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Rational Spectrum: Diatomic molecules, energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Vibrational Spectrum: Infra-red spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum. Idea of vibrational frequencies of different functional groups.

UNIT - III

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle.

Qualitative description of σ , π and n M.O. their energy levels and the respective transition.

UV Spectroscopy: Electronic excitation, elementary idea of instrument used, application to organic molecules, Woodward-Fieser rule for determining λ_{max} of enes, polyenes and α,β unsaturated carbonyl compounds.

UNIT - IV



Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes, Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radioactive processes (radioactive processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions energy transfer processes (simple examples.)

UNIT - V

Physical properties and Molecular Structure:

Optical activity, Polarization (Clausius - Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment measurement of dipole moment, temperature method and refractive method, dipole moment and structure of molecules, magnetic properties paramagnetic, diamagnetism and ferromagnetism.

Suggested Textbook & reference Books;

- Physical Chemistry - Puri, Sharma and Pathania - Vikas publications, New Delhi
- Physical Chemistry - G M Barrow, International student Edition McGraw hills.
- The elements of physical chemistry - PW Atkins, Oxford University press
- Physical Chemistry - R A Alberty, Willey Eastern Limited
- Physical Chemistry Through problems, S K Dogra and S Dogra, Willey Easter.



Faculty of Science
Class: B.Sc. (Microbiology)
Third Year
Subject- Chemistry
Paper-II (Inorganic Chemistry)
Code- BSCMB (Y-301)

UNIT - I

1. **Hard and soft acids and bases (HSAB)**

Introduction, classification of hard and soft acid-base, Hard and soft acid-base concept of Pearson, application of hard-soft acid base theory, Symbiosis, acid-base strength and hardness and softness; theoretical basis of hardness and softness, electronic theory, π -bonding theory, and dragowayland theory, electronegativity and hardness and softness, limitations of hard soft acid-base concept.

2. **Silicones and Phosphazenes**

Introduction; Silicones-methods of preparation, classification, properties and application (uses), phosphazenes (Phosphonitrilic chloride)-method of preparation and properties; structure of triphosphazenes, some other phosphazenes and uses of phosphazenes.

UNIT - II

1. **Metal Ligand Bonding in Transition Metal Complexes:**

Introduction, limitations of valence bond theory, crystal field theory, crystal field splitting of d-orbitals, d-orbital splitting and stabilization energy in octahedral, tetrahedral and square planar complexes; factor affecting the crystal field parameters. Application of crystal field theory and limitations of crystal field theory.

2. **Thermodynamic and Kinetic Aspects of Metal Complexes.**

Introduction; Thermodynamic aspects of metal complexes, factors affecting thermodynamic stability of complexes, kinetic aspects of metal complexes, stabilization reactions of square planar complexes and factors affecting the rate of substitution reactions in square planar complexes.

UNIT- III

Magnetic Properties of Transition Metal Complexes

Introduction, types of magnetic behavior, diamagnetisms, Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferrimagnetis, Origin and calculation of magnetism, methods of determining susceptibility- Guoy, Bhatnagar Mathur, Quincke's Curie and Nuclear magnetic Resonance method, Magnetic moment; L-S coupling, Determination of ground state term symbol, correlation of μ_s and μ_{eff} values, Orbital contribution to magnetic moments and application of magnetic moment data for 3d-model complexes.

UNIT - IV

A. **Electronic Spectra of Transition Metal Complex**

Introduction: Type of electronic transition, Selection rules for d-d transition; spectroscopic ground states-Notations, Spectroscopic states and spectroscopic ground states in complexes; Spectrochemical series; Orgal energy level diagram-Uses in octahedral and tetrahedral complexes having d^1 to d^9 states: Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

B. **Organometallic Chemistry**



Introduction: Nomenclature and classification of Organometallic compounds, General methods of preparation: Alkyl and aryl organometallic compounds of Lithium-preparation, Properties, Bond nature and application; organometallic compounds of Al, Hg, Sn and Ti-Preparation, properties, bond nature and applications.

UNIT - V

A. Bio-Inorganic Chemistry

Introduction: Essential and trace elements in biological processes, Biological function of the bio-elements. Availability of bio-metals and bio-non-metals: Metalloporphyrins, Hemoglobin structure and biological function, Myoglobin-mechanism of oxygen transfer through hemoglobin and myoglobin; Relation between hemoglobin and myoglobin and chemical reaction of hemoglobin and myoglobin; Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} ; Nitrogen fixation.

B. Metal Nitrosyl Complex

Nitrosylating agent, Synthesis, structure, properties and Bonding.

Suggested Textbook & reference Books:

- Inorganic Chemistry, Mac Murray, Pearson Education.
- Inorganic Chemistry - J D Lee, John Wiley
- Inorganic Chemistry - Cotton and Wilkinson, John Wiley
- Inorganic Chemistry - Huheey, Harper Collins pub, USA
- Inorganic Polymer - G R Chhabwal, Himalaya Publication.

Faculty of Science
Class: B.Sc. (Microbiology)
Third Year
Subject- Chemistry
Paper-III (Organic Chemistry)
Code- BSCMB (Y-301)

UNIT - I

Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond inclusion compounds, clathrates, Charge transfer complexes, resonance, hyper conjugation, inductive, electrometric, mesmeric and steric effect.

Mechanism of Organic Reactions

Hemolytic and heterotypic bond fission, types of reagents- electrophiles and nucleophiles, Types of organic reaction, energy consideration.

Reactive intermediates (carbonations, carbanions, free radicals, arynes and nitrenes with examples.)

Methods of determination of reaction mechanism (active intermediate products) isotope effects, kinetic and stereo chemical studies.

UNIT - II

Alkanes and cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, classification of alkanes, Isomerism in alkanes, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes, conformation of alkanes, Mechanism of free radical halogenation of alkanes, Cycloalkanes nomenclature, methods of formation, chemical reaction, Beyer strain theory and its limitation, Theory of strainless rings, The case of cyclopropane ring: Banana bonds, conformation of cycloalkanes.

UNIT- III

Alkenes, Cycloalkenes, Dienes

Nomenclature of alkenes, methods of formation mechanism of dehydration of alcohols and dehydrohalgeration of alkyl halides, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanism involved in hydrogenation, electrophilic and free radical addition, Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction, Epoxidation, ozonolysis, Polymerization of alkenes, Substitution at the allylic and vinylic positions, industrial application of ethylene and propene, Methods of formation, conformation and chemical reactions of cycloalkenes, Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, structure of allenes and butadiene, methods of formation, polymerisation, chemical reaction - 1,2 and 1,4 addition, Diels- Alder reaction.

UNIT - IV

Alkynes and Alkyl Halides

Nomenclature, structure and bonding in alkynes, methods of formation, Chemical reactions, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition

reaction, hydroboration oxidation, metal-ammonia reduction, oxidation and polymerization

Nomenclature and classification of alkyl halides, methods of formation; chemical reactions, Mechanisms of nucleophilic substitution reaction of reaction of alkyl halides, S_N^1 and S_N^2 reaction with energy profile diagrams, Elimination reaction Polyhalogen compounds; methods of preparation and properties of chloroform and properties of Chloroform and carbon tetrachloride.

UNIT - V

Stereochemistry of Organic Compounds

Concept of isomerism, types of isomerism, Optical isomerism elements of symmetry, molecular chirality, enantiomers, stereo genic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Relative and absolute configuration, sequence rule, D & L and R & S systems of nomenclature, Geometrical isomerism- determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Suggested Textbook & reference Books:

- Organic Chemistry, F A Carey McGraw hills Inc.
- Introduction to Organic Chemistry streitwieser, Heathcock and Kosover, MacMillan.
- Vogel's Qualitative and Quantitative analysis, Vol I, II, III, ELBS
- Advanced organic chemistry, I.L. Finar, ELBS
- Basic Concepts of analytical chemistry, S.M. Khopar, New age International Publishers.



PRACTICAL- CHEMISTRY
DSCMD4Y-301D)

Inorganic Chemistry:

- I. Gravimetric analysis:
Barium as Barium sulphate, Copper as cuprous-thiocyanate.
- II. Complex compound preparation
 - a. Potassium chlorochromate (IV)
 - b. Tetra mine copper (II) sulphate monohydrate
 - c. Hexamminenickel (II) chloride
- III. Effluent water analysis, Identification of cations and anions in different samples.
- IV. Water analysis, to determine dissolved oxygen in water samples in ppm.

Physical Chemistry:

- I. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate/ ethyl acetate catalyzed by hydrogen ions at room temperature and water.
- II. Determination of partition coefficient of iodine between carbon tetra chloride and water.
- III. Job's method
- IV. pH-metric titrations, conduct metric titrations

Organic Chemistry:

- I. Binary mixture analysis containing two solids:
Separation, identification and preparation of derivatives
- II. Preparation
 - a. Acetylation
 - b. Benzoylation
 - c. Meta dinitro benzene
 - d. Picric acid



Faculty of Science
Class: B.Sc. (Microbiology)
Third Year
Subject- Botany
Paper-I (Plant physiology and Bio chemistry)
Code- BSCMB (Y-J02)

Unit-I

Plant water relation- Properties of water, importance of water in plants life, Diffusion ,osmosis, ascent of sap, structure of stomata and its mechanism ,transpiration –its mechanism ,factors affecting rate of transpiration.

Unit II

Plant Nutrition and Bio molecules- Mineral Nutrition and essential macro & micro nutrients and their role, absorption of mineral nutrients, hydroponics, Tran's location of organic solvents Bio molecules- structure and function of carbohydrate, amino acids, proteins, lipids.

Unit III-

Photo synthesis, chloroplast, concept of two photo system, dark reaction, light reaction, red drop ,emerson effect, calvin, hatch and slack cycle, CAM pathway, factors effecting rate of photo synthesis.

UNIT IV-

Respiration- Mitochondria, aerobic and anaerobic respiration, Krebs cycle, MP pathway, electron transport system, factors affecting rate of respiration

Unit V

Enzymology and plant hormone- classification and nomenclature of enzymes, concept of holo enzyme, coenzyme, apoenzyme, cofactors Plant hormones- discovery ,structure, mode of action, role of auxin, gibberellins, cytokinin, ethylene, abscisic acid.

Suggested readings:

- 1 Verma Plant physiology, emkey publication
- 2 Salisbury and ross –Plant physiology
- 3 Das, dutta & gangully- College botany vol - II , Central Book Agency

Faculty of Science
Class: B.Sc. (Microbiology)
Third Year
Subject- Botany
Paper-II (Cell Biology Genetics & Bio Technology)
Code- BSCMB (Y-302)

Unit I

Cell envelope & cell organelles- Plasma membrane, lipid bilayer structure, functions of cell wall, Golgi complex, mitochondria, vacuole, and chloroplast.

Unit II

Chromosome organization- structure and function of chromosome, centromere and telomere, nucleosome model, special types of chromosome, variation in chromosome numbers, deletion, duplication, translocation and inversion, euploidy and aneuploidy, DNA structure, DNA genetic material, DNA replication

Unit III

Genetic Inheritance- Mendelism; Law of segregation, independent assortment, linkage, interaction of genes, cytoplasmic inheritance, Mutation; spontaneous and induced mutation, DNA DAMAGE REPAIR

Unit IV

Gene - structure of gene, genetic code, transfer of genetic information, transcription translation, protein synthesis, tRNA & ribosomes, regulation of gene expression in protein synthesis.

Unit V

Biotechnology Definition, basic aspects of plant tissue culture, cellular totipotency, differentiation and morphogenesis, important achievements of biotechnology in agriculture.

Suggested reading:

- 1 P.k .Gupta Text book of cell and molecular biology Rastogi publication.
- 2 Sinha & Sinha Cytogenetic and Plant Breeding, vikas publication.
- 3 P.K.Gupta Genetics Rastogi publication.


Prof. Dr. J. S. Jaisankar
Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)



Practical: Botany

BSCMB(Y-302C)

- 1 Exercise based on Physiology- 10
- 2 Bio chemical test-05
- 3 Exercise based on cytology-10
- 4 Ex based on genetic problem- 05
- 5 Spotting-10
- 6 VIVA VOICE- 05
- 7 Sessional- 05



Faculty of Science
Class: B.Sc. (Microbiology))
Third Year
Subject- Microbiology
Paper-I (Applied and Environment Microbiology)
Code- BSCMB (Y-303)

Unit-I

Design and Types of fermenter, Factors affecting fermentation process, Industrial production of alcohol, organic acid and economically important enzymes, amino acids, antibiotics, vitamins, methods of immunobilization and applications, strategy for improvement of industrially imp microbial strain

Unit -II

Physical and microbial spoilage of food and food products, spoilage of stored products, fruits and vegetables, spoilage of milk, milk products food preservation methods, canning, desiccation, pasteurization, Chemical preservation of food

Unit-III

PHYSICAL AND CHEMICAL characters of soil, soil microflora, soil fertility and management, microbial disease of crop plants with special feature of rice and wheat crop, blue green algae as a bio fertilizer.

UNIT -IV

CONCEPT OF environment in relation to microbes, physiological adaptation in microbes, nature of microbial population in soil water and air, microbial interaction

UNIT-V

BIO mediation, bio magnification, bioleaching, bio pesticides, microbial, H₂ production, impact of genetically modified organisms, biodegradation of plastics, liquid waste disposal

SUGGESTED READINGS-

1. Soil microbiology- SubbaRao, oxford publication
2. A textbook of microbiology Dubey, R.C. & MAHESWARI D.K. S.Chand
3. Industrial Microbiology- Prescott, D.C

Faculty of Science
Class: B.Sc. (Microbiology)
Third Year
Subject- Microbiology
Paper-II (Immunology and Medical Microbiology)
Code- BSCMB (Y-303)

Unit I

Structure, composition and types of cell and organs involved in immune system. Innate and acquired immunity. Types, structure and functions of MHC molecules, antigen processing and presentation, Humoral and cell mediated immune responses.

Unit- II

Antigens- STRUCTURE, Properties and types haptens and adjuvants, immunoglobulins- structure, heterogeneity, types and subtypes, physico-chemical and biological properties, theories of antibodies production, ELISA, RADIOimmunoassays, hybridoma.

UNIT- III

Tumor immunology- cancer, origin, oncogenes, tumor, antigens, immune response to tumors, diagnosis of tumors.

Unit -IV

Immunization- Modern methods of vaccine production, autoimmunity, hypersensitivity, antigens of ABO and Rh blood group systems.

Unit -V

Host microbe interaction, mechanism of pathogenicity. Lab strategy in diagnosis of infective syndrome. Bacterial and viral diseases of human- syphilis, pox, hepatitis. Fungal diseases of human- candidiasis, dermatocytosis, sexually transmitted diseases.

SUGGESTED READINGS-

- 4 Soil microbiology- SubbaRao, oxford publication
- 5 A textbook of microbiology Dubey, R.C. & MAHESWARI D.K, S.Chand
- 6 Industrial Microbiology- Prescott, D.C



PRACTICAL- MICROBIOLOGY

BSCMB(Y-303C)

- 1 Isolation and enumeration of microorganism from soil
- 2 Isolation and enumeration of microorganism from air
- 3 Isolation and enumeration of microorganism from water
- 4 Total count of bacteria from water
- 5 Determination of blood groups
- 6 Total count of RBC
- 7 Total count of WBC



Faculty of science
B.SC IIIrd year
Microbiology
(Foundation Course)
Paper-I (Moral Value and Language-III)
Code: FC(Y-304A)

इकाई -1

हिन्दी भाषा

1. मेरे सहायत्री (यात्रा व्रतांत) - अमृतलाल बेगड
2. मध्यप्रदेश की लोक कलाएं (संकलित)
3. लोकोक्तियां एवं मुहावरे (संकलित)

इकाई -2

हिन्दी भाषा

1. पत्रकारिता के विभिन्न आयाम (संकलित)
2. मध्यप्रदेश का लोक साहित्य (संकलित)
3. पत्र लेखन - आवेदन, प्रारूपण, आदेश परिपत्र जापन, अनुस्मारक

इकाई -3

नैतिक मूल्य

1. विश्व के प्रमुख धर्म एवं महत्वपूर्ण विशेषताएं (हिन्दू धर्म , जैन धर्म, बौद्ध धर्म, सिक्ख धर्म , ईसाह धर्म , इस्लाम धर्म
2. सत्य के साथ मेरे प्रयोग (महात्मा गांधी की आत्म कथा का संक्षिप्त संस्करण)





UNIT – 4

1. Stopping by Woods on a Snowy evening: Robert Frost,
2. Cherry Tree: Ruskin Bond
3. The Axe: R.K. Narayan
4. The Selfish Giant: Oscar Wilde
5. On the rule of the Road: A.G Gardiner
6. The song of kabir: Translated by Tagore

UNIT – 5

Direct-Indirect speech, Active-Passive Voice, Similar words with different meaning, Report Writing, Narration of events and situations, Drafting of E- mails, Drafting CV.

Text Books and References Books:

1. हिन्दी ग्रंथ अकादमी की पुस्तकें

Faculty of science

B.SC IIIrd year

Microbiology)

Foundation Course

PaperII (Basics of Computer App. & Information Technology)

Code: FC(Y-J04B)

Unit-I

PowerPoint-I Creating presentation using Slide master and Temp late in various Themes & Variants. Working with slides: New slide, move, copy, And delete duplicate. and slide layouts, Presentation views. Format Menu: Font, Paragraph, Drawing & Editing. Printing presentation: Print slides, notes, handout uts and outlines. Saving presentation in different file formats.

Unit-II

PowerPoint-II Idea of Smart Art graphics, inserting text/data using SmartArt, Converting old style presentation into new style through Smart Art. Inserting objects (Video, Audio, Symbol, Equation, etc.), table & excel sheets, picture, chart, photo album, shapes and Smart Art; Trimming of audio/videos. Connecting slides through hyperlink and action button. Slide sorter, slide transition and animation effects. Presenting the slide show: Setup Slide Show, Rehearse Timing.

Unit-III

MS Excel Workbook & Worksheet Fundamentals: Concept of Row, Column & Cell; creating a new workbook through blank & template. Working with worksheet: Entering data into worksheet (General, Number, Currency, Date, Time, Text, Accounting, etc.); Renaming, Copying, Inserting, deleting & protecting workaheet. Working with Row & Column (Inserting, Deleting, Pasing, and Resizing & Hiding), Cell & Cell formatting, and Concept of Range. Charts: Preparing & editing different types of Charts, Inserting trend line, Backward & forward forecasting. Working with formulae: Formula bar; Types of functions: Syntax & uses of the following functions: SUM,

Unit-IV

Internet & Web Services Internet: World Wide Web, Dial-up connectivity, Leased line, VSAT, Broad band, Wi-Fi, URL, Domain name, Web Browser (Internet Explorer, Firefox, Google Chrome, Opera, UC browser, etc.); Search Engine (Google, Bing, Ask, etc.); Website: Static & Dynamic; Difference between Website & Portal-mail: Account Opening, Sending & Receiving Mail s, Managing Contacts & Folders. Basics of Networking: Types of Networks (LAN, WAN , MAN); Network Topologies (Star, Ring, Bus, Hybrid).Elementary idea of - Cloud Computing & Office Web Apps, Mobile Computing & Mobile Apps.

Unit-V

Cyber Ethics, Security & Privacy• Email, Internet & Social Networking Ethics Types of viruses & antivirus Computer security issues & its protection through Firewall & antivirus

Suggesting Reading-

1. Computer Science And Information Technology- S.K. Vijay And Pankaj Singh-Books Of Hindi Granth Academy
2. Computer Study -Pankaj Singh



Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- Chemistry
Paper-I (Physical Chemistry)
Code- BSCM(Y-301)

UNIT - I

- A. **Elementary Quantum Mechanics:** Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect.
De-Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, and particle in a one-dimensional box.
- B. **Molecular orbital theory:** Basic ideas-criteria for forming M.O. from A.O., construction of M.O.'s by LCAO- H_2 ion, calculation of energy levels from wave functions, physical picture of bonding and antibonding wave functions, concept of σ , σ^* , π , π^* orbitals and their characters. Hybrid orbitals sp , sp^2 , sp^3 ; calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H_2 ion, comparison of M.O. and V.B. models.

UNIT - II

Spectroscopy:

Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Rotational Spectrum: Diatomic molecules, energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Vibrational Spectrum: Infra-red spectrum; Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum. Idea of vibrational frequencies of different functional groups.

UNIT- III

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle.

Qualitative description of σ , π and n M.O. their energy levels and the respective transition.

UV Spectroscopy: Electronic excitation, elementary idea of instrument used, application to organic molecules, Woodward-Fieser rule for determining λ_{max} of enes, polyenes and α,β unsaturated carbonyl compounds.

UNIT - IV

Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radioactive processes (radioactive processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions energy transfer processes (simple examples.)

UNIT - V

Physical properties and Molecular Structure:

Optical activity, Polarization (Clausius - Mossotti equation), orientation of dipoles in an electric field. dipole moment, induced dipole moment measurement of dipole moment, temperature method and refractive method, dipole moment and structure of molecules, magnetic properties paramagnetic, diamagnetism and ferromagnetism.

Suggested Textbook & reference Books:

- Physical Chemistry - Puri, Sharma and Pathania - Vikas publications, New Delhi
- Physical Chemistry - G M Barrow, International student Edition McGraw hills.
- The elements of physical chemistry - PW Atkins, Oxford University press
- Physical Chemistry - R A Alberty, Willey Eastern Limited
- Physical Chemistry Through problems, S K Dogra and S Dogra, Willey Easter.

Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- Chemistry
Paper-II (Inorganic Chemistry)
Code- BSCM(Y-301)

UNIT - I

1. Hard and soft acids and bases (HSAB)

Introduction, classification of hard and soft acid-base, Hard and soft acid-base concept of Pearson, application of hard-soft acid base theory, Symbiosis, acid-base strength and hardness and softness; theoretical basis of hardness and softness, electronic theory, Δ -bonding theory, and dragowayland theory, electronegativity and hardness and softness, limitations of hard soft acid-base concept.

2. Silicones and Phosphazenes

Introduction; Silicones-methods of preparation, classification, properties and application (uses), phosphazenes (Phosphonitrilic chloride)-method of preparation and properties; structure of triphosphazenes, some other phosphazenes and uses of phosphazenes.

UNIT - II

1. Metal Ligand Bonding in Transition Metal Complexes:

Introduction, limitations of valence bond theory, crystal field theory, crystal field splitting of d-orbitals, d-orbital splitting and stabilization energy in octahedral, tetrahedral and square planar complexes; factor affecting the crystal field parameters, Application of crystal field theory and limitations of crystal field theory.

2. Thermodynamic and Kinetic Aspects of Metal Complexes.

Introduction: Thermodynamic aspects of metal complexes, factors affecting thermodynamic stability of complexes, kinetic aspects of metal complexes, stabilization reactions of square planar complexes and factors affecting the rate of substitution reactions in square planar complexes.

UNIT- III

Magnetic Properties of Transition Metal Complexes

Introduction, types of magnetic behavior, diamagnetisms, Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferrimagnetis, Origin and calculation of magnetism, methods of determining susceptibility- Guoy, Bhanagar Mathur, Quincke's Curie and Nuclear magnetic Resonance method, Magnetic moment: L-S coupling, Determination of ground state term symbol, correlation of μ_s and μ_{eff} values, Orbital contribution to magnetic moments and application of magnetic moment data for 3d-model complexes.

UNIT - IV

A. Electronic Spectra of Transition Metal Complex

Introduction; Type of electronic transition, Selection rules for d-d transition; spectroscopic ground states-Notations, Spectroscopic states and spectroscopic ground states in complexes; Spectrochemical series; Orgal energy level diagram-Uses in octahedral and tetrahedral complexes having d^1 to d^9 states; Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

B. Organometallic Chemistry

Handwritten signature and stamp:
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Handwritten signature and stamp:
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Introduction: Nomenclature and classification of Organometallic compounds, General methods of preparation; Alkyl and aryl organometallic compounds of Lithium-preparation, Properties, Bond nature and application; organometallic compounds of Al, Hg, Sn and Ti-Preparation, properties, bond nature and applications.

UNIT - V

A. **Bio-Inorganic Chemistry**

Introduction: Essential and trace elements in biological processes, Biological function of the bio-elements, Availability of bio-metals and bio-non-metals: Metlloporphyrins, Hemoglobin structure and biological function, Myoglobin-mechanism of oxygen transfer through hemoglobin and myoglobin; Relation between hemoglobin and myoglobin and chemical reaction of hemoglobin and myoglobin; Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} ; Nitrogen fixation.

B. **Metal Nitrosyl Complex**

Nitrosylating agent, Synthesis, structure, properties and Bonding.

Suggested Textbook & reference Books:

- Inorganic Chemistry, Mac Murray, Pearson Education.
- Inorganic Chemistry - J D Lee, John Wiley
- Inorganic Chemistry - Cotton and Wilkinson, John Wiley
- Inorganic Chemistry - Huheey, Harper Collins pub, USA
- Inorganic Polymer - G R Chhatwal, Himalaya Publication.

Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- Chemistry
Paper-III (Organic Chemistry)
Code- BSCM(Y-J01)

UNIT - I

Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond inclusion compounds, clathrates, Charge transfer complexes, resonance, hyper conjugation, inductive, electrometric, mesmeric and steric effect.

Mechanism of Organic Reactions

Hemolytic and heterotypic bond fission, types of reagents- electrophiles and nucleophiles, Types of organic reaction, energy consideration.

Reactive intermediates (carbonations, carbanions, free radicals, arynes and nitrenes with examples.)

Methods of determination of reaction mechanism (active intermediate products) isotope effects, kinetic and stereo chemical studies.

UNIT - II

Alkanes and cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, classification of alkanes, Isomerism in alkanes, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes, conformation of alkanes, Mechanism of free radical halogenation of alkanes, Cycloalkanes nomenclature, methods of formation, chemical reaction, Baeyer strain theory and its limitation, Theory of strainless rings, The case of cyclopropane ring: Banana bonds, conformation of cycloalkanes.

UNIT- III

Alkenes, Cycloalkenes, Dienes

Nomenclature of alkenes, methods of formation mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes, Chemical reactions of alkenes-mechanism involved in hydrogenation, electrophilic and free radical addition, Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction, Epoxidation, ozonolysis, Polymerization of alkenes, Substitution at the allylic and vinylic positions, industrial application of ethylene and propene, Methods of formation, conformation and chemical reactions of cycloalkenes, Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, structure of allenes and butadiene, methods of formation, polymerisation, chemical reaction - 1,2 and 1,4 addition, Diels- Alder reaction.

UNIT - IV

Alkynes and Alkyl Halides

Nomenclature, structure and bonding in alkynes, methods of formation, Chemical reactions, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition

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reaction, hydroboration oxidation, metal-ammonia reduction, oxidation and polymerization

Nomenclature and classification of alkyl halides, methods of formation; chemical reactions, Mechanisms of nucleophilic substitution reaction of reaction of alkyl halides, S_N^1 and S_N^2 reaction with energy profile diagrams, Elimination reaction Polyhalogen compounds: methods of preparation and properties of chloroform and properties of Chloroform and carbon tetrachloride.

UNIT - V

Stereochemistry of Organic Compounds

Concept of isomerism, types of isomerism, Optical isomerism elements of symmetry, molecular chirality, enantiomers, stereo genic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Relative and absolute configuration, sequence rule, D & L and R & S systems of nomenclature, Geometrical isomerism- determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Suggested Textbook & reference Books:

- Organic Chemistry, F A Carey McGraw hills Inc.
- Introduction to Organic Chemistry streitwieser, Heathcock and Kosover, MacMillan.
- Vogel's Qualitative and Quantitative analysis, Vol I, II, III, ELBS
- Advanced organic chemistry, I.L. Finar, ELBS
- Basic Concepts of analytical chemistry, S.M. Koper, New age International Publishers.

PRACTICAL -CHEMISTRY
BSCM (Y-301D)

Inorganic Chemistry:

- I. Gravimetric analysis:
Barium as Barium sulphate, Copper as cuprous-thiocyanate.
- II. Complex compound preparation
 - a. Potassium chlorochromate (IV)
 - b. Tetra mine copper (II) sulphate monohydrate
 - c. Hexamminenickel (II) chloride
- III. Effluent water analysis. Identification of cations and anions in different samples.
- IV. Water analysis, to determine dissolved oxygen in water samples in ppm.

Physical Chemistry:

- I. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate/ ethyl acetate catalyzed by hydrogen ions at room temperature and water.
- II. Determination of partition coefficient of iodine between carbon tetrachloride and water.
- III. Job's method
- IV. pH-metric titrations, conduct metric titrations

Organic Chemistry:

- I. Binary mixture analysis containing two solids:
Separation, identification and preparation of derivatives
- II. Preparation
 - a. Acetylation
 - b. Benzoylation
 - c. Meta dinitro benzene
 - d. Picric acid

Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- PHYSICS
Paper-I (Quantum Mechanics and Spectroscopy)
Code- BSCM(Y-302)

Unit-I

QUANTUM MECHANICS-I

Particles and Waves: Photoelectric effect, Black body radiation, Compton Effect, De Broglie hypothesis, Wave particle duality, Davisson-Germer experiment, Wave packets, Concept of phase and group velocity, Two slit experiment with electrons, Probability, Wave amplitude and wave functions, Heisenberg's uncertainty principle with illustrations, Basic postulates and formalism of Schrodinger's equation, Eigenvalues, Probabilistic interpretation of wave function, Equation of continuity, Probability current density, Boundary conditions on the wave function, Normalization of wave function.

Unit-II

QUANTUM MECHANICS-2

Time independent Schrodinger equation: One dimensional potential well and barrier, Boundary conditions, Bound and unbound states, Reflection and transmission coefficients for a rectangular barrier in one dimension, Explanation of alpha decay, Quantum phenomenon of tunneling, Free particle in one-dimensional box, Eigen functions and Eigen values of a free particle, One-dimensional simple harmonic oscillator, energy eigenvalues from Hermite differential equation, wave function for ground state, Particle in a spherically symmetric potential, Rigid rotator, Orbital angular momentum, azimuthal quantum numbers and space quantization, Radial solutions and principle quantum number, Hydrogen atom.

Unit-III

ATOMIC SPECTROSCOPY

Atoms in electric and magnetic fields: Quantum numbers, Bohr model and selection rules, Stern-Gerlach experiment, Spin as an intrinsic quantum number, Incompatibility of spin with classical ideas, Orbital angular momentum, Fine structure, Total angular momentum, Pauli Exclusion Principle, Many particles in one dimensional box, Symmetric and anti-symmetric wave functions, Atomic shell model, Spectral notations for atomic states, Spin-orbit coupling, Vector model L-S and J-J coupling, Doublet structure of alkali spectra, Zeeman Effect, Continuous and characteristic X-rays, Mosley's law.

Unit-IV

MOLECULAR SPECTROSCOPY

Spectra: Various types of spectra, Rotational spectra, Intensity of spectral lines and determination of bond distance of diatomic molecules, Isotope effect, Vibrational energies of diatomic molecules, Zero point energy, Anharmonicity, Morse potential, Raman Effect, Rotational Raman spectra and Vibrational Raman spectra, Stokes and anti-Stokes lines and their intensity difference, Electronic spectra, Born-Oppenheimer approximation, Frank Condon principle, single and triplet states, Fluorescence and phosphorescence.

Unit-V

NUCLEAR PHYSICS

Interaction of charged particles and neutrons with matter, working of nuclear detectors, G-M counter, proportional counter, Scintillation counter, Cloud chamber. Basic properties of nucleus: Shape, Size, Mass and Charge of the nucleus, Stability of the nucleus and Binding energy. Alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttall law. Nature of beta ray spectra. The neutrino. Energy levels and decay schemes. Positron emission and electron capture. Selection rules. Beta absorption and range of beta particles. Kurie plot. Nuclear reactions, pair production, Q-values and threshold of nuclear reactions. Nuclear reaction cross-sections. Examples of different types of reactions and their characteristics. Compound nucleus, Bohr's postulate of compound nuclear reaction, Semi empirical mass formula. Shell model, Liquid drop model, nuclear fission and fusion (concepts).

References:

- 1 Quantum Mechanics: V. Deva Nathan, Narosa Publishing House, New Delhi, 2005.
- 2 Quantum Mechanics: B. H. Brans den, Pearson Education, Singapore, 2005.
- 3 Quantum Mechanics: Concepts and Applications, Nouredine Zetili, Jacksonville State University, Jacksonville, USA, John Wiley and Sons, Ltd, 2009.
- 4 Introductory Quantum Mechanics & Spectroscopy: K.M. Jain, South Asian Publications.
- 5 Physics of Atoms & molecules: B.H. Brans den & C.J. Joachim, Pearson Education, Singapore, 2003
- 6 Fundamentals of Molecular Spectroscopy: C.M. Ban well & M. McCash, McGraw Hill (U.K.edition)


REGISTRAR
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- PHYSICS
Paper – II (Solid State Physics and Devices)

Code- BSCM(Y-302)

Unit-I

Solid state physics-I Crystal structure and bonding; crystalline and amorphous solids, translational symmetry, Lattice and basis. Unit cell. Reciprocal lattice. Fundamental types of lattices (Bravais Lattice). Miller indices Lattice planes. Simple cubic. Face centered cubic. Body centered cubic lattices. Laue and Bragg's equation. Determination of crystal structure with X-rays, X-ray spectrometry, ionic, covalent, metallic, Vander walls and hydrogen bonding. Band theory of solids. Periodic potential and Bloch theorem. Kronig-penny model (Qualitative).

Unit-II

Solid state physics-2 Lattice structure and properties; Debye theory, Einstein and Debye theories of specific heats of solids. Elastic and atomic force constants. Dynamics of a chain of similar atoms and chain of two types of atoms. Optical and acoustic modes. Electrical resistivity. Specific heat of electron. Wiedemann-Franz law. Hall Effect. Response of substances in magnetic field, diamagnetism and ferromagnetic materials. Classical Langevin theory of diamagnetism and paramagnetic domain. Curie's Law Weiss theory of ferromagnetism and ferromagnetic domains. Discussion of BH hysteresis.

Unit-III

Semiconductor devices-I Electronic devices: types of semiconductors (p and n). Formation of Energy Bands. Energy level diagram. Conductivity and mobility. Junction formation. Barrier formation in p-n junction diode. Current flow mechanism in forward and reverse biased diode (recombination), drift and saturation of drift velocity. Derivation of mathematical equation for barrier potential, barrier width. Single p-n junction devices (physical explanation, current voltage characteristics and one or two applications). Two terminal device. Rectification. Zener diode, photo diode. Solar cell. Three terminal devices. Junction mechanism of current flow. Characteristics of transistor.

Unit-IV

Semiconductor devices-2 Amplifiers (only bipolar junction transistor). CB, CE and CC configuration. Single stage CE amplifier (biasing and stabilization circuits). Q-point, equivalent circuit. Input impedance, output impedance, voltage and current gain. Class A, B, C amplifiers (definitions). RC coupled amplifier (frequency response). Class B push-pull amplifier. Feedback

on input impedance, Output impedance and gain, Stability, distortion and noise, Principle of an Oscillator, Barkhausen criterion, Colpitts, RC phase shift oscillators, Basic concepts of amplitude, frequency and phase modulations and demodulation.

Unit-V

Nano materials Nanostructures: Introduction to nanotechnology, structure and size dependent properties, 0D, 1D, 2D, 3D nanostructure materials and their density of states, Surface and interface effects, Modelling of quantum size effect. Synthesis of nanoparticles-Bottom Up and Top Down approach, wet chemical method, Nanolithography, metal and semiconducting nanomaterials, Essential differences in structural and properties of bulk and Nano materials (qualitative description), Naturally occurring Nano crystals, Application of nanomaterials.

References:

1. Introduction to Solid state physics Kittel, VIIIth Edition, John Wiley and sons, New York 2005.
2. Intermediate Quantum theory of Crystalline Solids, A.O.E. Anisimov, and Prentice-Hall of India private Limited, New Delhi 1977
3. Solid state Electronic devices, B.G. Steelman, II Edition Prentice Hall India.
4. Microelectronics, J. Millman and A. Grabel McGraw Hill New York.
5. The Physics and Chemistry of Nano solids: Frank Owens, and Charles P. Poole jr. Wiley Inter Science, 2008
6. Physics of Low Dimensional semiconductors: An introduction: J.H. Davies, Cambridge University Press, U.K. 1998
7. Electronic fundamentals and applications, J.D. Ryder, Prentice Hall, India.

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Sehore



PRACTICAL- PHYSICS
BSCM (V-302C)

List of Practical's

1. Specific resistance and energy gap of a semiconductor.
2. Study of half wave and full wave rectification.
3. Characteristics of zener diode.
4. Characteristic of a tunnel diode.
5. Characteristics of JFET.
6. Characteristics of transistor.
7. Study of regulated power supply.
8. Study of RC coupled amplifiers.
9. Determination of Planck's constant.
10. Determination of e/m using Thomson's method.
11. Determination of e by Millikan's method.
12. Study of spectra of hydrogen and deuterium (Rydberg constant ratio of masses of electron to proton).
13. Absorption spectrum of iodine vapour.
14. Study of Zeeman Effect for determination of Lande g-factor.
15. Study of Raman spectrum using laser as an excitation source.
16. To draw B-H curve of Ferro-magnetic material with the help of CRO.
17. Hysteresis curves a transformer core.
18. Hall probe method for measurement of resistivity.


Rectrator
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- Mathematics
Paper-I (Linear Algebra and Numerical Analysis)
Code- BSCM(Y-303)

UNIT – I

Definition and examples of Vector spaces, subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence. Independence and their basic properties. Basis Existence Theorem for basis. Extension Theorem. Invariance of the number of elements of a basis. Dimension. Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space. Dimension of sum of subspaces. Quotient space and its dimension.

UNIT – II

Linear transformations and their representation as matrices. Algebra of linear transformations. Rank-Nullity theorem. Change of basis. Dual space. B_j -dual space and natural isomorphism. Ad joint of a linear transformation. Eigen values Eigen vectors of a linear transformation. Diagonalisation. Bilinear, Quadratic and Hermitian forms.

UNIT –III

Inner Product Space- Cauchy- Schwartz inequality-orthogonal vectors, Orthogonal complements, orthogonal sets and bases, Bessel's inequality for finite dimensional spaces. Gram-Schmidt orthogonalization process

UNIT-IV

Solution of Equations; Bisection, Secant Regula Falsi, Newton's Methods. Roots of second degree polynomials. Interpolation; Lagrange interpolation. Divided differences. Interpolation formula using Differences. Numerical Quadrature; Newton- Cote's formulae Gauss Quadrature formulae

UNIT-V

Linear equations direct methods for solving system of linear equations (Gauss elimination, LU decomposition, Cholesky decomposition). Iterative methods (Jacobi, Gauss- Seidel reduction methods). Ordinary differential equations: Euler method. Single step method, Range- Kuna's method, Multistep methods. Milne Simpson methods based on Numerical integration, Methods based on numerical differentiation

Text Books:-

Sri Satya Sai University of Technology & Medical Sciences (M.P.)



1. K.B. Datta- Matrix and Linear Algebra, Practice hall of India Pvt. Ltd, New Delhi, 2000
2. S.S.Sastry- Introductory Methods of Numerical Analysis. PHI learning Pvt.Ltd.

Reference Books:-

1. K.Hoffman and R. Kunze- Linear Algebra, 2nd Edition. Prentice Hall Englewood Cliffs.
2. S.K. Jain. A Gunawardena & P.B.Bhattacharya- Basic linear Algebra with MATLAB Key College Publishing (Springer-Verlag) 2001
3. S. Kumar sarin- Linear Algebra. A Bernetric Apprac Prentice-Hall of india. 200
4. Balaguruswamy – Numerical Methods. Tata Me Grew Hill Publication. New York


Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Mathematics)
Third Year
Subject- Mathematics
Paper-II (Real and Complex Analysis)
Code- HSCM(Y-302)

Unit-I

Riemann integral, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus, Partial derivatives and differentiability of real-valued functions of two variables, Schwarz's and Young's theorem, Implicit function theorem.

Unit-II

Improper integrals and their convergence, Comparison test, Abel's and Dirichlet's tests, Frullani's integral as a function of a parameter, Continuity, Derivability and integrability of an integral of a function of a parameter, Fourier series of half and full intervals.

Unit-III

Definition and examples of metric spaces, Neighbourhoods, Limit points, Interior points, Open and closed sets closure and interior, Boundary points, Subspace of metric space, Cauchy sequences, Completeness, Cantor's intersection theorem, Contraction principle, Real number as a complete ordered field, Dense subsets, Baire Category theorem, Separable, second countable and first countable spaces.

Unit-IV

Continuous functions, Extension theorem, Uniform continuity, Compactness, Sequential compactness, Totally bounded spaces, Finite intersection property, Continuous functions and compact sets, Connectedness.

Unit-V

Complex numbers as ordered pairs, Geometric representation of complex numbers, Continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Mobius transformations, Fixed points, Cross ratio, Inverse points, Conformal Mappings.

Text Books:

1. Mathematical analysis by S.C. Malik and Savita Arora, New Age Education, Delhi.

2. G.F. Simmons – Introduction to Topology and Modern Analysis, Me Graw Hill, New York 1963
3. L.V. Ahlfors, Complex Analysis Me Grew Hill, New York

Recommend Books

1. Walter Rudin-Real and Complex Analysis, Mc grew Hill, New York
2. Ponnuswamy- Complex Analysis, Narosa Publication, New Delhi.
3. R.V. Churchill & J.W. Brown Complex Variables and Application, 5th Edition, Mc grew Hill New York, 1990

Faculty of science
B,SC Mathematics IIIrd year
Subject – Mathematics
Paper-III (Statistical Methods)

Code- BSCM(Y-303)

Unit-I

Frequency Distribution- Measures of central tendency, Mean Median, Mode, G.M, H.M. Partition values. Measures of dispersion- Range, Interquartile range, Mean deviation, Standard Deviation, Moments, Skewness and Kurtosis.

Unit-II

Probability-Event, Sample space, Probability of an event, Addition and multiplication theorems, Baye's theorem, Continuous probability- probability density function and its applications for finding the mean, mode, Median and standard deviation of various continuous probability distributions, Mathematical expectation, Expectation of sum and product of random variables, Moment generating function.

Unit-III

Theoretical Distribution – Binomial- Poisson, Rectangular and exponential distributions, their properties and uses.

Unit- IV

Methods of least squares, Curve fitting, Co-relation and regression, Partial and multiple correlations (up to three variables only)

Unit-V

Sampling- Sampling of large samples, Null and alternative hypothesis, Errors of first and second kind, Level of significance, Critical region, Test of significance based on chi- square, t,F and Z- statistics.

Text Books:-

1. H.C. Saxena and j.N Kapoor, Mathematical statistics S.Chand and Company
2. M.Ray- Statistical Methods.

Faculty of science
B.SC Mathematics IIIrd year
Paper-I (Foundation Course (Moral Value and Language-III))
Code: FC(Y-304A)

इकाई -1

हिन्दी भाषा

1. मेरे सहायत्री (यात्रा व्रतांत) - अमृतलाल बेगड
2. मध्यप्रदेश की लोक कलाएं (संकलित)
3. लोकोक्तियां एवं मुहावरे (संकलित)

इकाई -2

हिन्दी भाषा

1. पत्रकरिता के विभिन्न आयाम (संकलित)
2. मध्यप्रदेश का लोक साहित्य (संकलित)
3. पत्र लेखन - आवेदन, प्रारूपण, आदेश परिपत्र जापन, अनुस्मारक

इकाई -3

नैतिक मूल्य

1. विश्व के प्रमुख धर्म एवं महत्वपूर्ण विशेषताएं (हिन्दू धर्म , जैन धर्म, बौद्ध धर्म, सिक्ख धर्म , ईसाह धर्म , इस्लाम धर्म)
2. सत्य के साथ मेरे प्रयोग (महात्मा गांधी की आत्म कथा का संक्षिप्त संस्करण)

UNIT - 4

1. Stopping by Woods on a Snowy evening: Robert Frost.
2. Cherry Tree: Ruskin Bond
3. The Axe: R.K. Narayan
4. The Selfish Giant: Oscar Wilde
5. On the rule of the Road: A.G Gardiner
6. The song of kabir: Translated by Tagore

UNIT - 5

Direct-Indirect speech, Active-Passive Voice, Similar words with different meaning. Report Writing, Narration of events and situations. Drafting of E- mails, Drafting CV.

Text Books and References Books:

1. हिन्दी ग्रंथ अकादमी की पुस्तकें

Faculty of science
B.SC Mathematics IIIrd year
Foundation Course

Paper-II: Basics of Computer App. & Information Technology
Code: FC(Y-304B)

Unit-I

PowerPoint-I Creating presentation using Slide master and Temp late in various Themes & Variants, Working with slides: New slide, move, copy, And delete duplicate, and slide layouts, Presentation views, Format Menu: Font, Paragraph, Drawing & Editing. Printing presentation: Print slides, notes, handout uts and outlines. Saving presentation in different file formats.

Unit-II

PowerPoint-II Idea of Smart Art graphics, inserting text/data using SmartArt, Converting old style presentation into new style through Smart Art. Inserting objects (Video, Audio, Symbol, Equation, etc.), table & excel sheets, picture, chart, photo album, shapes and Smart Art; Trimming of audio/videos. Connecting slides through hyperlink and action button. Slide sorter, slide transition and animation effects. Presenting the slide show: Setup Slide Show, Rehearse Timing.

Unit-III

MS Excel Workbook & Worksheet Fundamentals: Concept of Row, Column & Cell; creating a new workbook through blank & template. Working with worksheet: Entering data into worksheet (General, Number, Currency, Date, Time, Text, Accounting, etc.); Renaming, Copying, Inserting, deleting & protecting worksheet. Working with Row & Column (Inserting, Deleting, Pasting, and Resizing & Hiding). Cell & Cell formatting, and Concept of Range. Charts: Preparing & editing different types of Charts. Inserting trend line, Backward & forward forecasting. Working with formulas: Formula bar; Types of functions; Syntax & uses of the following functions: SUM.

Unit-IV

Internet & Web Services Internet: World Wide Web, Dial-up connectivity, I cased line, VSAT, Broad band, Wi-Fi, URL, Domain name, Web Browser (Internet Explorer, Firefox, Google Chrome, Opera, UC browser, etc.); Search Engine (Google, Bing, Ask, etc.); Website: Static & Dynamic; Difference between Website & Portal-mail: Account Opening, Sending & Receiving Mail s, Managing

Contacts & Folders. Basics of Networking: Types of Networks (LAN, WAN , MAN); Network Topologies (Star, Ring, Bus, Hybrid).Elementary idea of - Cloud Computing & Office Web Apps, Mobile Computing & Mobile Apps.

Unit-V

Cyber Ethics, Security & Privacy* Email, Internet & Social Networking Ethics
Types of viruses & antivirus Computer security issues & its protection through Firewall & antivirus

Suggesting Reading-

1. Computer Science And Information Technology- S.K.Vijay And Pankaj Singh- Books Of Hindi Granth Academy
2. Computer Study –Pankaj Singh



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- Computer Science
Paper-I -Database Management system

Code- BSCC(Y-301)

UNIT I

Introduction: Evolution of DB and DBMS, need for Data Management, Introduction and Application of DBMS, File System versus Database System. Concepts of DBMS: Data, Information, Database, Components of DBMS, Architecture of a database system – Physical, Conceptual and User level, Data Independence – Logical and Physical, DBMS terminology, Data Dictionary.

Concepts of Multitier Architecture in databases, Brief idea about distributed databases, parallel databases, mobile databases, temporal databases, spatial databases, geographic databases, data warehousing, data mining, data visualization, OODB and XML Databases, Multimedia and Web Databases.

UNIT II

Database Models: Network, Hierarchical and Relational Models. Features and Comparison of the three models. RDBMS: Introduction to Relational Database, Structure of Relational Database, Relational Model terminology- domains, Attributes, Tuples, Relations, Relational DB Schema, ER-Model, ER-Diagram, ER-concepts, and types of relationships. Codd's 12 rules.

Normalization: Functional Dependency, definition, Trivial and Non-Trivial Functional Dependencies, Steps involved in normalization, 1NF, 2NF, 3NF, Decomposition using Functional Dependency preservation, BCNF, Multi-valued Dependency, 4NF, Join Dependency, 5NF.

UNIT III

Idea about Generalization, Aggregation, Specialization. Indexing & Hashing : Basic Concepts, Indexing: b+ tree & B- tree index files, Hashing: static & dynamic hashing . Elementary Concepts of Database Security: System failure, Backup and Recovery Techniques, Authorization and Authentication. Relational Algebra: Formal Definition, Fundamental Operations – select, project, union, set, difference, Cartesian product & rename, additional operations & extended operations.

UNIT IV

Concept of SQL sublanguages – DDL, DML, DCL, TCL, SCL etc., Embedded SQL.

Interactive SQL: Oracle data types, table creation, modifying the structure of tables, dropping and renaming tables. DML commands: Insertion, updation, deletion operations, many faces of select command, data constraints, logical operators, range searching, pattern matching, oracle functions, use of Alias, grouping data from tables, manipulating dates in sql.

UNIT V

Joins: Equi Join, Self Join, Cross Join, Sub queries, Indexes, Views, Sequences, Roles, and Synonyms.
TCL Commands: use of save point, rollback, and commit commands, DCL Commands: creating user accounts, granting permissions, revoking permissions, Concept of importing and exporting database files.

Text Books & Reference Books:

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database System Concepts" McGraw Hill
2. Rajesh Narang "Database Management System" PHI
3. C.J. Date , "An introduction to database system "
4. Bipin C. Desai, "An Introduction to Database System" .
5. Ramakrishnan Gehrke, "Database management system".


Sri Satya Sai University of Technology & Medical Sciences (M.P.)



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- Computer Science
Paper-II - Operating System
Code- BSCC(Y-301)

UNIT I

Introduction: Definitions, functions and types of operating system, System components, Operating system Structure, System Calls, System Programs, Interrupts, Microkernel .

Process Management: Process Concepts, Process states & Process Control Block, Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non- Preemptive) –FCFS, SJF, RR, Priority, Multiple-Processor, Real-Time, Multilevel Feedback Queue Scheduling.

UNIT II

Process Synchronization: Critical Section Problem, Semaphores, Classical Problems of Synchronization and their Solutions, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Memory Management: Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation

UNIT III

Virtual Memory: concept, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms.

File Management: Concept of File System(File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree- Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed).

UNIT IV

Disk Management: Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery, Security: Security Threats, Protection, Trusted Systems, Windows Security.

UNIX : Introduction to UNIX, UNIX System Organization (the Kernel and the Shell), Files and Directories, Library Functions and System Calls, Editors (vi and ed). Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux File System (inode, Super block, Mounting and Un-mounting), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System Call, System Call for files, Processes and Signals.

UNIT V

Shell Programming: Types of Shells, Shell Meta Characters, Shell Variables, Shell Scripts, Shell Commands, the Environment. Integer Arithmetic and String Manipulation, Special

Command line Characters, Decision Making and Loop Control, Controlling Terminal Input, Trapping Signals, Arrays, I/O Redirection and Piping, Vi and Emacs Editors, Shell Control Statements, Find, Shell Meta- Characters, Shell Scripts, Shell Keywords, Shell Procedures and Reporting, Handling Documents, Changing Process Priority with Nice, Scheduling of Processes at Command, cron, Batch commands.

Process Management and Process Synchronization: Command line argument, Background processes, process synchronization, Sharing of data, user-id, group-id, pipes, fifos, message queues, semaphores, shared variables, Coding, Compiling, Testing and Debugging. AWK programming – report printing with AWK.

Textbooks & Reference Books:

1. Abraham Silberschatz and Peter Baer Galvin, —Operating System Concepts, Addison-Wesley.
2. Andrew Tanenbaum. —Modern Operating Systems, Prentice Hall.
3. Harvey M. Deitel, —An introduction to Operating Systems, Addison-Wesley.
4. Milan Milankovic. —Operating Systems, Concepts and Design, TMH
5. William Stallings. —Operating Systems: Internal and Design Principles, 3rd Edition, PHI.
6. Gary Nutt, —Operating Systems, A modern Approach, Third Edition. Addison Wesley, 2004
7. D.M. Dhamdhere, —Operating Systems: A Concept Based Approach. Second Edition, Tata McGraw-Hill, 2007.
8. Sumitabha Das — Unix Concepts and Applications, TMH.
9. Yashwant Kanetkar —Unix Shell Programming, BPB.
10. Paros —Advanced Unix—A Programmer's Guide, BPB.
11. Meeta Gandhi, —The C Odyssey Unix—The Open Boundless C, BPB.


Registrar
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



SUGGESTED SYLLBUS OF PRACTICALS

BSCC (Y-301C)

Database Management system

1. Create tables named Employee, Department, and Salary. Implement all DDL commands on it.
2. On the Employee Table use the many facets of SELECT command.
3. On a table perform WHERE CLAUSE, HAVING, GROUP BY, ORDER BY, IN, NOT IN, BETWEEN
4. Create a Database implementing Primary and Foreign Key.
5. Implement I/O Constraints and Business Rule constraints on the database created as in 4 above.
6. Perform Nested Queries on table STUDENT.
7. Perform different types of JOINS on any two tables.
8. Create VIEWS, SEQUENCES and SYNONYMS on a table.
9. Use of SAVEPOINT, ROLLBACK and COMMIT command.

Operating System

UNIX, UNIX System Organization (the Kernel and the Shell).

Files and Directories, Library Functions and System Calls.

Editors (VI and Ed), Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux File System (inode, Super block, Mounting and Un-mounting).

Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System Call, System Call for Files, Processes and Signals.

Command line Characters, Decision Making and Loop Control.

Controlling Terminal Input, Trapping Signals, Arrays, I/O Redirection and Piping, Vi and Emacs Editors, Shell Control Statements.

Find, Shell Meta- Characters, Shell Scripts, Shell Keywords, Shell Procedures and Reporting, Handling Documents, Changing Process Priority with Nice, Scheduling of Processes at Command, cron, Batch commands.

Registrar
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- PHYSICS
Paper-I (Quantum Mechanics and Spectroscopy)
Code- BSCC(Y-302)

Unit-I

QUANTUM MECHANICS-1

Particles and Waves: Photoelectric effect, Black body radiation, Compton Effect, De Broglie hypothesis, Wave particle duality, Davisson-Germer experiment, Wave packets, Concept of phase and group velocity, Two slit experiment with electrons, Probability, Wave amplitude and wave functions, Heisenberg's uncertainty principle with illustrations, Basic postulates and formalism of Schrodinger's equation, Eigenvalues, Probabilistic interpretation of wave function, Equation of continuity, Probability current density, Boundary conditions on the wave function, Normalization of wave function.

Unit-II

QUANTUM MECHANICS-2

Time Independent Schrodinger equation: One dimensional potential well and barrier, Boundary conditions, Bound and unbound states, Reflection and transmission coefficients for a rectangular barrier in one dimension, Explanation of alpha decay, Quantum phenomenon of tunneling, Free particle in one-dimensional box, Eigen functions and Eigen values of a free particle, One-dimensional simple harmonic oscillator, energy eigenvalues from Hermite differential equation, wave function for ground state, Particle in a spherically symmetric potential, Rigid rotator, Orbital angular momentum, azimuthal quantum numbers and space quantization, Radial solutions and principle quantum number, Hydrogen atom.

Unit-III

ATOMIC SPECTROSCOPY

Atoms in electric and magnetic fields: Quantum numbers, Bohr model and selection rules, Stern-Gerlach experiment, Spin as an intrinsic quantum number, Incompatibility of spin with classical ideas, Orbital angular momentum, Fine structure, Total angular momentum, Pauli Exclusion Principle, Many particles in one dimensional box, Symmetric and anti-symmetric wave functions, Atomic shell model, Spectral notations for atomic states, Spin-orbit coupling, Vector model L-S and J-J coupling, Doublet structure of alkali spectra, Zeeman Effect, Continuous and characteristic X-rays, Mosley's law.

Unit-IV

MOLECULAR SPECTROSCOPY

Spectra: Various types of spectra, Rotational spectra, Intensity of spectral lines and determination of bond distance of diatomic molecules, Isotope effect, Vibrational energies of diatomic molecules, Zero point energy, Anharmonicity, Morse potential, Raman Effect, Rotational Raman spectra and Vibrational Raman spectra, Stokes and anti-Stokes lines and their intensity difference, Electronic spectra, Born-Oppenheimer approximation, Frank Condon principle, singlet and triplet states, Fluorescence and phosphorescence.

NUCLEAR PHYSICS

Interaction of charged particles and neutrons with matter, Working of nuclear detectors, G-M counter, proportional counter, Scintillation counter, Cloud chamber, Basic properties of nucleus: Shape, Size,

Mass and Charge of the nucleus. Stability of the nucleus and Binding energy. Alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttall law. Nature of beta ray spectra. The neutrino. Energy levels and decay schemes. Positron emission and electron capture. Selection rules. Beta absorption and range of beta particles. Kurie plot. Nuclear reactions, pair production. Q-values and threshold of nuclear reactions. Nuclear reaction cross-sections. Examples of different types of reactions and their characteristics. Compound nucleus, Bohr's postulate of compound nuclear reaction, Semi empirical mass formula. Shell model, Liquid drop model, nuclear fission and fusion (concepts).

References:

- 1 Quantum Mechanics: V. Deva Nathan, Narosa Publishing House, New Delhi, 2005.
- 2 Quantum Mechanics: B. H. Brans den, Pearson Education, Singapore, 2005.
- 3 Quantum Mechanics: Concepts and Applications, Nouredine Zettili, Jacksonville State University, Jacksonville, USA, John Wiley and Sons, Ltd, 2009.
- 4 Introductory Quantum Mechanics & Spectroscopy: K.M. Jain, South Asian Publications.
- 5 Physics of Atoms & molecules: B.H. Brans den & C.J. Joachim, Pearson Education, Singapore, 2003
- 6 Fundamentals of Molecular Spectroscopy: C.M. Ban well & M. McCash, McGraw Hill (U.K.edition)


Professor
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- PHYSICS
Paper – II (Solid State Physics and Devices)
Code- BSCC(Y-302)

Unit-I

Solid state physics-1 Crystal structure and bonding; crystalline and amorphous solids, translational symmetry, Lattice and basis. Unit cell, Reciprocal lattice, Fundamental types of lattices (Bravais Lattice), Miller indices Lattice planes. Simple cubic, Face centered cubic, Body centered cubic lattices. Laue and Bragg's equation. Determination of crystal structure with X-rays, X-ray spectrometry, ionic, covalent, metallic, Vander walls and hydrogen bonding, Bond theory of solids, Periodic potential and Bloch theorem, Kronig-penny model (Qualitative).

Unit-II

Solid state physics-2 Lattice structure and properties; Dulong Petit, Einstein and Debye theories of specific heats of solids. Elastic and atomic force constants, Dynamics of a chain of similar atoms and chain of two types of atoms. Optical and acoustic modes, Electrical resistivity, Specific heat of electron, Wiedemann-Franz law, Hall Effect, Response of substances in magnetic field, dia-para and ferromagnetic materials, Classical Langevin theory of dia and paramagnetic domain, Curie's Law Weiss theory of ferromagnetism and ferromagnetic domains, Discussion of BH hysteresis.

Unit-III

Semiconductor devices-1 Electronic devices: types of semiconductors (p and n), Formation of Energy Bands, Energy level diagram, Conductivity and mobility, Junction formation, Barrier formation in p-n junction diode, Current flow mechanism in forward and reverse biased diode (recombination), drift and saturation of drift velocity, Derivation of mathematical equation for barrier potential, barrier width, Single p-n junction devices (physical explanation, current voltage characteristics and one or two application), Two terminal device, Rectification, Zener diode, photo diode, Solar cell, Three terminal devices, Junction mechanism of current flow, Characteristics of transistor.

Unit-IV

Semiconductor devices-2 Amplifiers (only bipolar junction transistor), CB, CE and CC configuration, Single stage CE amplifier (biasing and stabilization circuits), Q-point, equivalent circuit, Input impedance, output impedance, voltage and current gain, Class A, B, C amplifiers (definitions), RC coupled amplifiers (frequency response), Class B push-pull amplifier, Feedback on input impedance, Output impedance and gain, Stability, distortion and noise, Principle of an Oscillator, Barkhausen criterion, Colpitts, RC phase shift oscillators, Basic concepts of amplitude, frequency and phase modulations and demodulation.



Unit-V

Nano materials Nanostructures: Introduction to nanotechnology, structure and size dependent properties, 3D, 2D, 1D, 0D nanostructure materials and their density of states, Surface and interface effects. Modelling of quantum size effect. Synthesis of nanoparticles-Bottom Up and Top Down approach, wet chemical method. Nanolithography, metal and semiconducting nanomaterials. Essential differences in structural and properties of bulk and Nano materials (qualitative description). Naturally occurring Nano crystals. Application of nanomaterial's.

References:

1. Introduction to Solid state physics Kittel, VIIIth Edition, John Wiley and sons, New York 2005.
2. Intermediate Quantum theory of Crystalline Solids, A.O.E, Anmalu, and Prentice-Hall of India private Limited, New Delhi 1977
3. Solid state Electronic devices. R.G. Streetman, II Edition Prentice Hall India.
4. Microelectronics, J. Millman and A. Grabel McGraw Hill New York.
5. The Physics and Chemistry of Nano solids: Frank Owens, and Charles P. Poole jr. Wiley Inter Science, 2008
6. Physics of Low Dimensional semiconductors: An introduction: J.H. Davies. Cambridge University Press, U.K. 1998
7. Electronic fundamentals and applications, j.D. Ryder, Prentice Hall. India.


Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



PHYSICS PRACTICALS
BSCC (Y-302C)

List of Practical's

1. Specific resistance and energy gap of a semiconductor.
2. Study of half wave and full wave rectification.
3. Characteristics of zener diode.
4. Characteristic of a tunnel diode.
5. Characteristics of JFET.
6. Characteristics of transistor.
7. Study of regulated power supply.
8. Study of RC coupled amplifiers.
9. Determination of Planck's constant.
10. Determination of e/m using Thomson's method.
11. Determination of e by Millikan's method.
12. Study of spectra of hydrogen and deuterium (Rydberg constant ratio of masses of electron to proton).
13. Absorption spectrum of iodine vapour.
14. Study of Zeeman Effect for determination of Lande g-factor.
15. Study of Raman spectrum using laser as an excitation source.
16. To draw B-H curve of Ferro-magnetic material with the help of CRO.
17. Hysteresis curves a transformer core.
18. Hall probe method for measurement of resistivity.


Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- Mathematics
Paper -I (Linear Algebra and Numerical Analysis)

Code- BSCC(Y-303)

UNIT – I

Definition and examples of Vector spaces, subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis Existence Theorem for basis. Extension Theorem. Invariance of the number of elements of a basis. Dimension. Finite dimensional vector spaces. Existence of complementary subspaces of a subspace of a finite dimensional vector space. Dimension of sum of subspaces. Quotient space and its dimension.

UNIT – II

Linear transformations and their representation as matrices. Algebra of linear transformations. Rank-Nullity theorem. Change of basis. Dual space. B_j-dual space and natural isomorphism. Ad joint of a linear transformation. Eigen values Eigen vectors of a linear transformation. Diagonalisation. Bilinear. Quadratic and Hermitian forms.

UNIT –III

Inner Product Space- Cauchy- Schwartz inequality-orthogonal vectors. Orthogonal complements, orthogonal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt orthogonalization process

UNIT-IV

Solution of Equations: Bisection. Secant Regula Falsi. Newton's Methods. Roots of second degree polynomials. Interpolation: Lagrange interpolation. Divided differences. Interpolation formula using Differences. Numerical Quadrature. Newton- Cote's formulae Gauss Quadrature formulae

UNIT-V

Linear equations direct methods for solving system of linear equations (Gauss elimination. LU decomposition. Cholesky decomposition). Iterative methods (Jacobi. Gauss- Seidel reduction methods). Ordinary differential equations: Euler method. Single step method, Range- Kuta's method, Multistep methods. Milne Simpson methods based on Numerical integration, Methods based on numerical differentiation

Text Books:-

1. K.B. Data- Matrix and Linear Algebra, Practice hall of India Pvt. Ltd. New Delhi.2000
2. S.S.Sastri- Introductory Methods of Numerical Analysis PHI learning Pvt.Ltd.



Reference Books:-

1. K.Hoffman and R. Kunze- Linear Algebra. 2nd Edition, Prentice Hall Englewood Cliffs,
2. S.K. Jain, A Gunewardena & P.B.Bhattacharya- Basic linear Algebra with MATLAB Key College Publishing (Springer-Verlag) 2001
3. S. Kumar sarnu- Linear Algebra. A Bernetric Apprae Prentice-Hall of india.200
4. Balaguruswamy – Numerical Methods. Tata Mc Grew Hill Publication. New York


Registrar
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- Mathematics
Paper-II (Real and Complex Analysis)
Code- BSCC(Y-303)

Unit- I

Riemann integral, Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus, Partial derivatives and differentiability of real-valued functions of two variables. Schwarz's and Young's theorem. Implicit function theorem.

Unit- II

Improper integrals and their convergence. Comparison test. Abel's and Dirichlet's tests. Frullani's integral as a function of a parameter. Continuity, Derivability and integrability of an integral of a function of a parameter. Fourier series of half and full intervals.

Unit-III

Definition and examples of metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets closure and interior. Boundary points. Subspace of metric space, Cauchy sequences. Completeness, Cantor's intersection theorem, Contraction principle, Real number as a complete ordered field, Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces.

Unit-IV

Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets. Connectedness.

Unit-V

Complex numbers as ordered pairs. Geometric representation of complex numbers. Continuity and differentiability of complex functions. Analytic functions. Cauchy- Riemann equations. Harmonic functions. Mobius transformations. Fixed points. Cross ratio. Inverse points, Conformal Mappings.

Text Books:

1. Mathematical analysis by S.C. Malik and Savita Arora. New age publication, Delhi.
2. G.F.Simmons – Introduction to Topology and Modern Analysis, Mc Graw Hill, New York 1963
3. L.V. Ahlfors. Complex Analysis Mc Grew Hill, New York

Recommend Books

1. Walter Rudin-Real and Complex Analysis, Mc grew Hill, New York
2. Ponnuswamy- Complex Analysis, Narosa Publication, New Delhi.



3. R.V. Churchill & J.W. Brown Complex Variables and Application, 5th Edition, Mc graw Hill New York, 1990

RE: 

Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Faculty of Science
Class: B.Sc. (Computer Science)
Third Year
Subject- Mathematics
Paper-III (Statistical Methods)

Code- BSCC(Y-303)

Unit-I

Frequency Distribution- Measures of central tendency, Mean Median, Mode, G.M, H.M, Partition values, Measures of dispersion- Range, Interquartile range, Mean deviation, Standard Deviation, Moments, Skewness and Kurtosis.

Unit-II

Probability-Event, Sample space, Probability of an event, Addition and multiplication theorems, Baye's theorem, Continuous probability- probability density function and its applications for finding the mean, mode, Median and standard deviation of various continuous probability distributions, Mathematical expectation, Expectation of sum and product of random variables, Moment generating function.

Unit-III

Theoretical Distribution – Binomial- Poisson, Rectangular and exponential distributions, their properties and uses.

Unit- IV

Methods of least squares, Curve fitting, Co-relation and regression, Partial and multiple correlations (up to three variables only)

Unit-V

Sampling- Sampling of large samples, Null and alternative hypothesis, Errors of first and second kind, Level of significance, Critical region, Tests of significance based on chi- square,t,F and Z- statistics.

Text Books:-

1. H.C. Saxena and J.N Kapoor, Mathematical statistics S.Chand and Company
2. M.Ray- Statistical Methods.


Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Faculty of Science
B.Sc. Computer Science III rd. Year
Foundation Course
Paper-I (Moral Value and Language-III)
Code: FC(Y-304A)

इकाई -1

हिन्दी भाषा

1. मेरे सहयात्री (यात्रा व्रतांत) - अमृतलाल बेगड
2. मध्यप्रदेश की लोक कलाएं (संकलित)
3. लोकोक्तियां एवं मुहावरे (संकलित)

इकाई -2

हिन्दी भाषा

1. पत्रकारिता के विभिन्न आयाम (संकलित)
2. मध्यप्रदेश का लोक साहित्य (संकलित)
3. पत्र लेखन - आवेदन, प्रारूपण, आदेश परिपत्र ज्ञापन, अनुस्मारक

इकाई -3

नैतिक मूल्य

1. विश्व के प्रमुख धर्म एवं महत्वपूर्ण विशेषताएं (हिन्दू धर्म, जैन धर्म, बौद्ध धर्म, सिक्ख धर्म, ईसाह धर्म, इस्लाम धर्म)
2. सत्य के साथ मेरे प्रयोग (महात्मा गांधी की आत्म कथा का संक्षिप्त संस्करण)

UNIT - 4

1. Stopping by Woods on a Snowy evening: Robert Frost.
2. Cherry Tree: Ruskin Bond
3. The Axe: R.K. Narayan
4. The Selfish Giant: Oscar Wilde
5. On the rule of the Road: A.G Gardiner
6. The song of kabir: Translated by Tagore



UNIT - 5

Direct-Indirect speech, Active-Passive Voice, Similar words with different meaning. Report Writing, Narration of events and situations. Drafting of E- mails, Drafting CV.

Text Books and References Books:

1. हिन्दी ग्रंथ अकादमी की पुस्तकें


Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



Faculty of science
B.SC computer science IIIrd year
Foundation Course

Paper II: Basics of Computer App. & Information Technology

Code: FC(Y-304B)

Unit-I

PowerPoint-I Creating presentation using Slide master and Template in various Themes & Variants. Working with slides: New slide, move, copy, And delete duplicate, and slide layouts, Presentation views. Format Menu: Font, Paragraph, Drawing & Editing. Printing presentation: Print slides, notes, handouts and outlines. Saving presentation in different file formats.

Unit-II

PowerPoint-II Idea of Smart Art graphics, inserting text/data using SmartArt, Converting old style presentation into new style through Smart Art. Inserting objects (Video, Audio, Symbol, Equation, etc.), table & excel sheets, picture, chart, photo album, shapes and Smart Art; Trimming of audio/videos. Connecting slides through hyperlink and action button. Slide sorter, slide transition and animation effects. Presenting the slide show: Setup Slide Show, Rehearse Timing.

Unit-III

MS Excel Workbook & Worksheet Fundamentals: Concept of Row, Column & Cell; creating a new workbook through blank & template. Working with worksheet: Entering data into worksheet (General, Number, Currency, Date, Time, Text, Accounting, etc.); Renaming, Copying, Inserting, deleting & protecting worksheet. Working with Row & Column (Inserting, Deleting, Pasting, and Resizing & Hiding), Cell & Cell formatting, and Concept of Range. Charts: Preparing & editing different types of Charts, Inserting trend line, Backward & forward forecasting. Working with formulas: Formula bar; Types of functions; Syntax & uses of the following functions: SUM,

Unit-IV

Internet & Web Services Internet: World Wide Web, Dial-up connectivity, Leased line, VSAT, Broad band, Wi-Fi, URL, Domain name, Web Browser (Internet Explorer, Firefox, Google Chrome, Opera, UC browser, etc.); Search Engine (Google, Bing, Ask, etc.); Website: Static & Dynamic; Difference between Website & Portal-mail: Account Opening, Sending & Receiving Mail s, Managing Contacts & Folders. Basics of Networking: Types of Networks (LAN, WAN, MAN); Network Topologies (Star, Ring, Bus, Hybrid). Elementary idea of - Cloud Computing & Office Web Apps, Mobile Computing & Mobile Apps.

Unit-V

Cyber Ethics, Security & Privacy• Email, Internet & Social Networking Ethics Types of viruses & antivirus Computer security issues & its protection through Firewall & antivirus

Suggesting Reading-

1. Computer Science And Information Technology- S.K.Vijay And Pankaj Singh-Books Of Hindi Granth Academy
2. Computer Study –Pankaj Singh


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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Chemistry
Paper-I (Physical) Chemistry)
Code- BSCB(Y-301)

UNIT - I

- A. **Elementary Quantum Mechanics:** Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect.
De-Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, and particle in a one-dimensional box.
- B. **Molecular orbital theory:** Basic ideas-criteria for forming M.O. from A.O., construction of M.O.'s by LCAO- H_2 ion, calculation of energy levels from wave functions, physical picture of bonding and antibonding wave functions, concept of σ , σ^* , π , π^* orbitals and their characters. Hybrid orbitals sp , sp^2 , sp^3 ; calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H_2 ion, comparison of M.O. and V.B. models.

UNIT - II

Spectroscopy:

Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Rational Spectrum: Diatomic molecules, energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Vibrational Spectrum: Infra-red spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum, Idea of vibrational frequencies of different functional groups.

UNIT- III

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle.

Qualitative description of σ , π and n M.O. their energy levels and the respective transition.

UV Spectroscopy: Electronic excitation, elementary idea of instrument used, application to organic molecules, Woodward-Fieser rule for determining λ_{max} of enes, polyenes and α,β unsaturated carbonyl compounds.

UNIT - IV

Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes, Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state. qualitative description of fluorescence, phosphorescence, non-radioactive processes (radioactive processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions energy transfer processes (simple examples.)

UNIT - V

Physical properties and Molecular Structure:

Optical activity, Polarization (Clausius - Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment measurement of dipole moment, temperature method and refractive method, dipole moment and structure of molecules, magnetic properties paramagnetic, diamagnetism and ferromagnetism.

Suggested Textbook & reference Books:

- Physical Chemistry – Puri, Sharma and Pathania – Vikas publications, New Delhi
- Physical Chemistry – G M Barrow, International student Edition McGraw hills.
- The elements of physical chemistry – PW Atkins, Oxford University press
- Physical Chemistry – R A Alberty, Willey Eastern Limited
- Physical Chemistry Through problems, S K Dogra and S Dogra, Wiley Easter.


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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Chemistry
Paper-II (Inorganic Chemistry)
Code- BSC/B (Y-301)

UNIT - I

1. **Hard and soft acids and bases (HSAB)**

Introduction, classification of hard and soft acid-base, Hard and soft acid-base concept of Pearson, application of hard-soft acid base theory, Symbiosis, acid-base strength and hardness and softness; theoretical basis of hardness and softness, electronic theory, Δ -bonding theory, and dragowayland theory, electronegativity and hardness and softness, limitations of hard soft acid-base concept.

2. **Silicones and Phosphazenes**

Introduction: Silicones-methods of preparation, classification, properties and application (uses), phosphazenes (Phosphonitrilic chloride)-method of preparation and properties; structure of triphosphazenes. some other phosphazenes and uses of phosphazenes.

UNIT - II

1. **Metal Ligand Bonding in Transition Metal Complexes:**

Introduction, limitations of valence bond theory, crystal field theory, and crystal field splitting of d-orbitals, d-orbital splitting and stabilization energy in octahedral, tetrahedral and square planer complexes; factor affecting the crystal field parameters. Application of crystal field theory and limitations of crystal field theory.

2. **Thermodynamic and Kinetic Aspects of Metal Complexes.**

Introduction: Thermodynamic aspects of metal complexes, factors affecting thermodynamic stability of complexes, kinetic aspects of metal complexes, stabilization reactions of square planer complexes and factors affecting the rate of substitution reactions in square planar complexes.

UNIT- III

Magnetic Properties of Transition Metal Complexes

Introduction, types of magnetic behavior, diamagnetisms, Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferrimagnetis, Origin and calculation of magnetism, methods of determining susceptibility- Guoy, Bhatnagar Mathur, Quincke's Curie and Nuclear magnetic Resonance method, Magnetic moment; L-S coupling, Determination of ground state term symbol, correlation of μ_s and μ_{eff} values, Orbital contribution to magnetic moments and application of magnetic moment data for 3d-model complexes.

UNIT - IV

A. **Electronic Spectra of Transition Metal Complex**

Introduction: Type of electronic transition, Selection rules for d-d transition; spectroscopic ground states-Notations, Spectroscopic states and spectroscopic ground states in complexes; Spectrochemical series; Orgal energy level diagram-Uses in octahedral and tetrahedral complexes having d^1 to d^9 states: Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

B. **Organometallic Chemistry**

Introduction; Nomenclature and classification of Organometallic compounds, General methods of preparation; Alkyl and aryl organometallic compounds of Lithium-preparation, Properties, Bond nature and application; organometallic compounds of Al, Hg, Sn and Ti-Preparation, properties, bond nature and applications.

UNIT - V

A. Bio-Inorganic Chemistry

Introduction; Essential and trace elements in biological processes, Biological function of the bio-elements, Availability of bio-metals and bio-non-metals; Metalloporphyrins, Hemoglobin structure and biological function, Myoglobin-mechanism of oxygen transfer through hemoglobin and myoglobin; Relation between hemoglobin and myoglobin and chemical reaction of hemoglobin and myoglobin; Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+} ; Nitrogen fixation.

B. Metal Nitrosyl Complex

Nitrosylating agent, Synthesis, structure, properties and Bonding.

Suggested Textbook & reference Books:

- Inorganic Chemistry, Mac Murray, Pearson Education.
- Inorganic Chemistry - J D Lee, John Wiley
- Inorganic Chemistry - Cotton and Wilkinson, John Wiley
- Inorganic Chemistry - Huheey, Harper Collins pub, USA
- Inorganic Polymer - G R Chhatwal, Himalaya Publication.


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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Chemistry
Paper-III (Organic Chemistry)
Code- BSCB (Y-301)

UNIT - I

Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond inclusion compounds, clathrates. Charge transfer complexes, resonance, hyper conjugation, inductive, electromeric, mesomeric and steric effect.

Mechanism of Organic Reactions

Hemolytic and heterotypic bond fission, types of reagents- electrophiles and nucleophiles, Types of organic reaction, energy consideration.

Reactive intermediates (carbonations, carbanions, free radicals, arynes and nitrenes with examples.)

Methods of determination of reaction mechanism (active intermediate products) isotope effects, kinetic and stereo chemical studies.

UNIT - II

Alkanes and cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, classification of alkanes, Isomerism in alkanes, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes, conformation of alkanes, Mechanism of free radical halogenation of alkanes, Cycloalkanes nomenclature, methods of formation, chemical reaction, Baeyer strain theory and its limitation, Theory of strainless rings, The case of cyclopropane ring: Banana bonds, conformation of cycloalkanes.

UNIT- III

Alkenes, Cycloalkenes, Dienes

Nomenclature of alkenes, methods of formation mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanism involved in hydrogenation, electrophilic and free radical addition, Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction, Epoxidation, ozonolysis, Polymerization of alkenes, Substitution at the allylic and vinylic positions, industrial application of ethylene and propene, Methods of formation, conformation and chemical reactions of cycloalkenes, Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, structure of allenes and butadiene, methods of formation, polymerisation, chemical reaction - 1,2 and 1,4 addition, Diels- Alder reaction.

UNIT - IV

Alkynes and Alkyl Halides

Nomenclature, structure and bonding in alkynes, methods of formation, Chemical reactions, acidity of alkynes, Mechanism of electrophilic and nucleophilic addition



reaction, hydroboration oxidation, metal-ammonia reduction, oxidation and polymerization

Nomenclature and classification of alkyl halides, methods of formation; chemical reactions, Mechanisms of nucleophilic substitution reaction of reaction of alkyl halides, S_N1 and S_N2 reaction with energy profile diagrams, Elimination reaction Polyhalogen compounds; methods of preparation and properties of chloroform and properties of Chloroform and carbon tetrachloride.

UNIT - V

Stereochemistry of Organic Compounds

Concept of isomerism, types of isomerism, Optical isomerism elements of symmetry, molecular chirality, enantiomers, stereo genic centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.

Relative and absolute configuration, sequence rule, D & L and R & S systems of nomenclature, Geometrical isomerism- determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Suggested Textbook & reference Books:

- Organic Chemistry, F A Carey McGraw hills Inc.
- Introduction to Organic Chemistry streinwiesser, Heathcock and Kosover, MacMillan.
- Vogel's Qualitative and Quantitative analysis, Vol I, II, III, ELBS
- Advanced organic chemistry, I.L. Finar, ELBS
- Basic Concepts of analytical chemistry, S.M. Khorper, New age International Publishers.


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PRACTICAL
CODE-BSCB (V-301D)

Inorganic Chemistry:

- I. Gravimetric analysis:
Barium as Barium sulphate, Copper as cuprous-thiocyanate.
- II. Complex compound preparation
 - a. Potassium chlorochromate (IV)
 - b. Tetra mine copper (II) sulphate monohydrate
 - c. Hexamminenickel (II) chloride
- III. Effluent water analysis, Identification of cations and anions in different samples.
- IV. Water analysis, to determine dissolved oxygen in water samples in ppm.

Physical Chemistry:

- I. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate/ ethyl acetate catalyzed by hydrogen ions at room temperature and water.
- II. Determination of partition coefficient of iodine between carbon tetra chloride and water.
- III. Job's method
- IV. pH-metric titrations, conduct metric titrations

Organic Chemistry:

- I. Binary mixture analysis containing two solids:
Separation, identification and preparation of derivatives
- II. Preparation
 - a. Acetylation
 - b. Benzoylation
 - c. Meta dinitro benzene
 - d. Picric acid


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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Botany
Paper-I (Plant physiology and Bio chemistry)
Code- BSCB (Y-302)

Unit-I

Plant water relation- Properties of water, importance of water in plants life, Diffusion ,osmosis, ascent of sap, structure of stomata and its mechanism ,transpiration –its mechanism ,factors affecting rate of transpiration.

Unit II

Plant Nutrition and Bio molecules- Mineral Nutrition and essential macro & micro nutrients and their role, absorption of mineral nutrients, hydroponics, Tran's location of organic solvents Bio molecules- structure and function of carbohydrate, amino acids, proteins, lipids.

Unit III-

Photo synthesis, chloroplast, concept of two photo system, dark reaction, light reaction, red drop ,emerson effect, calvin, hatch and sluck cycle. CAM pathway, factors effecting rate of photo synthesis.

UNIT IV-

Respiration- Mitochondria, aerobic and anaerobic respiration, Krebs cycle, MP pathway, electron transport system. factors affecting rate of respiration

Unit V

Enzymology and plant hormone- classification and nomenclature of enzymes, concept of holo enzyme, coenzyme, apoenzyme, cofactors Plant hormones- discovery ,structure, mode of action, role of auxin, gibberllins, cytokinnin, ethylene, abscicissic acid.

Suggested readings:

- 1 Verma Plant physiology, emkey publication
- 2 Salisbury and ross -Plant physiology
- 3 Das, dutta & gangully- College botany vol II, Central Book Agency

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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Botany
Paper-II (Cell Biology Genetics & Bio Technology)
Code- BSCB (Y-302)

Unit I

Cell envelope & cell organelles- Plasma membrane, lipid bilayer structure, functions of cell wall, Golgi complex, mitochondria, vacuole, and chloroplast.

Unit II

Chromosome organization- structure and function of chromosome, centromere and telomere, nucleosome model, special types of chromosome, variation in chromosome numbers, deletion, duplication, translocation and inversion, euploidy and aneuploidy, DNA structure, dna genetic material, DNA replication

Unit III

Genetic Inheritance- Mendelism; Law of segregation, independent assortment, linkage, interaction of genes, cytoplasmic inheritance, Mutation; spontaneous and induced mutation, DNA DAMAGE REPAIR

Unit IV

Gene - structure of gene, genetic code, transfer of genetic information, transcription translation, protein synthesis, tRNA & ribosomes, regulation of gene expression in protein synthesis.

Unit V

Biotechnology Definition, basic aspects of plant tissue culture, cellular totipotency, differentiation and morphogenesis, important achievements of biotechnology in agriculture.

Suggested reading:

- 1 P.k .Gupta Text book of cell and molecular biology Rastogi publication.
- 2 Sinha & Sinha Cytogenetic and Plant Breeding, vikas publication.
- 3 P.K.Gupta Genetics Rastogi publication.




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Practical-Botany

CODE-BSCB (Y-302C)

- 1 Exercise based on Physiology- 10
- 2 Bio chemical test-05
- 3 Exercise based on cytology-10
- 4 Ex based on genetic problem- 05
- 5 Spotting-10
- 6 VIVA VOICE- 05
- 7 Sessional- 05




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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Zoology
Paper-I (Biotechnology, Immunology, Biological Tools and Techniques)
Code- BSCB (Y-303)

Unit-I

Biotechnology: Genetic Engineering (concept and recombinant DNA technology) and its application in agriculture & medical areas and energy production. Biotechnology of food processing, pharmaceuticals (e.g. use of microbes in insulin production) and fermentation.

Unit-II

Immunology. Concepts of immunity, types of immunity, Antigen and Antibodies, vaccines of different diseases and immunological reactions.

Unit-III

Biological Tools and Techniques: Principles and uses of instruments: pH Meter, Calorimeter, Microtome, Spectrophotometer & Centrifuge, Microscopy (light, transmission and scanning electron microscopy) Chromatography and Electrophoresis.

Unit-IV

Biostatistics: Sampling, Measures of central tendency (mean, median and Mode) and dispersion (variance, standard deviation and standard error); Correlation and Regression

Unit-V

Animal breeding and culture: Aquaculture, Pisciculture, Poultry, Sericulture, Apiculture, Lac-culture. Wild Life of India: Endangered species, Important sanctuaries; national parks of India; Different projects launched for the preservation of animal species; in-situ and ex-situ conservation of wild life.

Books References:

1. Invertebrates: R.L. Kotpal
2. Vertebrates: R.L. Kotpal
3. Ecology: PD Sharma
4. Zoology- Shivalal agrawal & company.
5. Ayush Aggarwal. Animal Biochemistry, 2013
6. Pelzar Jr, M.J. Chan, E.C.S. and Kricig N.R (Microbiology)


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Faculty of Science
Class: B.Sc. (Biology)
Third Year
Subject- Zoology
Paper-II (Ecology, Animal Behavior and Pollution, Microbiology and Toxicology)
Code- BSCB (Y-103)

Unit-I

Ecology: Ecosystem: Concept, components, fundamental operations, energy flow, food-chain, food webs and trophic levels, ecological niche, abiotic and biotic factors. **Population:** Characteristics and regulation. **Ecological succession.** **Adaptation:** Aquatic, terrestrial, aerial and arboreal.

Unit-II

Animal Behavior: Introduction to Ethology, Patterns of behavior (taxes, reflexes, instinct and motivation); biorhythms; learning and memory, Migration of fishes & birds.

Unit-III

Pollution and Toxicology: Concept, sources, types (air, water, soil, noise & radiation), and control of environmental pollution. Exposure of toxicants (routes of exposure, and duration and frequency of exposure); dose -response relationship categories of toxic effects.

Unit-IV

Microbiology: Morphology, physiology and infection (outline) of bacteria and viruses. Bacterial and viral diseases.

Unit-V

Parasitology: (a) Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of the following parasites of domestic animals and humans: Trypanosome, Giardia and Wuchereria. **Vectors and pests:** Life cycle and their control of following pests: Gundhi bug, Sugarcane leafhopper, Rodents, Termites and Mosquitoes and their control.

Books References:

1. Invertebrates: R.L. Kotpal
2. Vertebrates: R.L. Kotpal
3. Ecology: PD Sharma
4. Zoology- Shivalal agrawal & company
5. Ayush Aggarwal, Animal Biochemistry, 2013




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6. Pelzar Jr, M.J. Chan, E.C.S. and Krieg N.R (Microbiology)
7. Prescott L.M. Harley J.P and Klein D.A (Microbiology 5th Edition)
8. Balasubramanian D. Bryce, Concepts in Biotechnology




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Zoology Practical

BSCB(Y-303C)

- Permanent Preparation of; Euglena, Paramecium and rectal protozoans from frog.
- Stool examination for different intestinal parasites,
- Study of prepared slides/ specimens of Entamoeba, Giardia, Leishmania, Trypanosoma, Plasmodium, Fasciola, Cougnia, Taenia, Rallicetina, Polystoma Paramphistomum,

Schistosoma, Echinococcus, Dipylidium, Enterobius, Ascaris and Ancylostoma;

- Permanent Preparation of Cimex (bed bug)/ Pediculus (Louse), Haematopinus (cattle louse), fresh water annelids, arthropods; and soil arthropods.
- Larval stages of helminths and arthropods.
- Permanent mounts of wings, mouth parts and developmental stages of mosquito and house fly. Permanent preparation of ticks/ mites, abdominal gills of aquatic insects viz. Chironomus larva, dragonfly and mayfly nymphs, preparation of antenna of housefly.
- Collection and identification of pests.
- Life history of silkworm, honeybee and lac insect.
- Different types of important edible fishes of India.
- Prepared slides of plant nematodes.
- Demonstration of counting of cells (blood and protozoan) by haemocytometer, haemoglobinometer, pH meter, Colorimeter
- Microbiological Techniques: Media Preparation and sterilization, inoculation and Monitoring.
- Study of an aquatic ecosystem, its biotic components and food chain.
- Preparation of chromosomes, Test for carbohydrate Photochemical demonstration of proteins and lipids, using hand sections using hand sections, endocrine glands (Neurosecretory cells) of cockroach.
- Demonstration of developmental stages of chick
- Project Report/ model chart making.

Dissections:

- Cockroach: Central nervous system



- **Wallago:** Afferent and efferent branchial vessels, Cranial nerves, Weberian ossicles.
- **Practical exercises based on Biostatistics, Microbiology, Immunology, Biotechnology, Animal Behavior, Pollution & Toxicology.**



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Faculty of science
B.SC IIIrd year
Biology
Foundation Course
Paper-I (Moral Value and Language-III)
Code: FC(Y-304A)

इकाई -1

हिन्दी भाषा

1. मेरे सहात्री (यात्रा वृत्तान्त) - अमृतलाल बेगड
2. मध्यप्रदेश की लोक कलाएँ (संकलित)
3. लोकोक्तियाँ एवं मुहावरे (संकलित)

इकाई -2

हिन्दी भाषा

1. पत्रकरिता के विभिन्न आयाम (संकलित)
2. मध्यप्रदेश का लोक साहित्य (संकलित)
3. पत्र लेखन - आवेदन, प्रारूपण, आदेश परिपत्र ज्ञापन, अनुस्मारक

इकाई -3

नैतिक मूल्य

1. विश्व के प्रमुख धर्म एवं महत्वपूर्ण विशेषताएँ (हिन्दू धर्म, जैन धर्म, बौद्ध धर्म, सिक्ख धर्म, ईसाह धर्म, इस्लाम धर्म)
2. सत्य के साथ मेरे प्रयोग (महात्मा गांधी की आत्म कथा का संक्षिप्त संस्करण)



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UNIT - 4

1. Stopping by Woods on a Snowy evening: Robert Frost.
2. Cherry Tree: Ruskin Bond
3. The Axe: R.K. Narayan
4. The Selfish Giant: Oscar Wilde
5. On the rule of the Road: A.G Gardiner
6. The song of kabir: Translated by Tagore

UNIT - 5

Direct-Indirect speech, Active-Passive Voice, Similar words with different meaning. Report Writing, Narration of events and situations. Drafting of E- mails, Drafting CV.

Text Books and References Books:

1. हिन्दी ग्रंथ अकादमी की पुस्तकें


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Faculty of science

B.SC IIIrd year

Biology

Foundation Course

Paper II: Basics of Computer App. & Information Technology

Code: FC(Y-304B)

Unit-I

PowerPoint-I Creating presentation using Slide master and Template in various Themes & Variants, Working with slides: New slide, move, copy, And delete duplicate, and slide layouts, Presentation views, Format Menu: Font, Paragraph, Drawing & Editing, Printing presentation: Print slides, notes, handout etc and outlines, Saving presentation in different file formats.

Unit-II

PowerPoint-II Idea of Smart Art graphics, inserting text/data using SmartArt, Converting old style presentation into new style through Smart Art. Inserting objects (Video, Audio, Symbol, Equation, etc.), table & excel sheets, picture, chart, photo album, shapes and Smart Art; Trimming of audio/videos, Connecting slides through hyperlink and action button, Slide sorter, slide transition and animation effects, Presenting the slide show: Setup Slide Show, Rehearse Timing.

Unit-III

MS Excel Workbook & Worksheet Fundamentals: Concept of Row, Column & Cell; creating a new workbook through blank & template, Working with worksheet: Entering data into worksheet (General, Number, Currency, Date, Time, Text, Accounting, etc.); Renaming, Copying, Inserting, deleting & protecting worksheet, Working with Row & Column (Inserting, Deleting, Pasting, and Resizing & Hiding), Cell & Cell formatting, and Concept of Range, Charts: Preparing & editing different types of Charts, Inserting trend line, Backward & forward forecasting, Working with formulas: Formula bar, Types of functions; Syntax & uses of the following functions: SUM,

Unit-IV

Internet & Web Services Internet: World Wide Web, Dial-up connectivity, Leased line, VSAT, Broad band, Wi-Fi, URL, Domain name, Web Browser (Internet Explorer, Firefox, Google Chrome, Opera, UC browser, etc.); Search Engine (Google, Bing, Ask, etc.); Website: Static & Dynamic; Difference between Website & Portal-mail: Account Opening, Sending & Receiving Mail s, Managing Contacts & Folders, Basics of Networking: Types of Networks (LAN, WAN , MAN); Network Topologies (Star, Ring, Bus, Hybrid). Elementary idea of - Cloud Computing & Office Web Apps, Mobile Computing & Mobile Apps.

Unit-V

Cyber Ethics, Security & Privacy- Email, Internet & Social Networking Ethics Types of viruses & antivirus Computer security issues & its protection through Firewall & antivirus

Suggesting Reading-

1. Computer Science And Information Technology- S.K.Vijay And Pankaj Singh-Books Of Hindi Granth Academy
2. Computer Study -Pankaj Singh



University of Technology & Medical Sciences, Sehore (M.P.)
ANNUAL SCHEME

Scheme of Examination 2018-19
Second Year - Bachelor of Science (BIOLOGY)

BSC - IInd Year BIOLOGY

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory		CCE/Internal		Total		Practical		Total
					Max	Min	Max	Min	Max	Min	Max	Min	
	BSCB(Y-201A)	CHEMISTRY	Paper-I	PHYSICAL CHEMISTRY	29	10	5	2	34	12			150
	BSCB(Y-201B)		Paper-II	INORGANIC CHEMISTRY	28	10	5	2	33	12	50	17	
	BSCB(Y-201C)		Paper-III	ORGANIC CHEMISTRY	28	10	5	2	33	12			
	BSCB(Y-202A)	BOTANY	Paper-I	STRUCTURE DEVELOPMENT AND REPRODUCTION OF FLOWERING PLANTS	40	13	10	4	50	17	50	17	150
	BSCB(Y-202B)		Paper-II	PLANT ECOLOGY BIODIVERSITY & PHYTOGEOGRAPHY	40	13	10	4	50	17			
	BSCB(Y-203A)	ZOOLOGY	Paper-I	VERTEBRATES AND EVOLUTION	40	13	10	4	50	17			150
	BSCB(Y-203B)		Paper-II	ANIMAL PHYSIOLOGY AND BIO-CHEMISTRY	40	13	10	4	50	17	50	17	
	FC(Y-204A)	FOUNDATION	Paper-I	MORAL VALUE AND LANGUAGE-II	80	26	20	8	100	33	-	-	100
	FC(Y-204B)		Paper-II	ENVIRONMENTAL STUDIES	80	26	20	8	100	33	-	-	
TOTAL					405		95		500		150		650


 Head of the Department of Biology
 University of Technology & Medical Sciences (M.P.)





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ANNUAL SCHEME

Scheme of Examination 2018-19

Second Year - Bachelor of Science (COMPUTER SCIENCE)

BSC - IInd Year (Computer Science)

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory		CCE/Internal		Total		Practical		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
I st Year	BSCCIY-2021A)	COMPUTER SCIENCE	Paper-I	OBJECT ORIENTED PROGRAMMING USING C++	40	13	10	4	50	17	50	17	150	50
	BSCCIY-2011B)		Paper-II	DATA STRUCTURE AND ALGORITHMS	40	13	10	4	50	17				
	BSCCIY-2021A)		Paper-I	OPTICS	40	13	10	4	50	17				
	BSCCIY-2021B)		Paper-II	ELECTRO-STATIC, MAGNETO STATICS AND ELECTRODYNAMICS	40	13	10	4	50	17				
II nd Year	BSCCIY-2021A)	MATHEMATICS	Paper-I	ABSTRACT ALGEBRA	40	13	10	4	50	17	150	50		
	BSCCIY-2021B)		Paper-II	ADVANCED CALCULUS	40	13	10	4	50	17				
	BSCCIY-2021C)		Paper-III	DIFFERENTIAL EQUATION	40	13	10	4	50	17				
	FCIY-2011A)		Paper-I	MORAL VALUE AND LANGUAGE	80	26	20	8	100	17				
	FCIY-2011B)	FOUNDATION COURSE	Paper-II	ENVIRONMENT STUDIES	80	26	20	8	100	17	100	33		
	TOTAL		440		110		550		100				650	

(Signature)
 SEHORA
 SRI SATYA SAI UNIVERSITY
 SHORE (M.P.)

(Signature)
 Sri Satya Sai University of Technology & Medical Sciences, Shore (M.P.)



University of Technology & Medical Sciences, Sehore (M.P.)

ANNUAL SCHEME

Scheme of Examination 2018-19

Second Year - Bachelor of Science (MICROBIOLOGY)

BSC - IInd Year MICROBIOLOGY

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory				Total		Practical		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
I st Year	BSCMBI(Y-201A)	CHEMISTRY	Paper-I	PHYSICAL CHEMISTRY	20	10	5	2	34	12				
	BSCMBI(Y-201B)		Paper-II	INORGANIC CHEMISTRY	28	10	5	2	33	12	50	17	150	50
	BSCMBI(Y-201C)		Paper-III	ORGANIC CHEMISTRY	28	10	5	2	33	12				
I st Year	BSCMBI(Y-201A)	BOTANY	Paper-I	STRUCTURE DEVELOPMENT AND REPRODUCTION OF FLOWERING PLANTS	40	13	10	4	50	17				
	BSCMBI(Y-201B)		Paper-II	PLANT ECOLOGY BIODIVERSITY & PHYTOGEOGRAPHY	40	13	10	4	50	17	50	17	150	50
	BSCMBI(Y-201A)		Paper-I	BIO-CHEMISTRY AND MICROBIAL PHYSIOLOGY	40	13	10	4	50	17				
I st Year	BSCMBI(Y-203A)	MICROBIOLOGY	Paper-II	MICROBIAL GENETICS AND MOLECULAR BIOLOGY	40	13	10	4	50	17	50	17	150	50
	BSCMBI(Y-203B)		Paper-I	MORAL VALUE AND LANGUAGE-II	80	26	20	8	100	33				
	FCI(Y-204A)		Paper-II	ENVIRONMENTAL STUDIES	80	26	20	8	100	33				
	FCI(Y-204B)	FOUNDATION COURSE	Paper-II											
TOTAL					405		95		500		150		650	

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FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-I (PHYSICAL CHEMISTRY)

CODE- BSCMB(Y- 201A)

UNIT-I

Thermodynamics: Definition of thermodynamics, First Law of Thermodynamics, Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamic scale of temperature, Concept of entropy : entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium, Entropy change in ideal gases and mixing of gases. Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions : Gibbs function (G) and Helmholtz function (Z) as thermodynamic quantities, ΔG as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change.

Thermochemistry: standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant

UNIT-II

Phase Equilibrium : Statement and meaning of the terms - phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system - water, CO₂ and S systems. Phase equilibria of two component system - solid -liquid equilibria, simple eutectic - Bi-Cd, Pb-Ag systems, desilverisation of lead.

Solid solutions - compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H₂O), FeCl₃-H₂O) and CuSO₄-H₂O) system. Freezing mixture acetone-dry ice.

Liquid - liquid mixtures - Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system-azeotropes - HCl-H₂O and ethanol - water systems.

Partially miscible liquids - Phenol-water, trimethylamine-water, nicotine-water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst distribution law - thermodynamic derivation, applications.

UNIT-III

Electrochemistry - I : Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.

UNIT-IV

Electrochemistry - II : Types of reversible electrodes - gas - metal ion, metal-metal ion, metal - insoluble salt - anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes- standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), polarization, over potential and hydrogen overvoltage. Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations. Definition of pH and pKa determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.

Buffers - mechanism of buffer action, Henderson - Hazel equation, Hydrolysis of salts, Corrosion - types, theories and methods of combating it

UNIT-V

Surface Chemistry: Adsorption, adsorption and adsorption, types of Adsorption. Adsorption of gases and Liquids in solid adsorption, Freundlich and Langmuir adsorption isotherms surface area and determination of the surface area.

Catalysis: Characteristics of Catalyzed reactions, classification of Catalysis, application of Catalysis.

Suggested Readings:

1. **ADVANCED PHYSICAL CHEMISTRY, Gurdeep Raj, 2014.**

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-II (INORGANIC CHEMISTRY)

CODE- BSCMB(Y- 201B)

UNIT-I

Chemistry of Elements of First Transition Series: Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT-II

Chemistry of Elements of Second and Third Transition Series: General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

UNIT-III

Oxidation and Reduction: Use of redox potential data-analysis of redox cycle, redox stability in water - Frost, Latimer and Pourbeix diagrams. Principles involved in the extraction of the elements.

Coordination Compounds: Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

UNIT-IV

Chemistry of Lanthanide Elements: Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

Chemistry of Actinides: General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides.

UNIT-V

Acids and Bases: Arrhenius, Brunsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Non-aqueous Solvents : Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2

Suggested Readings:

1. A Text-Book Inorganic Chemistry, G. S. Newth
2. Physical Inorganic Chemistry: A Coordination Chemistry Approach, 1996, S.F.A. Kettle
3. Industrial Inorganic Chemistry, Werner Büchner



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-III (ORGANIC CHEMISTRY)

CODE- BSCMB(Y- 201C)

UNIT-I

Electromagnetic Spectrum : Absorption Spectra Ultraviolet (UV) absorption spectroscopy - absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transition, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infrared (IR) absorption spectroscopy--molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

UNIT-II

Alcohols: Classification and nomenclature. Monohydric alcohols – nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.

Dihydric alcohols -- nomenclature, methods of formation. chemical reactions of vicinal glycols, oxidative cleavage [$\text{Pb}(\text{OAc})_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric alcohols – nomenclature and methods of formation, chemical reactions of glycerol.

Phenols: Nomenclature. structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols --electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

UNIT-III

Aldehydes and Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1, 3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolf f-Kishner, LiAlH_4 and NaBH_4 reductions. Halogenation of enolizable ketones. An introduction to α, β unsaturated aldehydes and ketones.



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

UNIT-IV

Carboxylic Acids : Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.

UNIT-V

Organic Compounds of Nitrogen: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid. Halonitroarenes : reactivity. Structure and nomenclature of amines, physical properties. Stereo chemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salt as phase-transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction. Hofmann bromoamide reaction. Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

Suggested Readings:

1. **ORGANIC CHEMISTRY, VOL. I - DR. SULTANAT**
2. **Advanced Organic Chemistry, Vol IV - S.P. Bhutani**
3. **TEXTBOOK OF ORGANIC CHEMISTRY, VOL.III - V. K. AHLUWALIA**

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR
CHEMISTRY (PRACTICAL)

Inorganic Chemistry

- Analysis of inorganic mixture containing five radicals with at least one interfering radical.
- Determination of acetic acid in commercial vinegar using NaOH
- Redox titrations
- Estimation of hardness of water by EDTA.

Physical Chemistry Determination of transition temperature of given substance by thermometric method.

- To determine the enthalpy of neutralization of strong acid, strong base.
- Verification of Beer's- Lambert law.
- To study the phase diagram of two component system by cooling curve method.

Organic Chemistry (Any Two)

- Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.
- Use of paper chromatography/ Thin layer chromatography: determination of R_f Values, separation and identification of organic compounds.
- a) Separation of green leaf pigments (Spinach leave may be used)
- b) Separation of dyes.


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SUBJECT- BOTANY



FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR
PAPER-I (STRUCTURE DEVELOPMENT AND REPRODUCTION OF
FLOWERING PLANTS)
CODE- BSCMB(Y- 202A)

UNIT I

Tissue system- Types of Vascular bundles, Apical meristems, classification of meristems, The root system root apical meristem, anatomy of monocot and dicot root.

UNIT II

Shoot system, monocot systems of vascular cambium and their functions, heart and sap wood, sec. growth in nycotianthus, dracaena , leptadenia, bobravia, salvadora.

UNIT III

Leaf system- Origin and development of leaf, diversity in size, arrangement and shape, internal structure of mono and dicot leaf. adaptation to photosynthesis and water stress, senescence ,abscission.

UNIT IV

Embryology: concept of flower as a modified shoot, structure of anther, microsporogenesis, megasporogenesis, gametophyte and its types, pollination –mechanism and agencies, pollen pistil interaction and self incompatibility.

UNIT V

Embryology : Double fertilization, development and types of endosperm, development of embryo in monocot and dicot plants, fruit development and maturation ,seed structure and dispersal, Mode of vegetative propagation

Suggested reading;

1. Gangulce, H.C, Das, K.s , College Botany- central bno; agency
2. Singh, v. , Pande P.C & Jain- Structure and dev in angiosperms
3. Maheswarl, P- Plant Embryology

SUBJECT- BOTANY

PAPER-II (PLANT ECOLOGY BIODIVERSITY & PHYTOGEOGRAPHY)



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

CODE- BSCMB(Y- 202B)

UNIT I

Ecosystems-Structure and types ,biotic and abiotic concept, Trophic levels, food chain, food web, ecological pyramids, biogeo chemical cycles- carbon,nitrogen,sulphur

UNIT II

Ecological adaptations- Morphological and anatomical adaptations, physiological responses water, adaptation (hydrophyte and xerophytes) temp. adaptation (thermoperiodism,vernalization)light adaptation (photoperiodism) succession, types of succession- hydroxere, xerosere.

UNIT III

Biodiversity and Population ecology – Distribution pattern, Density, natality, mortality, growth curves, ecotypes, ecads, community ecology, biodiversity conservation, ex situ and in situ conservation, national parks and sanctuaries of mp , Red data book

UNIT IV

Soil and pollution- physical and chemical properties of soil, soil formation and development, soil profile ,soil classification, composition, pollution types-causes, global warming, acid rain, climate change, ozone hole and ozone layer.

UNIT V

Phytogeography- phytogeographical regions of india,vegetation types of M.P.. National parks and sanctuaries of M.P,NATURAL RESOURCES and types, conservation of natural resources, Land resource management, water and wet resource management.

Suggested readings :

- 1 kumar, v.k, Bio diversity conservation, agrobotanica, Rikater
- 2 P.D. Sharma, Ecology and Environment, Rastogi Publication


Head, Department
Faculty of Science and Computer Science
& Medical Sciences, Sehore (M.P.)

SUBJECT- BOTANY

PRACTICAL



Section cutting- Root/stem/leaf - 10

on ecology- 10

Exercise based on phylogeography/national parks- 05

Sporting-05 Embryology-anther/ovule/placentation-05

Exercise based

VIVAVOICE- 05

Sessional-05

SUBJECT- MICROBIOLOGY

PAPER-I (BIO CHEMISTRY AND MICROBIAL PHYSIOLOGYS)

CODE- BSCMB(Y- 203A)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

UNIT-I

Gen properties, classification and function of carbohydrate, lipids, proteins, GEN properties and classification of enzyme, factors affecting enzyme activity.

UNIT-II

Growth and measurement of growth, mathematical expression of growth, growth yield, growth curve, factors affecting, effect of nutrient, temp, oxygen, Ph.

UNIT-III

Energy production in aerobic and anaerobic process, glycolysis, PPP,ENTER Duodoroff pathway, fermentation, glycolse fermentation in E .COLI,TCA cycle, glyoxylate cycle

UNIT-IV

Utilization of energy, methods of studying microbial bio synthesis, assimilation of ammonia, nitrogen and sulphate utilization of energy in non bio synthetic and bio synthetic process ,diffusion, osmosis, plasmolysis

UNIT-V

Energy production by photosynthesis, photo chemical reaction, cyclic and non cyclic photophosphorylation, role of reducing power in metabolism, ETC concept

Suggested Reading:

SUBJECT- MICROBIOLOGY

PAPER-II (MICROBIAL GENETICS AND MOLECULAR BIOLOGY)

CODE- BSCMB(Y- 203B)

UNIT-I

Structure and genetic material of microbes, nucleic acid as a genetic material, physical and chemical structure and different forms of DNA, melting curve of DNA, Tm value, types of RNA, m RNA, Rna, Tma, gene structure and function.

UNIT-II

Types of DNA replication. DNA replication in prokaryotes and eukaryotes, semiconservative, conservative and dispersive mode of replication.

Mechanism of replication, meselson and stahl experiment, DNA topology, super coiling of DNA AND linking number, enzyme involved in replication of DNA

UNIT-III

Basic features of genetic code, Wobble hypothesis, poly cristic RNA, overlapping genes, gene translocation, ribosomes and role in protein synthesis, Tma initiation, elongation and termination of protein synthesis in prokaryotes..

UNIT-IV

Genetic recombination in bacteria, transformation, conjugation, Ffactor. Hfr strains ,plasmids and binary vectors ,transposons ,use of bacteria and virus in genetic engineering

UNIT V

DNA mutation and repair, Types of mutation evidence of spontaneous nature of mutation ,fluctuation, new combs experiment, replica testing, mode of action of physical, chemical, and biological mutagens-uv rays, nitrous acid, 5 bromo uracil, EMS

Suggested Reading:

1. Text book of Microbiology –Dubey, h.c, and maheswari, S. Chand & comp
2. Elementary microbiology- Modi, H.A, Ekta prakashan

Practical

1. To determine the ph. of solution
2. To prepare buffer solution

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

3. Qualitative analysis of amino acid – ninhydrine test, biuret test
4. Study conjugation in bacteria
5. Estimate of protein-folin lowry method


Professor
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Sri Satya Sai University of Technology
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FOUNDATION COURSE (MORAL VALUE AND LANGUAGE-II)

Code: FC(Y--204A)

UNIT-I

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

हिन्दी भाषा:

1. वह लोडनी पत्त धर कविता - (सूर्यकांत त्रिपाठी निराला)
2. दिमागी गुलामी निबंध - (राहुल सांकृत मायन)
3. छणी -विचार) स वर -वु यंजन, वर्गीकरण, उच्च कारण रु धान

UNIT-II

हिन्दी भाषा

1. नापित व का अभिशाप निबंध - (म हादेवी वर्मा)
2. चौफ की दावत कहानी - (भीष्म म साहनी)
3. विराम चिन् ह) -संकलित(

UNIT-III

हिन्दी भाषा: नैतिक मूल्य

1. शिकागो ट याद यान)वु याखु धान - (सु वामी त्रिवेकानंद)
2. धर्म और राष्ट्रवाद) -लेख (महर्षि अरविन्दु द)
3. सादगी)अत् मरुधर -(महात् मा गांधी)
4. चित त जहाँ भय शून य)कविता -(रवीन्दु दनाथ टैगोर)

UNIT IV

English:

1. Tree: Tina Morris
2. Night of the Scorpion : Nissim Ezekiel
3. Idgah : Premchand (translated by Khushwant singh)
4. Letter to God : G.L. Swatch (translated by Donald a Yates)
5. My Bank Account : Stephen Leacock
6. God sees the Truth but waits : Leo Tolstoy

UNIT V

English:

1. Short Essay on given topics
2. Correspondence skills (format & Informal letters and Application)
3. Translation of sentences/passage English to Hindi and Hindi to English.

Suggested Readings: Madhya Pradesh Hindi grant academy, Bhopal published book.



FOUNDATION COURSE (ENVIRONMENTAL STUDIES)

Code: FC(Y-204B)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MICROBIOLOGY) SECOND YEAR

UNIT I

Study of Environment and ecology: Definition and Importance of Environment and Ecology, Public participation and Public awareness.

UNIT II

Environmental Pollution : Air Pollution, water Pollution, noise Pollution, heat and nuclear pollution- Definition, Causes, effect and prevention of pollution. Disaster management – Flood, Earthquake, cyclones and landslides.

UNIT III

Environment and social problems: Sustainable development- Introduction, Energy problems of cities, solar energy, biogas and wind energy, Water conservation – rain-water harvesting.

UNIT IV

Role of mankind in conserving natural resources: Food resources – World food problem , Energy resources – increasing demand for energy.

UNIT V

Environment conservation laws: Conservation laws for air and water pollution, Wildlife conservation laws, Role of information technology in protecting environment & health.

Suggested Readings:

- Madhya Pradesh Hindi grant academy, Bhopal published book.



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-I (PHYSICAL CHEMISTRY)

CODE- BSCM(Y- 201A)

UNIT-I

Thermodynamics: Definition of thermodynamics, First Law of Thermodynamics, Second Law of Thermodynamics; Need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of entropy : entropy as a state function, entropy as a function of V & T , entropy as a function of P & T , entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions ; Gibbs function (G) and Helmholtz function (Z) as thermodynamic quantities. A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change.

Thermochemistry: standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant

UNIT-II

Phase Equilibrium : Statement and meaning of the terms - phase, component and degree of freedom, derivation of Gibbs phase rule. phase equilibria of one component system - water, CO_2 and S systems. Phase equilibria of two component system - solid -liquid equilibria, simple eutectic - Bi-Cd, Pb-Ag systems, desilverisation of lead.

Solid solutions - compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl- H_2O), $FeCl_3$ - H_2O) and $CuSO_4$ - $11H_2O$) system. Freezing mixture, acetone-dry ice.

Liquid - liquid mixtures - Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system-azeotropes - HCl - H_2O and ethanol - water systems.

Partially miscible liquids - Phenol-water, trimethylamine-water, nicotine-water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst distribution law - thermodynamic derivation, applications.

UNIT-III

Electrochemistry - I : Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.



Signature
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UNIT-IV

Electrochemistry - II : Types of reversible electrodes - gas - metal ion, metal-metal ion, metal - insoluble salt - anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes- standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), polarization, over potential and hydrogen overvoltage. Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations. Definition of pH and pK_a determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.

Buffers - mechanism of buffer action, Henderson - Hazel equation. Hydrolysis of salts. Corrosion - types, theories and methods of combating it

UNIT-V

Surface Chemistry: Adsorption, desorption and absorption, types of Adsorption, Adsorption of gases and Liquids in solid adsorption, Freundlich and Langmuir adsorption isotherms surface area and determination of the surface area.

Catalysts: Characteristics of Catalyzed reactions, classification of Catalysis, application of Catalysis.

Suggested Readings:

1. ADVANCED PHYSICAL CHEMISTRY, Gurdeep Raj, 2014.



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-II (INORGANIC CHEMISTRY)

CODE- BSCM(Y- 201B)

UNIT-I

Chemistry of Elements of First Transition Series: Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT-II

Chemistry of Elements of Second and Third Transition Series: General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

UNIT-III

Oxidation and Reduction: Use of redox potential data-analysis of redox cycle, redox stability in water - Frost, Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements.

Coordination Compounds: Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

UNIT-IV

Chemistry of Lanthanide Elements: Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

Chemistry of Actinides: General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides.

UNIT-V

Acids and Bases: Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Non-aqueous Solvents : Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2

Suggested Readings:

1. A Text-Book Inorganic Chemistry, G. S. Newth
2. Physical Inorganic Chemistry: A Coordination Chemistry Approach, 1996, S.F.A. Kettle
3. Industrial Inorganic Chemistry, Werner Büchner

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-III (ORGANIC CHEMISTRY)

CODE- BSCM(Y- 201C)

UNIT-I

Electromagnetic Spectrum : Absorption Spectra Ultraviolet (UV) absorption spectroscopy - absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transition, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infrared (IR) absorption spectroscopy--molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

UNIT-II

Alcohols: Classification and nomenclature. Monohydric alcohols -- nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.

Dihydric alcohols -- nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)₂ and HIO₄] and pinacol-pinacolone rearrangement. Trihydric alcohols -- nomenclature and methods of formation, chemical reactions of glycerol.

Phenols: Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols --electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

UNIT-III

Aldehydes and Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1, 3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolf f-Kishner, LiAlH₄and NaBH₄reductions. Halogenation of enolizable ketones. An introduction to α, β unsaturated aldehydes and ketones.

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

UNIT-IV

Carboxylic Acids : Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids: Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.

UNIT-V

Organic Compounds of Nitrogen: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid. Halonitroarenes : reactivity. Structure and nomenclature of amines, physical properties. Stereo chemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salt as phase-transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction. Hofmann bromoamide reaction. Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

Suggested Readings:

1. ORGANIC CHEMISTRY, VOL. I - DR. SULTANAT
2. ADVANCED ORGANIC CHEMISTRY, VOL. IV - S.P. BHUTANI
3. TEXTBOOK OF ORGANIC CHEMISTRY, VOL.III - V. K. AHLUWALIA



CHEMISTRY (PRACTICAL)

Inorganic Chemistry

- Analysis of inorganic mixture containing five radicals with at least one interfering radical.
- Determination of acetic acid in commercial vinegar using NaOH
- Redox titrations
- Estimation of hardness of water by EDTA.

Physical Chemistry Determination of transition temperature of given substance by thermometric method.

- To determine the enthalpy of neutralization of strong acid, strong base.
- Verification of Beer's- Lambert law.
- To study the phase diagram of two component system by cooling curve method.

Organic Chemistry (Any Two)

- Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.
- Use of paper chromatography/ Thin layer chromatography: determination of R_F Values, separation and identification of organic compounds.
 - a) Separation of green leaf pigments (Spinach leave may be used)
 - b) Separation of dyes.



SUBJECT- PHYSICS

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

PAPER-I (OPTICS)

CODE- BSCM(Y- 202A)

UNIT I

Geometrical optics:

Reflection and refraction, Fermat's principle, Refraction at a spherical surface, aplanatic points and its applications, Lens formula, Combination of thin lenses and equivalent focal length, Dispersion and dispersive power, chromatic aberration and achromatic combination, different types of aberration (Qualitative) and their remedy, Need for multiple lenses in eyepieces, Ramsden and Huygens eye-piece.

UNIT II

Interference of light:

The principle of superposition two slit interference, coherence requirement for the sources, optical path reardations, lateral shift of fringes, Rayleigh refractometer and other applications, localized fringes, thin films, Interference by a film with two non-parallel reflecting surfaces. Newton's rings, Haidinger fringes (Fringes of equal inclination), Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines, Intensity distribution in multiple beam interference, Fabry - Perot interferometer and Etalon.

UNIT III

Diffraction:

Fresnel's theory of half period zone. Diffraction at straight edge, Rectilinear propagation. Diffraction at a slit, phasor diagram and integral calculus methods. Diffraction at a circular aperture and a circular disc, Rayleigh criterion of resolution of images. Resolving power of telescope and microscope. Outline of phase contrast microscopy. Diffraction at N-parallel slits, Intensity distribution, plane diffraction grating, Resolving power of a grating and comparison with resolving power of prism and of a Fabry Perot etalon.

UNIT IV

Polarization:

Transverse nature of light waves. Polarization of electromagnetic waves, Plane polarized light - production and analysis, Description of linear, circular and elliptical polarization Propagation of electromagnetic waves in anisotropic media, uniaxial and biaxial crystals, and symmetric nature of dielectric tensor, Double refraction, and Hagen's principle, Ordinary and extraordinary refractive indices, Fresnel's formula, light propagation in uniaxial crystal, Nicol prism, Production of circularly and elliptically polarized light, Babinet compensator and applications, optical rotation, optical rotation in liquids and its measurement through polarimeter.

UNIT V



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FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

Laser and photo sensors:

A brief history of laser. Characteristics of laser light. Einstein prediction, Relationship between Einstein's coefficients (Qualitative discussion). Pumping schemes. Resonators, Ruby laser. He-Ne laser. Applications of laser. Principle of holography. Photodiodes, Phototransistors and photomultipliers.

SUGGESTED READING;

- **FUNDAMENTAL OF OPTICS: F.A. JENKINS AND H.E. WHITE. 1976 MC GRAW HILL.**
- **PRINCIPLES OD OPTICS: B. K. MATHUR 1995 GOPAL PRINTING**



SUBJECT- PHYSICS

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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

PAPER-II (ELECTRO-STATICS, MAGNETO STATICS AND ELECTRODYNAMICS)

CODE- BSCM(Y- 202B)

UNIT I

Electrostatics: Coulombs law in vacuum expressed in vector forms. Calculations of electric field E for simple distributions of charge at rest, dipole and quadruple fields. Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between electric field and electric potential ($E = -\nabla V$), torque on a dipole in a uniform electric field and its energy. Flux of the electric field. Gauss's law and its application for finding E for symmetric charge distributions. Capacitors. Conducting sphere in a uniform electric field. Point charge in front of a grounded infinite conductor. Dielectric parallel plate capacitor with a dielectric. Dielectric constant. Polarization and polarization vector P . Relation between displacement vector D , E and P molecular interpretation of claussius – mossotti equation.

UNIT II

Magneto statics: Force on a moving charge. Lorentz force equation and definition of B , force on a straight conductor carrying current in a uniform magnetic field. Torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio. Biot and savart's law, calculation of H for simple geometrical situations such as solenoid, Anchor ring. Ampere's law, $\nabla \times V = \mu_0 J$, $\nabla \cdot B = 0$. Field due to magnetic dipole, free and bound currents. Magnetization vector (M), relationship between B , H and M . derivation of the relation $\nabla \times M = J$ for non-uniform magnetization.

UNIT III

Current Electricity and Bio electricity: Steady current, current density J , non-stedy currents and continuity equation, Kirchhoff's laws and analysis of multiloop circuits growth and decay of current in LR and CR circuits. Decay constants, LCR circuits, AC circuits, complex numbers and their applications in solving AC circuits problems, complex impedance and reactance, series and parallel resonance, Q-factor, power consumed by an AC circuit, power factor, Y and Δ networks and transmission of electric power, Electricity observed in living systems, origin of bioelectricity.

UNIT IV

Motion of charged particles in Electric and magnetic fields: (Note: The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved.)

E as an accelerating field, electron gun, discharge tube, linear accelerator, E as deflecting velocity selector, Curvatures of tracks for energy determination for nuclear, Mass spectrograph and principle and working of cyclotron. Mutually perpendicular and parallel E & B fields positive ray parabolas, discovery of isotopes. Elements of Mass spectrographs. Principle of magnetic focusing (lenses).



FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

UNIT V

Electrodynamics: Electromagnetic induction, Faraday's Laws, Electromotive force, Integral and differential forms of Faraday's laws, Self and mutual inductance, Transformers, Energy in a static magnetic field, Maxwell's displacement current, Derivations of Maxwell's equations, Electromagnetic field energy density, Poynting vector, electromagnetic wave equation, Plane electromagnetic waves in vacuum and dielectric media, Reflection at a plane boundary of dielectrics, Fresnel's Laws, Polarization by reflection and total internal reflection, Waves in a conducting medium, Reflection and refraction by the ionosphere.

SUGGESTED READINGS :

- **PHYSICS VOLUME 2: D. HALLIDAY AND R. RESNICK**
- **INTRODUCTION TO ELECTRODYNAMICS : D. J. GRIFFITHS, 4th EDITION**
PRINTICE HALL



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Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

SUBJECT- PHYSICS
PRACTICAL

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Use of plane diffraction grating to determine D_1 , D_2 lines of sodium lamp.
4. Resolving power of telescope.
5. Polarization by reflection and verification of Brewster's law.
6. Study of optical rotation in sugar solution.
7. Refractive index and dispersive power of prism using spectrometer.
8. Absorption spectrum of material using constant deviation spectrograph.
9. Beam divergence of He-Ne laser.
10. Determination of wavelength of laser by diffraction.
11. Determination of radius of curvature of Plano-convex lens by Newton's rings.
12. Characteristics of Ballistic galvanometer.
13. Setting up and using an electroscopes or electrometer.
14. Measurement of low resistance by Carey-Foster bridge or otherwise.
15. Measurement of inductance using impedance at different frequencies.
16. Measurement of capacitance using impedance at different frequencies.
17. Response curve for LCR circuits and resonance frequencies.
18. Sensitivity of cathode-ray oscilloscope.
19. Use of a vibration magnetometer to study a field.
20. Study of magnetic field due to current using tangent galvanometer.
21. Study of decay of currents in LR and RC circuits.
22. Study of Lissajous figures using CRO.
23. Verification of network theorems.




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Medical Sciences, Sehore (M.P.)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

SUBJECT- MATHEMATICS

PAPER-I (ABSTRACT ALGEBRA)

CODE- BSCM(Y- 203A)

UNIT - I

Definition and basic properties of groups. Subgroups. Subgroups generated by a subset, Cyclic groups and simple properties.

UNIT-II

Coset decomposition, Lagrange's theorem and its corollaries including Fermat's theorem, Normal subgroups, Quotient groups.

UNIT -III

Homomorphism and Isomorphism of groups. Fundamental theorem of homomorphism. Transformation and Permutation group. S_n (various subgroups of $S_n, n < 5$ to be studied). Cayley's theorem

UNIT - IV

Group Automorphism. Inner Automorphism. Group of Automorphisms. Conjugacy relation and Centraliser. Normaliser. Counting principle and class equation of a finite group. Cauchy's theorem for finite abelian groups and non-abelian groups.

UNIT -V

definition and basic properties of rings. Ring homomorphism subrings, Ideals and Quotient rings. Polynomial rings & its properties. Integral domain and Field.

Suggested Reading:

1. I.N. Herstein- Topics In Algebra Wiley Eastern Ltd. New Delhi. 1977.
2. PB Bhattacharya, S.K. Jain and S R Nappaul - Basic Abstract Algebra. Wiley Eastern. New Delhi.1977

Reference Books:

1. Shantinarayan- A text Book of Modern Abstract Algebra, S. Chand and Company. New Delhi.
2. Surjeet Singh - A Text Book of Modern Algebra.

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (MATHEMATICS) SECOND YEAR
SUBJECT- MATHEMATICS
PAPER-II (ADVANCED CALCULUS)
CODE- BSCM(Y- 203B)

UNIT- I

Definition of a sequence. Theorem on limits of sequence. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison test. Cauchy's integral test. Cauchy's root test. Ratio tests, Raabe's tests. Logarithmic test. Alternating series. Leibnitz's test. Absolute and conditional convergence.

UNIT-II

Continuity of function of single variable, Sequential continuity, Properties of continuous functions. Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives.

UNIT -III

Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

UNIT-IV

Envelopes, Evolutes, Maxima and Minima of functions of two variables. Lagrange's multiplier method. Beta and Gamma Functions.

UNIT - V

Double and triple integrals. Volumes and surfaces of solids of revolution Dirichlet's integrals. Change of order of integration in double integrals.

Suggested Reading:

1. R.R. Goldberg- Real Analysis, Oxford & I.R.H. Publishing co, New Delhi
2. Gorakh Prasad- Differential Calculus. Pothishala Pvt. Ltd Allahabad.
3. Gorakh Prasad- Integral Calculus. Pothishala Pvt. Ltd. Allahabad.

Reference Books:

1. Gabriel Klaumber - Mathematical Analysis. Marcel Dekker, Inc, New York, 1975
2. T.M. Apostol- Mathematical Analysis. Narosa Publishing House, New Delhi, 1985

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

SUBJECT- MATHEMATICS

PAPER-III (DIFFERENTIAL EQUATION)

CODE- BSCM(Y- 203C)

UNIT-I

Series solutions of differential equations. Power series method. Bessel and Legendre equations. Bessel's and Legendre's functions and their properties- recurrence and generating function. Orthogonality of functions.

UNIT-II

Laplace Transformation. Linearity of the Laplace transformation. Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms.

UNIT-III

Inverse Laplace transforms. Convolution theorem. Application of Laplace transformation in Solving linear differential equations with constant coefficients.

UNIT-IV

Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method.

UNIT-V

Partial differential equations of second and higher orders. Classification of partial differential equations of second order. Homogeneous and non-homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients.

Text Books:

1. Sharma and Gupta- Integral Transform. Pragati Prakashan Meerut.
2. Sharma and Gupta- Differential Equation. Pragati Prakashan Meerut.
3. Ray Singhania-Differential Equation. Pragati Prakashan Meerut.

Reference Book:

1. D.A. Murray- Introductory course in differential equation, Orient Longman, India 1967
2. G.F. Simmons – Differential Equations, Tata McGraw Hill, 1972.
3. E.A. Coddington – An introduction to Ordinary differential equations, Prentice Hall of India, 1961

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (MATHEMATICS) SECOND YEAR
FOUNDATION COURSE (MORAL VALUE AND LANGUAGE-II)
Code: FC(Y--204A)

UNIT-I

हिन्दी भाषा:

1. वह तोड़ती पर धर)कविता - (सूर्यकांत त्रिपाठी निराला
2. दिमागी गुलामी)निबंध - (राहुल सांकृत याचन
3. वणी -विचार) स वर न्व यंजन, वर्गीकरण, उच्च चरण र धान

UNIT-II

हिन्दी भाषा

1. नारीत व का अशिक्षाप)निबंध - (म हाटेवी वर्मा
2. चीफ की दावत)कहानी - (श्रीम म साहनी
3. विराम पित ह) -संकलित(

UNIT-III

हिन्दी भाषा, नैतिक मूल य

1. शिखरी व याह यान)व याह यान - (स वामी विवेकानंद
2. धर्म और राष्ट्र द्वाद) -लेख (महर्षि अरविन्द
3. सादगी)आत् मक्या -(महात् मा गांधी
4. चित्त त जहां मय शून य)कविता -(रवीन् दनाथ टैगोर

UNIT IV

English:

1. Tree: Tina Morris
2. Night of the Scorpion : Nissim Ezekiel
3. Idgah : Premchand (translated by Khushwant singh
4. Letter to God : G.L. Swarth (translated by Donald • Yates
5. My Bank Account : Stephen Leacock
6. God sees the Truth but waits : Leo Tolstoy

UNIT V

English:

1. Short Essay on given topics
2. Correspondence skills (formal & Informal letters and Application)
3. Translation of sentences/passage English to Hindi and Hindi to English.

Suggested Readings: Madhya Pradesh Hindi grant academy, Bhopal published book.

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (MATHEMATICS) SECOND YEAR

FOUNDATION COURSE (ENVIRONMENTAL STUDIES)

Code: FC(Y-204B)

UNIT I

Study of Environment and ecology: Definition and Importance of Environment and Ecology, Public participation and Public awareness.

UNIT II

Environmental Pollution : Air Pollution, water Pollution, noise Pollution, heat and nuclear pollution- Definition, Causes, effect and prevention of pollution, Disaster management – Flood, Earthquake, cyclones and landslides.

UNIT III

Environment and social problems: Sustainable development- Introduction, Energy problems of cities, solar energy, biogas and wind energy, Water conservation – rain-water harvesting.

UNIT IV

Role of mankind in conserving natural resources: Food resources – World food problem , Energy resources – increasing demand for energy.

UNIT V

Environment conservation laws: Conservation laws for air and water pollution, Wildlife conservation laws, Role of information technology in protecting environment & health.

Suggested Readings:

- Madhya Pradesh Hindi grant academy, Bhopal published book.



FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
OBJECT ORIENTED PROGRAMMING USING C++
CODE- BSCC(Y- 201A)

UNIT I

Principles of OOPS, procedure oriented programming vs. object oriented programming, basic concepts, advantages, application of OOPS, object oriented languages. Beginning with C++: What is C++, structure of C++ program, creating, compiling, linking & executing a C++ program, Tokens, expressions & control structures, keywords, identifiers, basic data types, user-defined data types, derived data types, symbolic constants, type compatibility, variable declaration, dynamic initialization of variables, reference variables.

UNIT II

Operators in C++: scope resolution operator, memory management operators, manipulators, type cast operators, operators, operator precedence, control structures. Functions in C++: _Main function, function prototyping, call by reference vs. call by value, inline functions, default arguments, const arguments, function overloading, friend functions. Classes and objects: specifying a class, defining member functions, making an outside functions inline, private member function; array within a class, memory allocation for object; static data members, static member functions, array of objects, objects as function arguments, returning objects.

UNIT III

Constructors and Destructors: Constructors, Parametric Constructors, Multiple Constructors in a class, constructors with default arguments. Dynamic initialization of objects, copy constructors, dynamic constructors, destructors. Operator Overloading & Type Conversions: Definition of Overloading, & Operator Overloading, rules for Overloading Operators, Overloading Unary Operators; Binary Operators, Binary Operators using Friends.

UNIT IV

Inheritance: defining derived classes, single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, virtual base class, abstract classes, constructors in derived classes, member class, nesting of class.

UNIT V

Pointers, virtual functions and polymorphism, pointers to objects, this pointer, pointers to derived class, pure virtual functions, exception handling in C++, managing console I/O operations, working with files (open, close, basic read-write operations on files).

BOOKS:

1. Object Oriented Programming with C++ by E. Balagurusamy.
2. Programming In C++ by Robert Lafore
3. C++ - The complete Reference - by Herbert Schildt (TMH)



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FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
OBJECT ORIENTED PROGRAMMING USING C++
PRACTICAL

1. Write a program to convert decimal (integer) number into equivalent binary number.
2. Write a program to print Fibonacci series.
3. Write a program to find factorial of a given number using recursion.
4. Write a program to swap the contents of two variables with functions value parameters, address parameters and pointer parameters.
5. Write a program to check given string is palindrome or not.
6. Write a max function which accepts two numbers and find the maximum of two numbers. The two given numbers can be integer, float, or double so that the functions may call the overloaded functions.
7. Write a program to perform multiplications of two matrices.
8. Write a program to design a class distance with feet and inches as data members. Use a data function to set and show the distance.
9. Write a program to design a class with length and height as data member. Use a data function to get value of length and height from the keyboard and display area of right angle triangle.
10. Write a program to overload the binary operator to add two complex numbers.
11. Write a program to find the area and volume of a rectangular box using constructor.
12. Write a program to design a class time with hours, minutes and seconds as data members. Use a data function to perform the addition of two times objects in hours, minutes and seconds.
13. Write a program to implement single inheritance.



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FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
DATA STRUCTURE AND ALGORITHMS

CODE- BSCC(Y- 201B)

UNIT-I

Basic concepts and notations: Types of data structures, Data structure operations, Algorithmic complexity, Big 'O' notation, Arrays: Linear array, representation of single dimensional & multi dimensional array in memory, address calculation of single dimensional & multi dimensional array in memory, traversing 1 linear array, insertion and deletion in an array, Two-dimensional array, applications of Array.

UNIT-II

Stacks: Representation of stacks in memory (linked and sequential), operations on stacks, Applications of Stacks infix & Postfix expression, postfix expression evaluation. Queues: Representation of queues in memory (linked and sequential) circular queue, DE queue, priority queue, operations on queues: insertion, deletion from queue, application of Queue.

UNIT-III

Linked list: single and doubly linked list, description and operations on single and doubly linked list, Linked representation of stack and queue.

UNIT-IV

Trees: Definition and basic concepts, binary tree, Binary search tree, Operation on binary tree: insertion & deletion, binary tree traversal: in order, preorder & post order, Binary search tree, searching, insertion and deletion in binary search tree.

UNIT-V

Searching and sorting algorithms: Linear and binary search, bubble sort, insertion sort, selection sort, quick sort, merge sort, Graphs: Related concepts and its representations, Graph traversal Schemes: Depth First Search (DFS), Breadth First Search(BFS).

Suggested Reference Books:

1. Data Structure by Schaum Series
2. Data Structure by Tanenbaum
3. Data Structure using C++ by YashvantKumar



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& Medical Sciences, Sehore (M.P.)

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
DATA STRUCTURE AND ALGORITHMS
PRACTICAL

1. Write a program to traverse an array.
2. Write a program to insert item at k^{th} position in an array.
3. Write a program to delete k^{th} position item from array.
4. Write a program to push and pop operations on a stack using array.
5. Write a program to insert and delete operation on a queue using array.
6. Write a program for selection sort.
7. Write a program for bubble sort.
8. Write a program for linear (sequential) Search.
9. Write a program for binary search.
10. Write a program to implement linked list.



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FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
SUBJECT- PHYSICS
PAPER-I (OPTICS)
CODE- BSCC(Y- 202A)

UNIT I

Geometrical optics:

Reflection and refraction, Fermat's principle, Refraction at a spherical surface, aplanatic points and its applications. Lens formula. Combination of thin lenses and equivalent focal length. Dispersion and dispersive power, chromatic aberration and achromatic combination, different types of aberration (Qualitative) and their remedy, Need for multiple lenses in eyepieces, Ramsden and Huygens eye-piece.

UNIT II

Interference of light:

The principle of superposition two slit interference, coherence requirement for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer and other applications, localized fringes, thin films, Interference by a film with two non-parallel reflecting surfaces. Newton's rings, Haidinger fringes (Fringes of equal inclination), Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Intensity distribution in multiple beam interference, fabry - perot interferometer and Etalon.

UNIT III

Diffraction:

Fresnel's theory of half period zone, Diffraction at straight edge, Rectilinear propagation, Diffraction at a slit, phasor diagram and integral calculus methods. Diffraction at a circular aperture and a circular disc, Rayleigh criterion of resolution of images. Resolving power of telescope and microscope. Outline of phase contrast microscopy. Diffraction at N-parallel slits, Intensity distribution, plane diffraction grating, Resolving power of a grating and comparison with resolving power of prism and of a fabry perot etalon.

UNIT IV

Polarizations:

Transverse nature of light waves, Polarization of electromagnetic waves, Plane polarized light - production and analysis, Description of linear, circular and elliptical polarization. Propagation of electromagnetic waves in anisotropic media. uniaxial and biaxial crystals, and symmetric nature of dielectric tensor, Double refraction, and Hagen's principle. Ordinary and extraordinary refractive indices. Fresnel's formula, light propagation in uniaxial crystal. Nicole prism. Production of circularly and elliptically polarized light, Babinet compensator and applications, optical rotation, optical rotation in liquids and its measurement through polarimetry.



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FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR

UNIT V

Laser and photo sensors:

A brief history of laser. Characteristics of laser light. Einstein prediction. Relationship between Einstein's coefficients (Qualitative discussion). Pumping schemes. Resonators, Ruby laser. He-Ne laser. Applications of laser. Principle of holography. Photodiodes, Phototransistors and photomultipliers.

SUGGESTED READING:

- **FUNDAMENTAL OF OPTICS: F.A. JENKINS AND H.E. WHITE, 1976 MC GRAW HILL.**
- **PRINCIPLES OD OPTICS: B. K. MATHUR 1995 GOPAL PRINTING**



Handwritten signature and text in blue ink. The text includes "SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL SCIENCES (M.P.)" and a signature that appears to be "Hee".

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
SUBJECT- PHYSICS

PAPER-II (Electro-Statics, Magneto Statics And Electrodynamics)
CODE- BSCC(Y- 202B)

UNIT I

Electrostatics: Coulombs law in vacuum expressed in vector forms. Calculations of electric field E for simple distributions of charge at rest, dipole and quadruple fields. Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between electric field and electric potential ($E = -\nabla V$), torque on a dipole in a uniform electric field and its energy. Flux of the electric field. Gauss's law and its application for finding E for symmetric charge distributions. Capacitors. Conducting sphere in a uniform electric field. Point charge in front of a grounded infinite conductor. Dielectric parallel plate capacitor with a dielectric. Dielectric constant. Polarization and polarization vector P. Relation between displacement vector D, E and P molecular interpretation of claussius – mossotti equation.

UNIT II

Magneto statics: Force on a moving charge. Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field. Torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio. Biot and savart's law, calculation of H for simple geometrical situations such as solenoid, Anchor ring. Ampere's law, $\nabla \times V = \mu_0 J$, $\nabla \cdot B = 0$. Field due to magnetic dipole, free and bound currents. Magnetization vector (M), relationship between B, H and M. derivation of the relation $\nabla \times M = J$ for non-uniform magnetization.

UNIT III

Current Electricity and Bio electricity: Steady current, current density J, non-steady currents and continuity equation, Kirchhoff's laws and analysis of multiloop circuits growth and decay of current in LR and CR circuits. Decay constants, LCR circuits, AC circuits, complex numbers and their applications in solving AC circuits problems, complex impedance and reactance, series and parallel resonance, Q-factor, power consumed by an AC circuit, power factor, Y and Δ networks and transmission of electric power, Electricity observed in living systems, origin of bioelectricity.

UNIT IV

Motion of charged particles in Electric and magnetic fields: (Note: The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved.)

E as an accelerating field, electron gun, discharge tube, linear accelerator, E as deflecting velocity selector, Curvatures of tracks for energy determination for nuclear, Mass spectrograph and principle and working of cyclotron. Mutually perpendicular and parallel E & B fields positive ray parabolas, discovery of isotopes. Elements of Mass spectrographs. Principle of magnetic focusing (lenses).

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR

UNIT V

Electrodynamics: Electromagnetic induction, Faraday's Laws, Electromotive force, Integral and differential forms of Faraday's laws. Self and mutual inductance. Transformers. Energy in a static magnetic field. Maxwell's displacement current, Derivations of Maxwell's equations, Electromagnetic field energy density. Pointing vector, electromagnetic wave equation. Plane electromagnetic waves in vacuum and dielectric media. Reflection at a plane boundary of dielectrics, Fresnel's Laws, Polarization by reflection and total internal reflection. Waves in a conducting medium, Reflection and refraction by the ionosphere.

SUGGESTED READINGS :

- **PHYSICS VOLUME 2: D. HALLIDAY AND R. RESNICK**
- **INTRODUCTION TO ELECTRODYNAMICS : D. J. GRIFFITHS, 4TH EDITION**
PRINTICE HALL



FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
SUBJECT- PHYSICS
PRACTICAL.

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Use of plane diffraction grating to determine D_1 , D_2 lines of sodium lamp.
4. Resolving power of telescope.
5. Polarization by reflection and verification of Brewster's law.
6. Study of optical rotation in sugar solution.
7. Refractive index and dispersive power of prism using spectrometer.
8. Absorption spectrum of material using constant deviation spectrograph.
9. Beam divergence of He-Ne laser.
10. Determination of wavelength of laser by diffraction.
11. Determination of radius of curvature of Plano-convex lens by newton's rings.
12. Characteristics of Ballistic galvanometer.
13. Setting up and using an electroscopes or electrometer.
14. Measurement of low resistance by carey-foster bridge or otherwise.
15. Measurement of inductance using impedance at different frequencies.
16. Measurement of capacitance using impedance at different frequencies.
17. Response curve for LCR circuits and response frequencies.
18. Sensitivity of cathode-ray oscilloscope.
19. Use of a vibration magnetometer to study a field.
20. Study of magnetic field due to current using tangent galvanometer.
21. Study of decay of currents in LR and RC circuits.
22. Study of lissajous figures using CRO.
23. Verification of network theorems.



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FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
SUBJECT- MATHEMATICS
PAPER-I (ABSTRACT ALGEBRA)
CODE- BSCC(Y- 203A)

UNIT - I

Definition and basic properties of groups, Subgroups. Subgroups generated by a subset, Cyclic groups and simple properties.

UNIT-II

Coset decomposition, Lagrange's theorem and its corollaries including Fermat's theorem, Normal subgroups, Quotient groups.

UNIT -III

Homomorphism and Isomorphism of groups, Fundamental theorem of homomorphism, Transformation and Permutation group, S_n (various subgroups of $S_n, n \leq 5$ to be studied), Cayley's theorem

UNIT - IV

Group Automorphism, Inner Automorphism, Group of Automorphisms, Conjugacy relation and Centraliser, Normaliser, Counting principle and class equation of a finite group, Cauchy's theorem for finite abelian groups and non-abelian groups.

UNIT -V

definition and basic properties of rings, Ring homomorphism subrings, Ideals and Quotient rings, Polynomial rings & its properties, Integral domain and Field.

Suggested Reading:

1. I.N. Herstein- **Topics in Algebra** Wiley Eastern Ltd, New Delhi, 1977.
2. PB Bhattacharya, S.K. Jain and S R Nagpaul – **Basic Abstract Algebra**, Wiley Eastern, New Delhi, 1977

Reference Books:

1. Shantinarayan- **A text Book of Modern Abstract Algebra**, S. Chand and Company, New Delhi.
2. Surjeet Singh – **A Text Book of Modern Algebra**.

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
SUBJECT- MATHEMATICS
PAPER-II (ADVANCED CALCULUS)
CODE- BSCC(Y- 203B)

UNIT- I

Definition of a sequence. Theorem on limits of sequence. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison test. Cauchy's integral test. Cauchy's root test. Ratio tests. Raabe's tests. Logarithmic test. Alternating series. Leibnitz's test. Absolute and conditional convergence.

UNIT-II

Continuity of function of single variable, Sequential continuity, Properties of continuous functions. Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives.

UNIT -III

Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

UNIT-IV

Envelopes, Evolutes. Maxima and Minima of functions of two variables. Lagrange's multiplier method. Beta and Gamma Functions.

UNIT - V

Double and triple integrals. Volumes and surfaces of solids of revolution Dirichlet's integrals. Change of order of integration in double integrals.

Suggested Reading:

1. R.R. Goldbeg- Real Analysis, Oxford & I.B.H. Publishing co. New Delhi
2. Gorakh Prasad- Differential Calculus. Pothishala Pvt. Ltd Allahabad.
3. Gorakh Prasad- Integral Calculus. Pothishala Pvt. Ltd. Allahabad.

Reference Books:

1. Gabriel Klaumber – Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975
2. T.M. Apostol- Mathematical Analysis, Narosa Publishing House, New Delhi, 1985

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
SUBJECT- MATHEMATICS
PAPER-III (DIFFERENTIAL EQUATION)
CODE- BSCC(Y- 203C)

UNIT- I

Series solutions of differential equations. Power series method. Bessel and Legendre equations. Bessel's and Legendre's functions and their properties- recurrence and generating function. Orthogonality of functions.

UNIT- II

Laplace Transformation. Linearity of the Laplace transformation. Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms.

UNIT-III

Inverse Laplace transforms. Convolution theorem. Application of Laplace transformation in Solving linear differential equations with constant coefficients.

UNIT-IV

Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method.

UNIT- V

Partial differential equations of second and higher orders. Classification of partial differential equations of second order. Homogeneous and non-homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients.

Text Books:

1. Sharma and Gupta- Integral Transform. Pragati Prakashan Meerut.
2. Sharma and Gupta- Differential Equation. Pragati Prakashan Meerut.
3. Reysinghania-Differential Equation. Pragati Prakashan Meerut.

Reference Book:

1. D.A. Murray- Introductory course in differential equation. Orient Longman. India 1967
2. G.F. Simmons – Differential Equations. Tata McGraw Hill. 1972.
3. E.A. Codrington – An introduction to Ordinary differential equations. Prentice Hall of India. 1961



FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR
FOUNDATION COURSE (MORAL VALUE AND LANGUAGE-II)

Code: FC(Y--204A)

UNIT-I

हिन्दी भाषा:

1. वह लोवती पत्थर कविता - (सूर्यकांत त्रिपाठी निराला)
2. दिमागी गुलामी निबंध - (राहुल सांकृत यायन)
3. वर्ण -विचार) सु वर -व यंजन, वर्गीकरण, उच्च चरण रू थान

UNIT-II

हिन्दी भाषा

1. नारीत्व का अभिवाप निबंध - (म हादेवी वर्मा)
2. पीप की दावत कहानी - (मीशू म साहनी)
3. विराम चिन्ह ह) -संकलित

UNIT-III

हिन्दी भाषा; नैतिक मूल्य

1. सिकागो ट याद यान)द याद यान - (सु दामी विवेकानंद)
2. धर्म और राष्ट्र टवाद) -लेख (महर्षि जगदिन्द्र)
3. सादगी)ज्ञान मकथा -(महात्मा गांधी)
4. चित्त त जहां मय शून्य)कविता -(रवीन्द्र नाथ टैगोर)

UNIT IV

English:

1. Tree: Tina Morris
2. Night of the Scorpion : Nissim Ezekiel
3. Idgah : Premchand (translated by Khushwant Singh)
4. Letter to God : G.L. Swatch (translated by Donald a Yates)
5. My Bank Account : Stephen Leacock
6. God sees the Truth but waits : Leo Tolstoy

UNIT V

English:

1. Short Essay on given topics
2. Correspondence skills (format & Informal letters and Application)
3. Translation of sentences/passage English to Hindi and Hindi to English

Suggested Readings: Madhya Pradesh Hindi grant academy, Bhopal published book.

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (COMPUTER SCIENCE) SECOND YEAR

FOUNDATION COURSE (ENVIRONMENTAL STUDIES)

Code: FC(Y-204B)

UNIT I

Study of Environment and ecology: Definition and Importance of Environment and Ecology, Public participation and Public awareness.

UNIT II

Environmental Pollution : Air Pollution, water Pollution, noise Pollution, heat and nuclear pollution- Definition, Causes, effect and prevention of pollution, Disaster management – Flood, Earthquake, cyclones and landslides.

UNIT III

Environment and social problems: Sustainable development- Introduction, Energy problems of cities, solar energy, biogas and wind energy, Water conservation – rain-water harvesting.

UNIT IV

Role of mankind in conserving natural resources: Food resources – World food problem , Energy resources – increasing demand for energy.

UNIT V

Environment conservation laws: Conservation laws for air and water pollution, Wildlife conservation laws, Role of information technology in protecting environment & health.

Suggested Readings:

- Madhya Pradesh Hindi grant academy, Bhopal published book.



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FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-I (PHYSICAL CHEMISTRY)

CODE- BSCB(Y- 201A)

UNIT-I

Thermodynamics: Definition of thermodynamics, First Law of Thermodynamics, Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamic scale of temperature, Concept of entropy : entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium, Entropy change in ideal gases and mixing of gases, Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data, Gibbs and Helmholtz functions : Gibbs function (G) and Helmholtz function (Z) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change.

Thermochemistry: standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant

UNIT-II

Phase Equilibrium : Statement and meaning of the terms - phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system - water, CO₂ and S systems. Phase equilibria of two component system - solid -liquid equilibria, simple eutectic - Bi-Cd, Pb-Ag systems, desilverisation of lead.

Solid solutions - compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H₂O), FeCl₃-H₂O) and CuSO₄-H₂O) system. Freezing mixture, acetone-dry ice.

Liquid - liquid mixtures - Ideal liquid mixtures, Raoult's and Henry's law, Non-ideal system-azeotropes - HCl-H₂O and ethanol - water systems.

Partially miscible liquids - Phenol-water, trimethylamine-water, nicotine-water systems. Lower and upper consolute temperature, Effect of impurity on consolute temperature, Immiscible liquids, steam distillation, Nernst distribution law - thermodynamic derivation, applications.

UNIT-III

Electrochemistry - I : Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution, Migration of ions and Kohlrausch law Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations, Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only), Transport number, definition and determination by Hittorf method and moving boundary method.



UNIT-IV

Electrochemistry - II : Types of reversible electrodes - gas - metal ion, metal-metal ion, metal - insoluble salt - anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes- standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG , ΔH and K), polarization, over potential and hydrogen overvoltage. Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations. Definition of pH and pK_a determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.

Buffers - mechanism of buffer action, Henderson - Hazel equation, Hydrolysis of salts, Corrosion - types, theories and methods of combating it

UNIT-V

Surface Chemistry: Adsorption, adsorption and adsorption, types of Adsorption, Adsorption of gases and Liquids in solid adsorption, Freundlich and Langmuir adsorption isotherms surface area and determination of the surface area.

Catalysis: Characteristics of Catalyzed reactions, classification of Catalysis, application of Catalysis.

Suggested Readings:

1. ADVANCED PHYSICAL CHEMISTRY, GURDEEP RAJ, 2014.


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FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-II (INORGANIC CHEMISTRY)

CODE- BSCB(Y- 201B)

UNIT-I

Chemistry of Elements of First Transition Series: Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

UNIT-II

Chemistry of Elements of Second and Third Transition Series: General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry.

UNIT-III

Oxidation and Reduction: Use of redox potential data-analysis of redox cycle, redox stability in water - Frost, Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements.

Coordination Compounds: Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

UNIT-IV

Chemistry of Lanthanide Elements: Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

Chemistry of Actinides: General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides.

UNIT-V

Acids and Bases: Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Non-aqueous Solvents : Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH₃ and liquid SO₂

Suggested Readings:

1. A Text-Book Inorganic Chemistry, G. S. Newth
2. Physical Inorganic Chemistry: A Coordination Chemistry Approach, 1996, S.F.A. Kettle
3. Industrial Inorganic Chemistry, Werner Buchner



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

SUBJECT- CHEMISTRY

PAPER-III (ORGANIC CHEMISTRY)

CODE- BSCB(Y- 201C)

UNIT-I

Electromagnetic Spectrum : Absorption Spectra Ultraviolet (UV) absorption spectroscopy - absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transition, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

Infrared (IR) absorption spectroscopy--molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

UNIT-II

Alcohols: Classification and nomenclature. Monohydric alcohols – nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.

Dihydric alcohols -- nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$\text{Pb}(\text{OAc})_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric alcohols -- nomenclature and methods of formation, chemical reactions of glycerol.

Phenols: Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols --electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

UNIT-III

Aldehydes and Ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1, 3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolf -Kishner, LiAlH_4 and NaBH_4 reductions. Halogenation of enolizable ketones. An introduction to α, β unsaturated aldehydes and ketones.



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

UNIT-IV

Carboxylic Acids : Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.

UNIT-V

Organic Compounds of Nitrogen: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid. Halonitroarenes : reactivity. Structure and nomenclature of amines, physical properties. Stereo chemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salt as phase-transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction. Hofmann bromoamide reaction. Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, azo coupling.

Suggested Readings:

1. **ORGANIC CHEMISTRY, VOL. 1 - DR. SULTANAT**
2. **Advanced Organic Chemistry, VOL IV - S.P. BHUTANI**
3. **TEXTBOOK OF ORGANIC CHEMISTRY, VOL.III - V. K. AHLUWALIA**


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& MEDICAL SCIENCES, SEHORE (M.P.)



SUBJECT- BOTANY

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (BIOLOGY) SECOND YEAR
PAPER-I (STRUCTURE DEVELOPMENT AND REPRODUCTION OF
FLOWERING PLANTS)
CODE- BSCB(Y- 202A)

UNIT I

Tissue system- Types of Vascular bundles, Apical meristems, classification of meristems, The root system root apical meristem, anatomy of monocot and dicot root.

UNIT II

Shoot system, monocot systems of vascular cambiums and their functions, heart and sap wood, sec. growth in nycanthus, dracaena , leptadenia, bohravia, salvadora.

UNIT III

Leaf system- Origin and development of leaf, Diversity in size, arrangement and shape, internal structure of mono and dicot leaf. adaptation to photosynthesis and water stress, senescence abscission.

UNIT IV

Embryology: concept of flower as a modified shoot, structure of anther, microsporogenesis, megasporogenesis, gametophyte and its types, pollination –mechanism and agencies, pollen pistil interaction and self incompatibility.

UNIT V

Embryology ; Double fertilization, development and types of endosperm, development of embryo in monocot and dicot plants, fruit development and maturation ,seed structure and dispersal, Mode of vegetative propagation

SUGGESTED READING;

- 1 GANGULEE,H.C, DAS,K.S , COLLLEGE BOTANY- CENTRAL BOO: AGENCY**
- 2 SINGH, V. , PANDE P.C & JAIN- STRUCTURE AND DEV IN ANGIOSPERMS**
- 3. MAHESWARIP- PLANT EMBRYOLOGY**



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

SUBJECT- BOTANY

PAPER-II (PLANT ECOLOGY BIODIVERSITY & PHYTOGEOGRAPHY)

CODE- BSCB(Y- 202B)

UNIT I

Ecosystems-Structure and types ,biotic and abiotic concept, Trophic levels, food chain, food web, ecological pyramids, biogeo chemical cycles- carbon,nitrogen,sulphur

UNIT II

Ecological adaptations- Morphological and anatomical adaptations, physiological responses water, adaptation (hydrophyte and xerophytes) temp. adapotation (thermoperiodism,vernalization)light adaptation (photoperiodism) succession, types of succession- hydroxere, xerosere.

UNIT III

Biodiversity and Population ecology – Distribution pattern, Density, natality, mortality, growth curves, ecotypes, ecads, community ecology, biodiversity conservation, ex situ and in situ conservation, national parks and sanctuaries of mp , Red data book

UNIT IV

Soil and pollution- physical and chemical properties of soil, soil formation and development, soil profile ,soil classification, composition, pollution types-causes, global warming, acid rain, climate change, ozone hole and ozone layer.

UNIT V

Phytogeography- phytogeographical regions of india,vegetation types of M.P., National parks and sanctuaries of M.P.NATURAL RESOURES and types, conservation of natural resources, Land resource management, water and wet resource management.

SUGGESTED READINGS :

- 1 KUMAR, V.K, BIO DIVERSITY CONSERVATION, ACROBOTANICA, BIKANER
- 2 P.D. SHARMA, ECOLOGY AND ENVIRONMENT, RASTOGI PUBLICATION



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

SUBJECT- BOTANY

PRACTICAL.

Section cutting- Root/stem/leaf

On ecology

Exercise based on phytogeography/national parks

Spotting-05 Embryology-anther/ovule/placentation

Exercise based

VIVAVOICE

Sessional




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SUBJECT- ZOOLOGY

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

PAPER-I (VERTEBRATES AND EVOLUTION)

CODE- BSCB(Y- 203A)

UNIT - I

1. Origin of Chordates, Classification of phylum Chordate upto orders according to Parker and Haswell (latest edition)
2. Urochordata- Type study of Herdmania
3. Cephalochordata –Type study of Amphioxus, Affinities of Amphioxus
4. Comparison between Petromyzon and Myxine.

UNIT - II

1. Comparative account of integuments
2. Comparative account of limb bones and girdles of vertebrates (Amphibia, Reptiles, Birds and Mammals).
3. Comparative account of digestive system (Amphibia, Reptiles, Birds and Mammals).
4. Comparative account of respiratory system (Amphibia, Reptiles, Birds and Mammals).

UNIT - III

1. Comparative account of aortic arches and heart.
2. Comparative account of brain
3. Comparative account of Urinogenital system
4. Placentation in mammals.

UNIT - IV

1. Origin of life- modern concept only.
2. Lamarckism, Darwinism.
3. Modern synthetic theories Variations, Mutation, Isolation & Speciation
4. Adaptation and Mimicry
5. Micro, Macro evolution and mega evolution

UNIT - V

1. Fossils, methods of fossilization , determination of age of fossils.
2. Study of extinct forms: Dinosaurs and Archaeopteryx.
3. Zoogeographical distribution.
4. Evolution of man.
5. Geological time scale and Insular fauna.



SUBJECT- ZOOLOGY

FACULTY OF SCIENCE AND COMPUTER SCIENCE
CLASS: B.Sc. (BIOLOGY) SECOND YEAR
PAPER-II (ANIMAL PHYSIOLOGY AND BIO-CHEMISTRY)
CODE- 8SCB(Y- 203B)

UNIT-I

Nutrition and Metabolism

1. Physiology of digestion in mammals
2. Protein Metabolism: Deamination, Decarboxylation, Transamination of amino acids, and Ornithine cycle.
3. Carbohydrate metabolism- Glycogenesis, Glycogenolysis, Glycolysis, the Citric Acid cycle, Gluconeogenesis.
4. Lipid Metabolism-Beta oxidation of fatty acids.

UNIT-II

Respiration, Excretion and Immune System

1. Mechanism and Physiology of respiration in mammals (transport of gases, chloride shift)
2. Physiology of Excretion- urea and urine formation in mammals
3. Innate and acquired immunity, immune cells and lymphoid system, immune response; cellular and humoral immunity

UNIT-III

Regulatory Mechanisms of Enzymes and role of Vitamins

1. Thermoregulation.
2. Definition and nomenclature of enzymes, classification of enzymes.
3. Mechanism of enzyme action.
4. Co-enzymes
5. Vitamins

UNIT-IV

Neuromuscular Co-ordination

1. Types of neurons and glial cells
2. Physiology of nerve impulse conduction.
3. Types and structure of Muscles
4. Theory of muscle contraction and its biochemistry.



FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

UNIT-V

Endocrine system

1. Structure and functions of Pituitary gland.
2. Structure and functions of Thyroid gland.
3. Structure and functions of Adrenal gland.
4. Structure and functions of Parathyroid, Thymus and Islets of Langerhan's
5. Physiology of Male and Female Sex Hormones.

SUGGESTED READING:

1. MAMMALIAN PHYSIOLOGY: BY C. S. SHERRINGTON, 2001.
2. ANIMAL PHYSIOLOGY, CC CHATTERJEE, 1980.
3. VERTEBRATE ZOOLOGY, RL KOTPAL, 1989.




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& Medical Sciences Sehore (M.P.)

SUBJECT- ZOOLOGY

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

PRACTICAL

1. Dissections of commercial available species of locally available Fishes (Efforts may be done to use computer simulation technique).
2. Study of museum specimens (Vertebrates)
3. Study of specimens of evolutionary importance viz living fossils, connecting link, extinct animals, fossils: Limulus, Latimeria, Dinosaurs, Ascitic chital, Archeopteryx, Peripatus etc.
4. Osteology :Limb bones and girdle bones of Frog, Varanus, Pigeon and Rabbit.
5. Detection of protein, Carbohydrate and lipid/study of human salivary enzyme activity in relation to pH.
6. Hematological Experiment-RBC and WBC counting /Blood grouping in blood samples/Estimation of Hemoglobin and sugar in blood samples.
7. Histological study of various endocrine glands-T.S.of Thyroid,T.S.of Pituitary gland,T.S.of Adrenal gland,T.S.of Testis,T.S.of Ovary.
8. Histological study of Digestive and Visceral organ -T.S of Stomach,T.S of intestine,T.S of Pancreas T.S. of Liver,T.S of Lungs and L.S. of Kidney



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Sri Satya Sai University of Technology
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FOUNDATION COURSE (MORAL VALUE AND LANGUAGE-II)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

Code: FC(Y--204A)

UNIT-I

हिन्दी भाषा:

1. वह लोडती पत्थर ,कविता , सूर्यकांत त्रिपाठी निराला
2. दिमागी गुनामी ,निबंध , एडवेल सोकृत यायन
3. वर्ण ,विचार, स वर , व संजन, वर्गीकरण, उच्चारण स्थान

UNIT-II

हिन्दी भाषा

1. नारीत्व का अभिशाप ,निबंध , म हादेवी बर्म
2. चीफ की टाइट ,कहानी , भीष्म साहनी
3. विराम चिन्ह , संकलित

UNIT-III

हिन्दी भाषा, नैतिक मूल्य

1. शिकागो क्याख्यान , व थाख यान , स वामी विवेकानंद
2. धर्म और राष्ट्रवाद , लेख , महर्षि अरविन्द
3. सादगी , आत् मकथा , महात् मा गांधी
4. चित्क नहो भय शून्य , कविता , रवीन्द्र नाथ टैगोर

UNIT IV

English:

1. Tree: Tina Morris
2. Night of the Scorpion : Nissim Ezekiel
3. Idgah : Premchand (translated by Khushwant Singh)
4. Letter to God : G.L. Swarth (translated by Donald Yates)
5. My Bank Account : Stephen Leacock
6. God sees the Truth but waits : Leo Tolstoy

UNIT V

English:

1. Short Essay on given topics
2. Correspondence skills (format & Informal letters and Application)
3. Translation of sentences/passage English to Hindi and Hindi to English.

SUGGESTED READINGS: MADHYA PRADESH HINDI GRANT ACADEMY, BHOPAL
PUBLISHED BOOK.

FOUNDATION COURSE (ENVIRONMENTAL STUDIES)

FACULTY OF SCIENCE AND COMPUTER SCIENCE

CLASS: B.Sc. (BIOLOGY) SECOND YEAR

Code: FC(Y—204B)

UNIT I

Study of Environment and ecology: Definition and Importance of Environment and Ecology, Public participation and Public awareness.

UNIT II

Environmental Pollution : Air Pollution, water Pollution, noise Pollution, heat and nuclear pollution- Definition, Causes, effect and prevention of pollution, Disaster management – Flood, Earthquake, cyclones and landslides.

UNIT III

Environment and social problems: Sustainable development- Introduction, Energy problems of cities, solar energy, biogas and wind energy, Water conservation – rain-water harvesting.

UNIT IV

Role of mankind in conserving natural resources: Food resources – World food problem, Energy resources – increasing demand for energy.

UNIT V

Environment conservation laws: Conservation laws for air and water pollution, Wildlife conservation laws, Role of information technology in protecting environment & health.

SUGGESTED READINGS:

- **MADHYA PRADESH HINDI GRANTS ACADEMY, BHOPAL PUBLISHED BOOK.**



University of Technology & Medical Sciences, Sehore (M.P.)

ANNUAL SCHEME

Scheme of Examination 2017-18

First Year - Bachelor of Science (MICROBIOLOGY)

BSC - 1st Year MICROBIOLOGY

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory		CCE/Internal			Total		Practical		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
1 st Year	BSCMB(Y-101A)	CHEMISTRY	Paper-I	Inorganic chemistry	29	10	5	2	34	12					
	BSCMB(Y-101B)		Paper-II	Physical Chemistry	28	10	5	2	33	12	50	17	150	50	
	BSCMB(Y-101C)		Paper-III	Organic Chemistry	25	10	5	2	33	12					
	BSCMB(Y-102A)	BOTANY	Paper-I	Diversity of Lower plants	40	13	10	4	50	17					
	BSCMB(Y-102B)		Paper-II	Diversity of higher plants	40	13	10	4	50	17	50	17	150	50	
	BSCMB(Y-103A)	MICROBIOLOGY	Paper-I	General microbiology and cell biology-I	40	13	10	4	50	17					
	BSCMB(Y-103B)		Paper-II	General microbiology and cell biology-II	40	13	10	4	50	17	50	17	150	50	
	FCY-104A)	FOUNDATION COURSE	Paper-I	Moral value and language	80	26	20	8	100	33					
	FCY-104B)		Paper-II	Development of Entrepreneurship	80	26	20	8	100	33					
			TOTAL			405		95		500		150		650	



By *[Signature]*
 Sy. Suresh Kumar
 Head of Department
 of Medical Sciences, Sehore (M.P.)

Faculty of science
B.SC Computer science 1st year
YEAR: 1 ST

GROUP-COMPUTER APPLICATION

Subject – Fundamental of computer and PC software

PAPER:-I

PAPER CODE: BSCC(T- 101A)

Unit- I

Introduction to computer system: block diagram, components, motherboard, processor, main memory, cache memory, hard disk.

Input device, output device, external storage devices: floppy disk CD ROM, DVD, USB drives.

Types of software: system Software, application software .System Software: operating system, utility programs, anti-virus, and disk cleaning .Application software: example commercial software with brief introduction.

Programming language : low level language ,high level language ,assembly language ,middle level language ,compiler ,interpreter ,assembler . difference between compiler and interpreter .

Unit: II

Operating system : definition . functions of operating system,CUI,GUI,types of operating system like single user ,multi user, real time, time sharing and batch processing ,multiprogramming ,multiprocessing ,multitasking, distributed processing .elementary idea of various common operating system prevalent round the world .

MS windows: introduction and its features, desktop, taskbar, files and folder start menu operations

My computer, network neighborhood,recycle-bin,windows explorer, creating ,copying ,moving and deleting files . setting wall paper , changing the mouse pointer, paint, notepad .

Unit: III

Introduction of MS Word: Advantages of word Processing, Creating, saving, and editing a document: selecting, deleting, replacing text, copying text to another file, Insert ,formatting text and paragraph , using the font ,dialog box, paragraph formatting using bullets and numbering in paragraph ,use of smart art ,checking spelling ,line spacing , margins, space before and after paragraph , mail merge ,customizing the ribbon.

Introduction of MS excel: entering the information, numbers, formulas, editing data in a cell, excel functions, using a range with SUM, Moving and copying data, inserting and deleting row and columns in the worksheet, using the format cells.

Introduction of MS power point: introduction, slide show, formatting, creating a presentation inserting smart art, adding objects applying transitions, animation effects, adding tables.

Unit: IV

Decision support system: importance of decision support system, limitation, characteristics of DSS, decision support and structure of decision making and repetitiveness of decision, DSS users.

Expert system: support for decision making phases, support for the intelligent phases, support for design phase, support for choice phase.

Management Information System: introduction, role of IT, MIS characteristics and application areas, business and technology trends –specialization, management methodology, decentralization, internationalization etc.

Unit: V

BSC CS/MATHS 1st Year Syllabus


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Internet : meaning ,definitions ,history ,internet protocols,TCP/IP,FTP,HTTP,URL, internet browsers,WWW ,search engines ,introduction internet security terminology-network security,firewall,cryptography, password ,biometrics, digital signature, digital certificate,Business application of internet, email, use net ,news group,telnet,intranet, extranet eticketing,chatting.

E-Banking and its benefits: smart card, E-cash, online financial services stock trading, E-broking,E-business model, do it yourself model, made to order model, information service model, emerging hybrid models.

Text Books and Reference Books:

1. Computer Fundamental by P.K.Sinha
2. Fundamental of Information Technology by A. Leon M. Leon
3. Computer today by Suresh K. Basandra
4. P C Software by Nitin K Nayak



Faculty of science
B.SC Computer science 1st year
YEAR: I ST
Group-Computer Application
Subject –Desktop Publishing and Multimedia
PAPER:-II
PAPER CODE:05CC(Y-1010)

Unit - I

Importance and Advantages of DTP, DTP Software and Hardware, Commercial DTP Packages, Page Layout programs, Introduction to Word Processing, Commercial DTP Packages, Difference between DTP Software and Word Processing Software.

Unit- II

Types of Graphics, Uses of Computer Graphics Introduction to Graphics Programs, Font and Type faces, Types of Fonts, Creation of Fonts (Photographer), Anatomy of Type faces, Printers, Types of Printers used in DTP, Plotter, Scanner.

Unit-III

History and Versions of Page Maker, Creating a New Page, Document Setup Dialog Box, Paper Size, Page Orientation, Margins, Different Methods of placing text and graphics in a document, Master Page, Story Editor, Formatting of Text, Indent, Leading, Hyphenation, Spelling Check, Creating Index, Text Wrap, Position (Superscript/Subscript), Control Palette.

Unit-IV

History, Multimedia Elements; Text Images, Sound, Animation and Video, Text, Concept of Plain Text and Formatted Text, RTF & HTML Text, Image , Importance of Graphics in Multimedia, Image Capturing Methods, Scanner, Digital Camera, Sound – Sound and its effect in Multimedia, Analog and Digital Sound, Animation, Basics, Principles and use of Animation, Video, Basics of Video, Analog and Digital Video.

Unit-V

Features of Multimedia, Overview of Multimedia, Multimedia Software Tools, Multimedia Authoring- Production and Presentation, Graphic File Formats, MIDI- Overview, Concepts, Structure of MIDI Devices, MIDI Messages.

Text Books and reference books:

1. Desktop Publishing on PC by M.C. Sharma
2. Professional in Desktop Publishing by Dinesh Maidasani
3. DTP Courses 2/e by Singh & Singh
4. Multimedia, Computing, Communication & Applications by Ralf Steinmetz
5. Fundamentals of Multimedia by Ze - Nian Li
6. Page Maker- Manual
7. 'o' Level module m3.2 Desktop publishing & Presentation graphics by V.K. Gupta



Faculty of science
BSC Computer science 1st year
YEAR: 1ST
GROUP-COMPUTER APPLICATION
SUBJECT -PRACTICAL
PAPER CODE: BSCC(Y-101P)
MS-Word

1. Create a document and apply different Editing options.
2. Create Banner for your college.
3. Design a Greeting Card using Word Art for different festivals.
4. Create your Biodata and use page borders and shading .
5. Create a document and insert headers and footer, page title etc.
6. Implement Mail Merge.
7. Insert a table into a document.
8. Create a document and apply different formatting options.

MS Excel

1. Design your class Time Table.
2. Prepare a Mark sheet of your class subjects..
3. Prepare a Salary Slip of an employee.
4. Prepare a bar chart & pie chart for analysis of Election Results.
5. Prepare a generic Bill of a Super Market.
6. Work on the following exercise on a workbook:
 - a) Copy an existing Sheet
 - b) Rename the old Sheet
 - c) Insert a new Sheet into an existing Workbook
 - d) Delete the renamed Sheet.
7. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance , total percentage of attendance of each student & average of attendance
8. Create a worksheet on Students list of any 4 faculties and perform following database functions on it,
 - a) Sort data by Name
 - b) Filter data by Class
 - c) Subtotal of no. of students by Class.

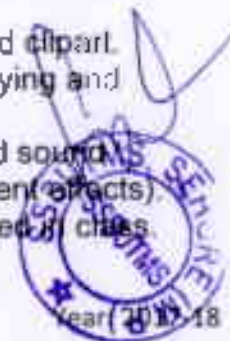
MS Power Point

1. Design a presentation of your institute using auto content wizard, design template and blank presentation.
2. Design a presentation illustrating insertion of pictures, word Art and clipart.
3. Design a presentation learn how to save it in different format, copying and opening an existing presentation.
4. Design a presentation illustrating insertion of movie ,animation and sound.
5. Illustrate use of custom animation and slide transition (using different effects).
6. Design a presentation using charts and tables of the marks obtained by class.
7. Illustrate use of macro in text formatting in your presentation.

BSC CS/MATHS 1st Year Syllabus

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PageMaker

1. Create a Greeting Card for New Year.
2. Create a Visiting Card.
3. Create your Resume.
4. Create an advertisement for job in well-known firm.
5. Create a Newspaper Report.
6. Create a document by importing Graphic Image from Clip Art.
7. Create a Wedding Card.
8. Type a document using Story Editor .
9. Input a text from Word Document into a PageMaker document.
10. Create a document on Importance of Text Wrap applying proper font sizes


Prof. Dr. S. S. S. S. S.
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of science
BSC Computer science 1st year
Subject – Physics

Paper Title – Mathematical Physics, Mechanics and Properties of Matter
Paper – I
Paper code-BSCC(Y- 102A)

Unit – I Mathematical Physics

Addition, subtraction and product of two vectors; Polar and axial vector and their examples from physics; Triple and quadruple product (without geometrical applications); Scalar and vector field; Differentiation of a vector; Repeated integral of a function of more than one variable; Unit tangent vector and unit normal vector; Gradient, Divergence and Curl; Laplacian operator; Idea of line, Surface and volume integrals; Stokes' and Green's theorems.

Unit – II Mechanics

Position, Velocity and acceleration vector, Components of velocity and acceleration in different coordinate systems, Newton's Laws of motion and its explanation with problems various types of forces in nature (explanation), Pseudo Forces (e.g. Centrifugal Force), Coriolis force and its applications, Motion under a central force, Derivation of Kepler's laws, Gravitational law and field, Potential due to a spherical body, Gauss & Poisson equation of Gravitational Self- energy, System of particles, Centre of mass and reduced Mass, Elastic and inelastic collisions.

Unit-III General Properties of Matter

Elastic moduli and their relations, Determination of Y of rectangular thin bar loaded at the Centre; Torsional oscillations, Torsional rigidity of a wire, to determine by torsional oscillations, Surface Tension, Angle of Contact, Capillary Rise Methods; Energy required to rise a liquid in capillary tube; Factors affecting surface tension; Jagger's Method for Determination of Surface Tension; Applications of surface Tension, Concept of Viscous Forces and viscosity; Steady and Turbulent Flow, Reynolds's Number; Equation of Continuity; Bernoulli's Principle; Application of Bernoulli's equation- (i) Speed of Efflux (ii) Venturimeter (iii) Aspirator Pump (iv) Change of Plane of Motion of a spinning ball.

Unit IV: Oscillations

Concept of Simple, Periodic & Harmonic Oscillation With Illustrations; Differential equation of harmonic oscillator; Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring; Translational and Rotational motion, Moment of Inertia and their Production, Principal moments and axes, Motion of Rigid Body, Euler's equation.

Unit V:

Relativistic Mechanics: Michelson- Morley experiment and its outcome; Postulates of Special Theory of Relativity; Lorentz Transformation, Simultaneity and order of events; Lorentz contraction; Time dilation; Relativistic transformation of velocity, Frequency and Wave number; Relativistic addition of Velocities; Variation of Mass with velocity.

Earlier Development in Physics up to 18th Century; Contribution of Aryabhan, Archimedes, Niculus Copernicus, Galileo Galilei, Huygens, Robert Hooke.

Toricelli, Vernier, Pascal, Kepler, Newton, Boyle, Young, Thompson, Coulomb, Ampere, Gauss, Biot-Savarts, Cavendish, Galvani, Franklin and Bernoulli.

Reference Books:

1. University Physics: Sears and Zemansky, XIth edition, Pearson Education
2. Concept of Physics: H.C. Verma, Bharati Bhavan Publishers
3. Problems in Physics: P.K. Srivastava, Wiley Eastern Ltd.
4. Berkeley Physics Course Vol' 1, Mechanics: E.M. Purcell, McGraw hill
5. Properties of Matter: D.S. Mathur, Sharda Charitable Trust, New Delhi



Faculty of science
BSC Computer science 1st year
Subject – Physics
Paper Title – Thermodynamics and Statistical Physics
Paper – II
Paper code-BSCC(Y- 102B)

Unit- I: Thermodynamics – I Reversible and irreversible process. Heat engine. Definition of Efficiency, Carnot's Ideal heat engine, Carnot's Cycle, Effective way to increase efficiency, Carnot's engines and refrigerator, Coefficient of Performance, Second law of thermodynamics, Various Statements of Second law of thermodynamics, Carnot's theorem, Clapeyron's latent heat equation, Carnot's cycle and its applications. Steam engine, Otto engine, Petrol engine, Diesel engine.

Unit – II: Thermodynamics-II

Concept of entropy, Change in entropy in adiabatic process, Change in entropy in reversible cycle, Principle of increase of entropy, Change in entropy in irreversible process, T-S diagram, Physical significance of Entropy of a Perfect gas, Kelvin's Thermodynamic scale of temperature, The Size of a degree, Zero of absolute scale, Identity of a perfect gas scale and absolute scale, Third law of Thermodynamics, Zero Point energy, Negative temperature (not possible), Heat death of the universe, Relation between thermodynamic Variable (Maxwell's relations).

Unit- III: Statistical Physics – I

Description of a system; Significance of statistical approach, Particle-States System-states, Microstates and Macro-states of a system, Equilibrium states, Fluctuations, Classical & Statistical Probability, The equi-probability postulate, Statistical ensemble, Number of states accessible to a system, Phase space, Micro Canonical Ensemble, Canonical Ensemble.

Helmholtz free energy, Enthalpy, First law of thermodynamics, Gibbs free energy, Grand Canonical Ensemble.

Unit – IV Statistical Physics-II

Statistical Mechanics: Phase Space, The probability of a distribution, The most probable distribution and its narrowing with increase in number of particles, Maxwell- Boltzmann statistics, Molecular speeds, Distribution and mean, R.m.s and most Probable velocity, Constraints of accessible and inaccessible states, Quantum Statistics: Partition Function Relation between Partition Function and Entropy, Bose- Einstein Statistic, Black- body radiation, The Rayleigh –Jeans formula, The Plank radiation formula, Fermi-Dirac statistics, Comparison of result, Concept of phase transition.

Unit – V: Contribution of Physics

S.N. Bose, M.N. Saha, Maxwell, Clausius, Boltzmann, Joule, Wien, Einstein, Planck, Bohr, Heisenberg, Fermi, Dirac, Max Born, Bardeen.

Text and Reference Books:

1. **Heat and Thermodynamics:** Marks W. Zemansky, Richard H. Dittman, Seventh Edition, McGraw- Hill International Editions.
2. **Thermal Physics (Heat and Thermodynamics):** A.B. Gupta, J.P. Roy, Books and Allied (P) Ltd, Calcutta.
3. **Laboratory Manual of Physics for Undergraduate classes.** D.P. Khandelwal, Vani Publishing House, New Delhi.


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Faculty of science
B.SC Mathematics 1st year
Subject – Physics
Paper code-BSCM(T-102P)

List of Practical's

1. To verify laws of parallel and perpendicular axes for moment of inertia
2. To determine acceleration due to gravity using compound pendulum.
3. To determine damping coefficient using a bar pendulum.
4. To determine Young's Modulus by bending of beam method.
5. To determine Young's Modulus using Cantilever Method.
6. To determine coefficient of rigidity by static method.
7. To determine coefficient of rigidity by dynamic method.
8. To determine Surface Tension by Jaeger's method.
9. To determine Surface Tension of a liquid by capillary rise method.
10. To determine Viscosity of fluid using Poiseuille' method.
11. To study conversion of mechanical energy into heat using calendar & Barne's method.
12. To determine heating efficiency of electrical kettle with various voltages.
13. To determine heating temperature coefficient of resistance using platinum resistance thermometer.
14. To determine thermo electromotive force by a thermocouple method.
15. To determine heating efficiency of electrical kettle with various voltages.
16. To determine heat conductivity of bad conductors of different geometry by Lee's method.
17. To verify Newton's Laws of cooling.
18. To determine specific heat of Coefficient of thermal conductivity by Searl's method.
19. To determine specific heat of a liquid.
20. To compare Maxwell- Boltzmann, Bose Einstein and Eermi-Dirac Distribution Function vs temperature using M.S. Excel, C++
21. To Plot equation of state and Vander-wall equation with temperature using M.S. Excel/C++


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Faculty of science
B.Sc Computer science 1st year
Subject – Mathematics
Paper Title – Algebra and Trigonometry
Paper – I
Paper code- BSEE(Y-103A)

Unit - I

Rank Of matrix, Normal & Echelon form of a matrix. Characteristic equation of a matrix. Eigen values. Eigen vectors. Linear Independence of row and column matrix.

Unit-II

Cayley Hamilton theorem and its use in finding inverse of a matrix. Application of matrix to solve a system of linear (homogenous and non-homogenous) equations. Theorems on consistency and inconsistency of a system of linear equations. Solving linear equation upto three unknowns.

Unit - III

Relation between the roots and coefficients of a general polynomial equation in one variable. Transformation of equations. Reciprocal equations. Descartes's rule of signs.

Unit -IV

Logic- Logical connectives. Truth Tables. Tautology. Contradiction, Logical Equivalence, Algebra of propositions. Boolean Algebra-definition and properties. Switching circuits and its applications. Logic gates and circuits.

Unit-V

De-Moivre's theorem and its application. Direct and inverse circular and hyperbolic functions. Expansion of trigonometric functions. Logarithm of complex quantities. Gregory's series. Summation of trigonometrically series.

Text Books:

1. S.I. Loney- Plane Trigonometry Part - II
2. K.B. Datta- Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd. New Delhi 2000.
3. Chandrika Prasad - A Text Book on Algebra and theory of Equations, Pothishala Pvt. Ltd. Aabad.
4. C. L. Liu-Elements of Discrete Mathematics (Second Edition). McGraw Hill, International Edition, Computer Science Series, 1986.
5. म.प्र. हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Book:

1. H.S.Hall and S.R. Knight-Higher Algebra H.M Publication, 1984
2. N.Jacobson-Basic Algebra Vol. I and II. W.H Freeman.
3. N.Saran and R.S. Gupta- Analytica; Geometry of three Dimension. Pothishala Pvt. Ltd. Allahabad



Faculty of science
B.SC Computer science 1st year
Subject - Mathematics
Paper Title - Calculus and Differential Equations
Paper - II
Paper code-BSCC(Y-1030)

Unit -I

Successive Differentiation, Leibnitz theorem, Maclaurin's and Taylor's series expansions, Asymptotes.

Unit -II

Curvature, tests for concavity and convexity, Points of inflexion, Multiple points, Tracing of curves in Cartesian and polar coordinates.

Unit -III

Integration of transcendental function, Definite Integrals, Reduction Formulae, Quadrature, Rectification.

Unit -IV

Linear differential equations and equations reducible to the linear form, exact differential equations, First order and higher degree equations solvable for x , y and p , Clairaut, s equation and singular solutions, Geometrical meaning of a differential equation, Orthogonal trajectories.

Unit -V

Linear differential equation with constant coefficients, Homogeneous Linear ordinary differential equations, Linear differential equations of second order, transformation of equations by changing the dependent variable Independent variable, Method of variation of parameters.

Text Books:

1. Gorakh Prasad - Differential Calculus. Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad - Integral Calculus. Pothishala Private Ltd. Allahabad.
3. D. A. Murray - Introductory Course in Differential Equations, Oxfordman (India) 1967.
4. मध्यप्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Books:

1. G.F. Simmons-Differential Equations. Tata McGraw Hill, 1972.
2. E.A. Coddington- an Introduction to ordinary differential Equation. Prentice Hall of India, 1961.
3. H.T.H Piaggio- Elementary Treatise on Differential Equations and their Application, C.B.S Publisher & Distributors, Delhi, 1985

Faculty of science
B.Sc Computer science Ist year
Subject – Mathematics
Paper Title – Vector Analysis and Geometry
Paper – III
Paper code- BSCC(Y-105C)

Unit-I

Scalar and vector product of three vectors, product of four vectors. Reciprocal vectors. Vector differentiation. Gradient, Divergence and curl.

Unit -II

Vector Integration. Theorems of Gauss, Green, Stoke (without Proof) and Problems based on them.

Unit-III

General equation of second degrees. Tracing of conics. System of conics. polar equation of a conic.

Unit-IV

Equation of cone with given base. Generators of cone. Condition for three mutually perpendicular generators. Right circular cone, equation of cylinder and its properties.

Unit- V

Central conicoids, Paraboloids, plane sections of conicoids. Generating lines.

Text Books:

1. N. Sanyal and S.N. Nigam- Introduction to Vector Analysis. Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H.C. Gupta-Text Book on Coordinate Geometry. Pothishala Pvt. Ltd. Allahabad
3. N. Sanyal and R.S Gupta- Analytical Geometry of Three Dimensions. Pothishala Pvt. Ltd Allahabad (Unit- IV)

Reference Books:

1. R.J.T. Bell- Elementary Treatise on Coordinate Geometry of Three Dimensions, Macmillan India Ltd. 1994 (Unit-V)
2. Murray R. Spiegel-Theory and Problems of Advance Calculus. Schaum Publishing Company. New York.
3. Murray R. Spiegel- Vector Analysis. Schaum Publishing Company. New York.
4. Shanti Narayan- a Text Book of Vector Calculus, S. Chand & Co. New Delhi.


Registrar
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)



FACULTY OF SCIENCE
CLASS: B.SC COMPUTER SCIENCE
GROUP-FOUNDATION COURSE
Moral Value & Language
नैतिकमूल्य औरभाषा
Paper - I
Paper Code: FC(Y-104A)

UNIT I

हिन्दी भाषा

1. स्वतंत्रता पुकारती (कविता) -जयशंकर प्रसाद
2. पुष्प की अभिलाषा (कविता) - माखनलाल चतुर्वेदी
3. वाक्य संरचना और अक्षुब्ध (संकलित)

UNIT II

हिन्दी भाषा

1. नमक का दरोडा (कहानी)- प्रेमचंद
2. एक थे राजा भोज (निबंध) - डॉ. विष्णुबन्धु शुकल
3. परीयवाणी, विलोम, एकदही अनेकदही, एवं शब्दयुग्म शब्द (संकलित)

UNIT III

नैतिक मूल्य

1. नैतिक मूल्य परिचय एवं वर्गीकरण (आलेख) -डॉ. शशि राय
2. आचरण की सम्यक्त (निबंध -तरदार पूर्णसिंह
3. अंतर्गत और नैतिक जीवन (लेख) -डॉ. सर्वपत्नी राधाकृष्णन
4. जन्म वीथी भव (लेख) - स्वामि श्यामंद

UNIT IV

1. Where the minis without fear; Rabindranath Tagore
2. The Hero; R. K. Narayan
3. Trys with Destiny; Jawaharlal Nehru
4. Indian weavers; Sarjini Naidu
5. The Portrait of a lady; Khushwani Singh
6. The Solitary Reaper : William Wordsworth

UNIT V

1. Basic Language Skills: Vocabulary, Synonyms, Antonyms, Word formation, Prefixes, Suffixes.
2. Basic Language Skills: Uncountable Noun, Verbs, Tenses, Adverbs.
3. Comprehension/Unseen Passage.
4. Composition and Paragraph Writing

Suggested Readings:

मध्यप्रदेश हिन्दी बोध आकादमी द्वारा प्रकाशित पुस्तकें



FACULTY OF SCIENCE
CLASS: B.SC COMPUTER SCIENCE
YEAR: I ST
GROUP-FOUNDATION COURSE
SUBJECT -DEVELOPMENT OF ENTREPRENEURSHIP
PAPER:-II
PAPER CODE:FC(Y-104B)

UNIT I

Entrepreneurship Development- Concept and importance, function of Enterprises, Goal determination – Problems Challenges and Solutions.

UNIT II

Project Proposal – need and objects- Nature of organization, Production Management, Financial Management, Marketing Management, Consumer Management.

UNIT III

Role of regulatory Institutions, Role of development Organization, and self employment oriented schemes, various growth schemes.

UNIT IV

Financial Management for Project- Financial Institution and their role, Capital estimation and arrangement, cost and price determination, accounting management.

UNIT V

Problem of entrepreneur- Problem relating Capital, Problem relating Registration, administration problem and how to overcome from above problems.

Suggested Readings:

मध्यप्रदेश हिन्दी ग्रंथ आकादमी द्वारा प्रकाशित पुस्तकें



Faculty of Science
Class-B,se Biology 1ST Year
Subject-Chemistry
Title of paper-Inorganic Chemistry
Paper - I
CODE-BSCB(Y-101A)

Unit - I Atomic Structure:

Dual Nature of matter idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and ψ^2 , Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, and d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule Electronic configuration of the elements, effective nuclear charge.

Unit - II Chemical Bonding - Part I

Covalent Bond - Valence bond theory and its limitations, Directional characteristics of covalent bond. Various types of hybridization and shapes of simple inorganic molecules ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_2O , SF_4 , ClF_3 , and H_2O , MO theory, homonuclear and heteronuclear (CO and NO)₂ diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy.

Unit III Chemical Bonding Part II:

Ionic Solids- Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and Polarizability of ions, Fajan's rule. Metallic bond- free electron, valence bond and band theories. Weak Interactions- Hydrogen bonding, van der Waals forces.

Unit IV: S- Block Elements:

Comparative study Li and Mg, diagonal relationships, salient features of hydrides. Solvation and complexation tendencies including their functions in bio systems and introduction to alkyls and aryls.

Unit V: P- Block Elements Part - I:

Comparative study Be and Al (including diagonal relationship) of group 13-17 elements. Compound like hydrides, Oxides, Oxyacids and halides of groups 13-16.

p- Block Elements Part- II: Hydrides of boron-diborane and higher boranes, borazine, boron hydrides, Fullerenes, fluorocarbons, silicates (structural principle), tetrathioarsenic trisulfide, basic properties of halogens, interhalogens and polyhalides.

Reference Books:

1. Inorganic Chemistry, - J D Lee, Pearson Education
2. Inorganic Chemistry- Cotton and Wilkinson, John Wiley
3. Inorganic Chemistry - Huheey, Harper Collins Pub. USA
4. Inorganic Chemistry - GR Chhatwal, Himalaya Publication



Faculty of Science
Class-B.sc Biology 1ST Year
Subject-Chemistry
Title of paper-Physical Chemistry
Paper – II
CODE-BSCB(Y-201B)

Unit – I Gaseous States and Molecular Velocities:

Critical Phenomenon: PV isotherms of ideal gases. Andrew's experiment, continuity of state, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constants, Root mean square, average and most probable velocities Qualitative discussion of the Maxwell's distribution of molecular velocities. Collision numbers, mean free path and collision diameter.

Unit – II Liquid State:

Intermolecular forces, structure of Liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, Solid and liquid. Classification. Structure of nematic and cholesteric phases. Thermography and seven segment cell.

Unit III Chemical Kinetics:

Chemical kinetics and its scope, rate of a reaction. Factors influencing the rate of a reaction_ concentration, temperature, pressure, solvent, light and catalyst. Dependence of rate on concentration, mathematical. Characteristics of simple chemical reaction-zero order, First order, second and pseudo order, half – life and mean life. Determination of the order of reaction, Differential method, Integration method and half life method. Study of chemical kinetics by polarimetry and spectrophotometry. Effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy. Simple collision theory. Transition state theory (equilibrium hypothesis).

Unit IV: Radioactivity and Nuclear Chemistry:

Natural and artificial radioactivity, radioactive radiations, detection and measurement of radioactive radiation, theory of radioactivity, Group displacement law of soddy, radioactive disintegration, nuclear reactions, nuclear fission and nuclear fusion, half life period, isotopes, Isobars and isomers, application of radiochemistry.

Unit V:

A. Chemical Equilibrium :

Law of mass action, Equilibrium constant, Lechatelier's Principles.

B. Colloidal Solutions: Classification, lyophilic and lyophobic colloids, properties: Kinetic, optical and electrical, coagulation, Hardy- Schulze rule, gold number, emulsions, gels and sols, application of colloidal.

Reference Books:

- 1- Physical Chemistry – Puri, Sharma and Pathania- Vikas Publications, New Delhi
- 2- Physical Chemistry – GM Barrow, International Student Edition McGraw Hills
- 3- The Elements of Physical Chemistry, PW Atkins, Oxford University Press
- 4- Physical Chemistry – R A Alberty, Willey Eastern Limited
- 5- Physical Chemistry Through Problems, SK Dograjn

Faculty of Science
Class-B.sc Biology 1ST Year
Subject-Chemistry
Title of paper-Organic Chemistry
Paper – III
CODE-BSCB(Y-101C)

Unit – I Spectroscopy:

Nuclear Magnetic Resonance Spectroscopy. Proton Magnetic Resonance (¹HNMR) Spectroscopy Nuclear shielding and dis-shielding, chemical shift and molecular structure, spin-spin coupling and coupling constant, region of signals, Explanation of PMR spectra of simple organic molecules like ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromo ethane, ethyl acetate, toluene and acetophenone. Applications of UV, IR and PMR spectroscopy for simple organic compounds.

Unit – II Organo- Metallic compounds:-

Organ magnesium compound- Grignard reagent, preparations, structure and chemical reactions. Organ zinc compounds- Preparations and chemical reactions. Organ lithium compounds- Preparations and chemical reactions.

Unit III Fat, Oil and Detergents:

Natural fat, edible and industrial oil of plant origin, Normal fatty acids, glycerides. Hydrogenation of unsaturated oil, saponification value, iodine value and acid value. Synthetic Detergents:- Alkyl and aryl Sulphonate.

Unit IV -

Amino Acid, Peptide, Protein and nucleic acid. Classification of amino acids, structure and stereo chemistry. Acid base behavior, isoelectric point and electrophoresis. Preparations and chemical reactions of alpha amino acids.

Unit V –

Introductory idea about five- and six – membered condensed heterocyclic compounds. Indole, Quinaline and isoquinoline- preparations and chemical properties (Fischer- Indole synthesis, Skraup's synthesis, BischlerNapieralsky synthesis) Electrophilic substitution reactions of Indole, Quinoline and Isoquinoline

Reference Books:

1. Organic Chemistry, Morrison and Boyd, Prentice Hall
2. Organic Chemistry, LG Wade Jr, Prentice Hall
3. Fundamentals of Organic chemistry, Solomon, John Wiley


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& Medical Sciences, Sehore (M.P.)



Faculty of Science
BSC BIOLOGY
Subject – Chemistry
First Year
Paper – Practical
CODE-BSCB(Y-101P)
Physical Chemistry

(A) Any one experiment

- (i) Determination of melting point
- (ii) Determination of boiling point
- (iii) Weighing and preparation of Solution

(B) Any one experiment

- (i) Determination of surface tension/percentage composition of given liquid mixture using surface tension method.
- (ii) Determination of viscosity/ percentage composition of given liquid mixture using viscosity method

Inorganic Chemistry

- (i) Inorganic mixture analysis Mixture analysis for 2 cation and 2 anion
- (ii) Separation of cations by paper chromatography

Organic Chemistry

- (i) Crystallization
- (ii) Sublimation
- (iii) Detection of elements
- (iv) Identification of functional group




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Faculty of Science
Class- B.sc Biology 1ST Year
Subject-Botany
Title of paper- Diversity of Lower Plants
Paper - I
Paper Code-BSCB(Y-102A)

Unit I:

Viruses and Prokaryotes: Characteristics of Viruses, general account of TMV and T4 bacteriophage, bacterial structure, nutrition, reproduction and economic importance. General account of Mycoplasma, Cyanobacteria and Actinomycetes.

Unit II:

Algae: General characters, classification and economic importance. Important features and life history of Chlorophyceae- Volvox, Oedogonium, Charophyceae-Chara, Xanthophyceae, Vaucheria, Phaeophyceae-Ectocarpus, Rhodophyceae-Polysiphonia.

Unit III

Fungi: General characters, Classification and economic importance, important features and Life history of Oomycetes- Albugo. Zygomycetes: Mucor, Ascomycetes: Yeast, Peziza. Basidiomycetes: Puccinia, Deuteromycetes: Alternaria. General account of Lichens

Unit IV

Bryophyta: General characters and classification, study of morphology, anatomy and reproduction of Hepaticopsida: Riccia, Marchantia, Anthocerotopsida: Anthoceros, Bryopsida: Polytrichum.

Unit V:

Pteridophyta: Important Characters and classification. Stele organization. Morphology and anatomy of Rhytia. Structure anatomy and reproduction in Lycopodium. Selaginella, Equisetum and Marsilea.

Suggested Readings

1. Bhojwani. S.S. & Bhargava, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin Cummings Publisher, USA



Faculty of Science
BSC BIOLOGY
Subject – Botany
First Year
Paper – Practical
CODE-BSCB(Y-102P)

Practical

1. Study of meristems through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
4. Root: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circumtropous, amphitropous/Campylotropous.
9. Female gametophyte: *Polygonum* (monosporic) type of Embryo sac Development (Permanent slides/photographs).
11. Pollination types and seed dispersal mechanisms (including appendages, aril, Caruncle) (Photographs and specimens).


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Faculty of Science

B.Sc. Ist Year

Subject-Botany

Title of paper -Diversity of Higher Plants

Paper-II

Subject code-05CB(Y-1020)

Unit-I

Gymnosperms: General Characters and Classification of Gymnosperms. Heterospory and Origin of seed habit. Diversity of gymnosperms. Geological time scale and Fossilization. Fossil Gymnosperms: Lyginopteris and Williamsonia.

Unit-II

Gymnosperm: Morphology, Anatomy, Reproduction and life cycle of cycus, Pinus and Ephedra.

Unit-III

Taxonomy: Origin and Evolution of Angiosperms: Principles and rules of Botanical nomenclature, Museum, Herbarium and Botanical gardens; Classification of Angiosperms: Bentham and Hooker, and Modern trends in Taxonomy including Molecular taxonomy. APG IV System.

Unit-IV

Terminology for plant description in semi-technical language; Diagnostic characteristics and Economic Importance of families-

Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, and Apocynaceae.

Unit-V Taxonomy: Diagnostic characteristics & Economic Importance to Families- Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae, and Poaceae.

Suggested Readings:

1. Agarwal, S.B 2007 Unified Botany, ShivalAgarwal & Company.
2. Gangulee H.C & Kar A.K 2006 College Botany Vol-III, New Central book agency p (ltd) London.
3. Vashita P.C 2005. Botany for degree students Vol-V




Professor
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)

**Faculty of science
Class- B.Sc. 1st year
Subject: Zoology
Title of Paper-Zoology-I
Paper-I
Paper Code- BSCB(Y-103A)**

UNIT I:

Classification of Non Chordates up to classes according to Parker and Haswell, (7th Edition).

1. Classification of lower Invertebrates.
2. Classification of higher invertebrates.
3. Protozoa — Type study of *Plasmodium*.
4. Porifera — Type study of *Sycon*.

UNIT II

1. Coelenterata — Type study of *Obelia*.
2. Helminthes — Type study of Liver Fluke.
3. Annelida — Type study of Earthworm, Metamerism, Trochophore Larva of nereis.

UNIT III

1. Arthropoda — Type study of Prawn.
2. Mollusca — Type study of Pila.
3. Echinodermata — External Features of Star Fish and Echinoderm Larvae.

UNIT IV

1. The cell - History of Cell Biology, Cell theory, Prokaryotic and Eukaryotic cell.
2. Microscopy: Compound and Electron Microscopy.

UNIT V

1. Nuclear Organization of cell.
2. Extra nuclear organization of cell.
3. Cell reproduction - Amitosis, mitosis.

SUGGESTED READINGS :

1. An introduction to the Invertebrates – J. Moore (Cambridge Univ. Pr.)
2. Introduction to General Zoology, Volume I – K. K. Chaki, G. Kundu, S. Sarkar (NCBA)
3. Biology of non-chordates – H.C. Nigam (Vishal Pub.)
4. General Zoology – C. A. Villee, W. F. Walker and R. D. Barnes (Saunders College Pub.)
5. Invertebrate Zoology – P. A. Meglisch and F. R. Schram (Oxford Univ Pr.)



Faculty of science
Class- B.Sc. 1st year
Subject: Zoology
Title of Paper-Zoology-II
Paper-II
Paper Code-BSCB(Y-103B)

Unit-I

1. Origin of Chordates Classification of phylum Chordata up to orders according to Parker and Haswell (Latest edition).
2. Hemichordata – External features and affinities of Balanoglossus.
3. Urochordata – Type study of Herdmania.
4. Cephalochordata – Type study of Amphioxus. Affinities of Amphioxus.

Unit-II

1. Comparison between Petromyzon and Myxine.
2. Comparative account of integuments
3. Comparative account of limb bones and girdles of vertebrates (Amphibia, Reptiles, Birds and Mammals).
4. Comparative account of digestive system.
5. Comparative account of respiratory system.

Unit - III

1. Comparative account of aortic arches and heart.
2. Comparative account of brain
3. Placentation in mammals.

Unit - IV

1. Origin of life- modern concepts only.
2. Lamarckism, Darwinism.
3. Modern synthetic theories: Variations, Mutation, isolation & speciation
4. Adaptation and mimicry
5. Micro, macro evolution and mega evolution.

Unit - V

1. Fossils, methods of fossilization, determination of age of fossils.
2. Study of extinct forms: Dinosaurs and Archaeopteryx.
3. Zoogeographical distribution.
4. Evolution of man.
5. Geological time scale and insular fauna.

SUGGESTED READINGS :

1. Text book of Zoology, Volume II, Vertebrates – Parker & Haswell (Ed. A. J. Marshall) (ELBS Macmillan)
2. Vertebrate life – F. H. Pough & W. N. McFarland (Prentice Hall)
3. The Life of Vertebrates – J. Z. Yong (ELBS Oxford)
4. Vertebrates: Comparative anatomy, function, Evolution – K. V. Kardong (WCB McGraw Hill)
5. Comparative Anatomy of Vertebrates – G.C. Kent & L. Miller (WCB Pub)

Faculty of science
CLASS: B.SC BIOLOGY
GROUP-FOUNDATION COURSE
Moral Value & Language
नैतिकमूल्य औरभाषा
Paper - I
Paper Code: FC(Y-104A)

UNIT I

हिन्दी भाषा

1. स्वतंत्रता पुकारती (कविता) -जयशंकर प्रसाद
2. पुष्प की अभिलाषा (कविता) - माखनलाल चतुर्वेदी
3. वाक्य संरचना और अशुद्धियाँ (संकलित)

UNIT II

हिन्दी भाषा

1. नमक का दरोगा (कहानी)- प्रेमचंद
2. एक थे राजा भोज (निबंध) - डॉ. विजयननाथ शुक्ल
3. पर्यायवाची, विलोम, एकांश अनेकार्थी, एवं शब्दयुग्म शब्द (संकलित)

UNIT III

नैतिक मूल्य

1. नैतिक मूल्य परिचय एवं वर्गीकरण (आलेख) -डॉ. ललिता राव
2. आचरण की सम्मता (निबंध) -सरदार पूर्णसिंह
3. अंतर्जाल और नैतिक जीवन (लेख) -डॉ. सर्वपल्ली राधाकृष्णन
4. जप्य दीपो नर (लेख) - स्वामी ब्रह्मानंद

UNIT IV

1. Where the minis without few: Rabindranath Tagore
2. The Heron: R.K.Narayan
3. Tryst with Destiny: Jawaharlal Nehru
4. [ndian weavers: Sarjini Naidu
5. The Portrait of a lady: Khushwani Singh
6. The Solitary Reaper : William Wordsworth

UNIT V

1. Basic Language Skills: Vocabulary, Synonyms, Antonyms, Word formation, Prefixes, Suffixes.
2. Basic Language Skills: Uncountable Noun, Verbs, Tenses, Adverbs.
3. Comprehension/Unseen Passage.
4. Composition and Paragraph Writing

Suggested Readings:

मध्यप्रदेश हिन्दी बोध आकादमी द्वारा प्रकाशित पुस्तकें

Faculty of science
CLASS: B.SC BIOLOGY
YEAR: I ST
GROUP-FOUNDATION COURSE
SUBJECT –DEVELOPMENT OF ENTREPRENEURSHIP

PAPER:-II
PAPER CODE: FC(Y-104B)

UNIT I

Entrepreneurship Development- Concept and importance, function of Enterpriser, Goal determination – Problems Challenges and Solutions.

UNIT II

Project Proposal – need and objects- Nature of organization, Production Management, Financial Management, Marketing Management, Consumer Management.

UNIT III

Role of regulatory Institutions, Role of development Organization, and self employment oriented schemes. various growth schemes.

UNIT IV

Financial Management for Project- Financial Institution and their role, Capital estimation and arrangement, cost and price determination, accounting management.

UNIT V

Problem of entrepreneur- Problem relating Capital, Problem relating Registration, administration problem and how to overcome from above problems.

Suggested Readings:

मध्यप्रदेश हिन्दी बंध आकादमी द्वारा प्रकाशित पुस्तकें




Faculty of Science
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)

Faculty of Science
Class-B.Sc Mathematics 1ST Year
Subject-Chemistry
Title of paper-Inorganic Chemistry
Paper - I
CODE- BSCM(Y-101A)

Unit - I Atomic Structure:

Dual Nature of matter idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and ψ^2 , Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, and d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule Electronic configuration of the elements, effective nuclear charge.

Unit - II Chemical Bonding - Part I

Covalent Bond - Valence bond theory and its limitations. Directional characteristics of covalent bond. Various types of hybridization and shapes of simple inorganic molecules ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_2O , SF_4 , ClF_3 , and H_2O , MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy.

Unit III Chemical Bonding Part II:

Ionic Solids- Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and Polarizability of ions. Fajan's rule, Metallic bond- free electron, valence bond and band theories. Weak Interactions- Hydrogen bonding, van der Waals forces.

Unit IV: S- Block Elements:

Comparative study Li and Mg, diagonal relationships, salient features of hydrides. Solvation and complexation tendencies including their functions in bio systems and introduction to alkyls and aryls.

Unit V: P- Block Elements Part - I:

Comparative study Be and Al (including diagonal relationship) of group 13-17 elements. Compound like hydrides, Oxides, Oxyacids and halides of groups 13-16.

p- Block Elements Part- II: Hydrides of boron-diborane and higher boranes, borazine, boronhydrides, Fullerenes, fluorocarbons, silicates (structural principle), tetrathiothiuric trioxide, basic properties of halogens, interhalogens and polyhalides.

Reference Books:

1. Inorganic Chemistry, - J D Lee, Pearson Education
2. Inorganic Chemistry- Cotton and Wilkinson, John Wiley
3. Inorganic Chemistry - Huheey, Harper Collins Pub. USA
4. Inorganic Chemistry - G.R Chhatwal, Himalaya Publication



Faculty of Science
Class-Mathematics 1ST Year
Subject-Chemistry
Title of paper-Physical Chemistry
Paper – II
CODE-BSCM(Y-101B)

Unit – I Gaseous States and Molecular Velocities:

Critical Phenomenon: PV isotherms of ideal gases. Andrew's experiment, continuity of state, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constants, Root mean square, average and most probable velocities Qualitative discussion of the Maxwell's distribution of molecular velocities. Collision numbers, mean free path and collision diameter.

Unit – II Liquid State:

Intermolecular forces, structure of Liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, Solid and liquid. Classification. Structure of nematic and cholesteric phases. Thermography and seven segment cell.

Unit III Chemical Kinetics:

Chemical kinetics and its scope, rate of a reaction. Factors influencing the rate of a reaction, concentration, temperature, pressure, solvent, light and catalyst. Dependence of rate on concentration, mathematical. Characteristics of simple chemical reaction-zero order, First order, second and pseudo order, half – life and mean life. Determination of the order of reaction, Differential method. Integration method and half life method. Study of chemical kinetics by polarimetry and spectrophotometry. Effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy. Simple collision theory. Transition state theory (equilibrium hypothesis).

Unit IV: Radioactivity and Nuclear Chemistry:

Natural and artificial radioactivity, radioactive radiations, detection and measurement of radioactive radiation, theory of radioactivity. Group displacement law of soddy, radioactive disintegration, nuclear reactions, nuclear fission and nuclear fusion, half life period, isotopes. Isobars and isomers, application of radiochemistry.

Unit V:

A. Chemical Equilibrium :

Law of mass action, Equilibrium constant, Lechatelier's Principles.

B. Colloidal Solutions: Classification, lyophilic and lyophobic colloids, properties; Kinetic, optical and electrical, coagulation. Hardy- Schulze rule, gold number, emulsions, gels and sols, application of colloidal.

Reference Books:

- 1- Physical Chemistry – Puri, Sharma and Pathania- Vikas Publications, New Delhi
- 2- Physical Chemistry – GM Barrow, International Student Edition McGraw Hills
- 3- The Elements of Physical Chemistry, PW Atkins, Oxford University Press
- 4- Physical Chemistry – R A Alberty, Wiley Eastern Limited
- 5- Physical Chemistry Through Problems, SK Dograjn

Faculty of Science
Class-B.sc Mathematics IST Year
Subject-Chemistry
Title of paper-Organic Chemistry
Paper – III
CODE- BSCM(Y-101C)

Unit – I Spectroscopy:

Nuclear Magnetic Resonance Spectroscopy. Proton Magnetic Resonance (1H NMR) Spectroscopy Nuclear shielding and dis-shielding, chemical shift and molecular structure, spin-spin coupling and coupling constant, region of signals. Explanation of PMR spectra of simple organic molecules like ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromo ethane, ethyl acetate, toluene and acetophenone. Applications of UV, IR and PMR spectroscopy for simple organic compounds.

Unit – II Organo- Metallic compounds:-

Organ magnesium compound- Grignard reagent, preparations, structure and chemical reactions. Organ zinc compounds- Preparations and chemical reactions. Organ lithium compounds- Preparations and chemical reactions.

Unit III Fat, Oil and Detergents:

Natural fat, edible and industrial oil of plant origin. Normal fatty acids, glycerides. Hydrogenation of unsaturated oil, saponification value, iodine value and acid value. Synthetic Detergents:- Alkyl and aryl Sulphonate.

Unit IV -

Amino Acid, Peptide, Protein and nucleic acid, Classification of amino acids, structure and stereo chemistry. Acid base behavior, isoelectric point and electrophoresis. Preparations and chemical reactions of alpha amino acids.

Unit V –

Introductory idea about five- and six – membered condensed heterocyclic compounds. Indole, Quinoline and isoquinoline- preparations and chemical properties (Fischer- Indole synthesis, Skraup's synthesis. BischlerNapieralsky synthesis) Electrophilic substitution reactions of Indole, Quinoline and Isoquinoline

Reference Books:

1. Organic Chemistry, Morrison and Boyd, Prentice Hall
2. Organic Chemistry, LG Wade Jr, Prentice Hall
3. Fundamentals of Organic chemistry, Solomon, John Wiley


Sri Satya Sai University of Technology & Medical Sciences
Faculty of Science
Department of Chemistry
Schore (M.P.)



Faculty of Science
BSC Mathematics
Subject – Chemistry
First Year
Paper – Practical BSCM(Y-101P)

Physical Chemistry

(A) Any one experiment

- (i) Determination of melting point
- (ii) Determination of boiling point
- (iii) Weighing and preparation of Solution

(B) Any one experiment

- (i) Determination of surface tension/percentage composition of given liquid mixture using surface tension method.
- (ii) Determination of viscosity/ percentage composition of given liquid mixture using viscosity method

Inorganic Chemistry

- (i) Inorganic mixture analysis Mixture analysis for 2 cation and 2 anion
- (ii) Separation of cations by paper chromatography

Organic Chemistry

- (i) Crystallization
- (ii) Sublimation
- (iii) Detection of elements
- (iv) Identification of functional group


Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)



Faculty of science
B.SC Mathematics 1st year
Subject – Physics

Paper Title – Mathematical Physics, Mechanics and Properties of Matter
Paper – I
Paper code-BSCM(Y-102A)

Unit – I Mathematical Physics

Addition, subtraction and product of two vectors: Polar and axial vector and their examples from physics. Triple and quadruple product (without geometrical applications): Scalar and vector field; Differentiation of a vector: Repeated integral of a function of more than one variable; Unit tangent vector and unit normal vector; Gradient, Divergence and Curl; Laplacian operator; Idea of line, Surface and volume integrals; Stokes' and Green's theorems.

Unit – II Mechanics

Position, Velocity and acceleration vector, Components of velocity and acceleration in different coordinate systems, Newton's Laws of motion and its explanation with problems various types of forces in nature (explanation), Pseudo Forces (e.g. Centrifugal Force), Coriolis force and its applications. Motion under a central force, Derivation of Kepler's laws. Gravitational law and field. Potential due to a spherical body. Gauss & Poisson equation of Gravitational Self-energy. System of particles, Centre of mass and reduced Mass, Elastic and inelastic collisions.

Unit-III General Properties of Matter

Elastic moduli and their relations, Determination of Y of rectangular thin bar loaded at the Centre; Torsional oscillations, Torsional rigidity of a wire, to determine by torsional oscillations. Surface Tension, Angle of Contact, Capillary Rise Methods; Energy required to rise a liquid in capillary tube; Factors affecting surface tension; Jaeger's Method for Determination of Surface Tension; Applications of surface Tension, Concept of Viscous Forces and viscosity; Steady and Turbulent Flow, Reynolds's Number; Equation of Continuity; Bernoulli's Principle; Application of Bernoulli's equation- (i) Speed of Efflux (ii) Venturimeter (iii) Aspirator Pump (iv) Change of Plane of Motion of a spinning ball.

Unit IV: Oscillations

Concept of Simple, Periodic & Harmonic Oscillation With Illustrations; Differential equation of harmonic oscillator; Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring; Translational and Rotational motion, Moment of Inertia and their Production, Principal moments and axes, Motion of Rigid Body, Euler's equation.

Unit V:

Relativistic Mechanics; Michelson- Morley experiment and its outcome; Postulates of Special Theory of Relativity; Lorentz Transformation, Simultaneity and order of events; Lorentz contraction; Time dilation; Relativistic transformation of velocity, Frequency and Wave number; Relativistic addition of Velocities; Variation of Mass with velocity.

Earlier Development in Physics up to 18th Century; Contribution of Aryabhata, Archimedes, Nicolus Copernicus, Galileo Galilei, Huygens, Robert Hooke,

Toricelli, Verrier, Pascal, Kepler, Newton, Boyle, Young, Thompson, Coulomb, Amperes, Gauss, Biot-Savarts, Cavendish, Galvani, Franklin and Bernoulli.

Reference Books:

1. University Physics: Sears and Zeemansky, XIth edition, Pearson Education
2. Concept of Physics: H.C. Verma, Bharati Bhawan Publishers
3. Problems in Physics: P.K. Srivastava, Willey Eastern Ltd.



Faculty of science
B.Sc Mathematics 1st year
Subject – Physics
Paper Title – Thermodynamics and Statistical Physics
Paper – II
Paper code-BSCM(Y-102B)

Unit- I: Thermodynamics – I Reversible and irreversible process, Heat engine, Definition of Efficiency, Carnot's Ideal heat engine, Carnot's Cycle, Effective way to increase efficiency, Carnot's engines and refrigerator, Coefficient of Performance, Second law of thermodynamics, Various Statements of Second law of thermodynamics, Carnot's theorem, Clapeyron's latent heat equation, Carnot's cycle and its applications, Steam engine, Otto engine, Petrol engine, Diesel engine.

Unit – II: Thermodynamics-II

Concept of entropy, Change in entropy in adiabatic process, Change in entropy in reversible cycle, Principle of increase of entropy, Change in entropy in irreversible process, T-S diagram, Physical significance of Entropy of a Perfect gas, Kelvin's Thermodynamic scale of temperature, The Size of a degree, Zero of absolute scale, Identity of a perfect gas scale and absolute scale, Third law of Thermodynamics, Zero Point energy, Negative temperature (not possible), Heat death of the universe, Relation between thermodynamic Variable (Maxwell's relations).

Unit- III: Statistical Physics – I

Description of a system: Significance of statistical approach, Particle-States System-states, Microstates and Macro-states of a system, Equilibrium states, Fluctuations, Classical & Statistical Probability, The equi-probability postulate, Statistical ensemble, Number of states accessible to a system, Phase space, Micro Canonical Ensemble, Canonical Ensemble, Helmholtz free energy, Enthalpy, First law of thermodynamics, Gibbs free energy, Grand Canonical Ensemble.

Unit – IV Statistical Physics-II

Statistical Mechanics: Phase Space, The probability of a distribution, The most probable distribution and its narrowing with increase in number of particles, Maxwell- Boltzmann statistics, Molecular speeds, Distribution and mean, R.m.s and most Probable velocity, Constraints of accessible and inaccessible states, Quantum Statistics: Partition Function Relation between Partition Function and Entropy, Bose- Einstein Statistic, Black- body radiation, The Rayleigh –Jeans formula, The Plank radiation formula, Fermi-Dirac statistics, Comparison of result, Concept of phase transition.

Unit – V: Contribution of Physics

S.N. Bose, M.N. Saha, Maxwell, Clausius, Boltzmann, Joule, Wien, Einstein, Planck, Bohr, Heisenberg, Fermi, Dirac, Max Born, Bardeen.

Text and Reference Books:

1. **Heat and Thermodynamics:** Marks W. Zemansky, Richard H. Dittman. Seventh Edition, McGraw- Hill International Editions.
2. **Thermal Physics (Heat and Thermodynamics):** A.B. Gupta, H.P. Roy, Books and Allied (P) Ltd. Calcutta.
3. **Laboratory Manual of Physics for Undergraduate classes.** D.P. Khandelwal, Vani Publishing House, New Delhi.

Faculty of science
B.SC Mathematics 1st year
Subject – Physics
Paper code-BSCM(Y-102P)

List of Practical's

1. To verify laws of parallel and perpendicular axes for moment of inertia
2. To determine acceleration due to gravity using compound pendulum.
3. To determine damping coefficient using a bar pendulum.
4. To determine Young's Modulus by bending of beam method.
5. To determine Young's Modulus using Cantilever Method.
6. To determine coefficient of rigidity by static method.
7. To determine coefficient of rigidity by dynamic method.
8. To determine Surface Tension by Jaeger's method.
9. To determine Surface Tension of a liquid by capillary rise method.
10. To determine Viscosity of fluid using Poiseuille's method.
11. To study conversion of mechanical energy into heat using calendar & Barne's method.
12. To determine heating efficiency of electrical kettle with various voltages.
13. To determine heating temperature coefficient of resistance using platinum resistance thermometer.
14. To determine thermo electromotive force by a thermocouple method.
15. To determine heating efficiency of electrical kettle with various voltages.
16. To determine heat conductivity of bad conductors of different geometry by Lee's method.
17. To verify Newton's Laws of cooling.
18. To determine specific heat of Coefficient of thermal conductivity by Searl's method.
19. To determine specific heat of a liquid.
20. To compare Maxwell-Boltzmann, Bose Einstein and Fermi-Dirac Distribution Function vs temperature using M.S. Excel, C++
21. To Plot equation of state and Vander-wall equation with temperature using M.S. Excel/C++



Responsible
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)

Faculty of science
B.SC Mathematics 1st year
Subject – Mathematics
Paper Title – Algebra and Trigonometry
Paper – I
Paper code-BSCM(Y-103A)

Unit -I

Rank Of matrix, Normal & Echelon form of a matrix. Characteristic equation of a matrix. Eigen values. Eigen vectors. Linear Independence of row and column matrix.

Unit-II

Cayley Hamilton theorem and its use in finding inverse of a matrix. Application of matrix to solve a system of linear (homogenous and non-homogenous) equations. Theorems on consistency and inconsistency of a system of linear equations. Solving linear equation upto three unknowns.

Unit - III

Relation between the roots and coefficients of a general polynomial equation in one variable. Transformation of equations. Reciprocal equations. Descarte's rule of signs.

Unit -IV

Logic- Logical connectives. Truth Tables. Tautology. Contradiction, Logical Equivalences, Algebra of propositions. Boolean Algebra-definition and properties. Switching circuits and its applications. Logic gates and circuits.

Unit-V

De-Moivre's theorem and its application. Direct and inverse circular and hyperbolic functions. Expansion of trigonometric functions. Logarithm of complex quantities. Gregory's series. Summation of trigonometrically series.

Text Books:

1. S.I. Loney- Plane Trigonometry Part - II
2. K.B. Datta- Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd. New Delhi 2006.
3. Chandrika Prasad - A Text Book on Algebra and theory of Equations, Pothishala Pvt. Ltd. Aabad.
4. C. L. Liu-Elements of Discrete Mathematics (Second Edition). McGraw Hill, International Edition, Computer Science Series. 1986.
5. म.प्र. हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Book:

1. H.S. Hall and S.R. Knight-Higher Algebra I.I.M Publication, 1984
2. N. Jacobson-Basic Algebra Vol. I and II. W.H Freeman.
3. N. Saran and R.S. Gupta- Analytic Geometry of three Dimension, Pothishala Pvt. Ltd. Allahabad

Faculty of science
B.SC Mathematics 1st year
Subject – Mathematics
Paper Title – Calculus and Differential Equations
Paper – II
Paper code- BSCM(Y-103B)

Unit -I

Successive Differentiation, Leibniz theorem, Maclaurin's and Taylor's series expansions, Asymptotes.

Unit -II

Curvature, tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates.

Unit -III

Integration of transcendental function, Definite Integrals. Reduction Formulae, Quadrature, Rectification.

Unit - IV

Linear differential equations and equations reducible to the linear form, exact differential equations. First order and higher degree equations solvable for x , y and p , Clairaut, s equation and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories.

Unit -V

Linear differential equation with constant coefficients, Homogeneous Linear ordinary differential equations. Linear differential equations of second order, transformation of equations by changing the dependent variable Independent variable. Method of variation of parameters.

Text Books:

1. Gorakh Prasad -Differential Calculus. Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad - Integral Calculus. Pothishala Private Ltd. Allahabad.
3. D. A. Murray - Introductory Course in Differential Equations. Oriel Longman (India) 1967.
4. मध्यप्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Books:

1. G.F. Simmons-Differential Equations. Tata McGraw Hill, 1972.
2. E.A. Codington- an Introduction to ordinary differential Equation, Printice Hall of India, 1961.
3. H.T.H Piaggio- Elementary Treatise on Differential Equations and their Application. C.B.S Publisher & Distributors. Delhi. 1985

Faculty of science
B.SC MATHEMATICS 1st YEAR
Subject – Mathematics
Paper Title – Vector Analysis and Geometry
Paper – III
Paper code- BSCM(Y-103C)

Unit- I

Scalar and vector product of three vectors, product of four vectors. Reciprocal vectors. Vector differentiation. Gradient, Divergence and curl.

Unit -II

Vector Integration. Theorems of Gauss, Green, Stoke (without Proof) and Problems based on them.

Unit-III

General equation of second degree. Tracing of conics. System of conics. polar equation of a conic.

Unit-IV

Equation of cone with given base. Generators of cone. Condition for three mutually perpendicular generators. Right circular cone, equation of cylinder and its properties.

Unit- V

Central conicoids, Paraboloids, plane sections of conicoids. Generating lines.

Text Books:

1. N. Sarn and S.N. Nigam- Introduction to Vector Analysis. Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H.C. Gupta-Text Book on Coordinate Geometry. Pothishala Pvt. Ltd. Allahabad
3. N. Sarn and R.S Gupta- Analytical Geometry of Three Dimensions. Pothishala Pvt. Ltd Allahabad (Unit- IV)

Reference Books:

1. R.J.T. Bell- Elementary Treatise on Coordinate Geometry of Three Dimensions, Macmillan India Ltd. 1994 (Unit-V)
2. Murray R. Spiegel-Theory and Problems of Advance Calculus. Schaum Publishing Company. New York.
3. Murray R. Spiegel- Vector Analysis. Schaum Publishing Company. New York.
4. Shanti Narayan- a Text Book of Vector Calculus, S. Chand & Co. New Delhi.



Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)

FACULTY OF SCIENCE
CLASS: B.SC MATHEMATICS
GROUP-FOUNDATION COURSE

Moral Value & Language
uSfrdewY; vkSjHkk"kk

Paper – I

Paper Code: FC(Y-104A)

UNIT I

हिन्दी भाषा

1. स्वतंत्रता पुकारती (कविता) – जयशंकर प्रसाद
2. पुष्प की अभिलाषा (कविता) – माखनलाल चतुर्वेदी
3. वाक्य संरचना और अशुद्धियाँ (संकलित)

UNIT II

हिन्दी भाषा

1. नमक का दरोगा (कहानी) – प्रेमचंद
2. एक धे राजा भोज (निबंध) – डॉ. विभुवननाथ शुक्ल
3. पर्यायवाची, विलोम, एकार्थी अनेकार्थी, एवं शब्दयुग्म शब्द (संकलित)

UNIT III

नैतिक मूल्य

1. नैतिक मूल्य परिचय एवं वर्गीकरण (आलेख) – डॉ. शशि राय
2. आचरण की सम्यता (निबंध) – सरदार पूर्णसिंह
3. अंतर्ज्ञान और नैतिक जीवन (लेख) – डॉ. सर्वपल्ली राधाकृष्णन
4. अप्प दीपो भव (लेख) – स्वामि श्रद्धानंद

UNIT IV

1. Wheretheminiswithoutfear: RabindranathTagore
2. TheHero: R.K.Narayan
3. TrystwithDestiny: JawaharlalNehru
4. Indianweavers: SarjiniNaidu
5. ThePortraitofalady: KhushwaniSingh
6. TheSolitaryReaper : WilliamWordsworth

UNIT V

1. BasicLanguageSkills:
Vocabulary, Synonyms, Antonyms, Word formation, Prefixes, Suffixes.
2. BasicLanguageSkills: Uncountable Noun, Verbs, Tenses, Adverbs.
3. Comprehension/Unseen Passage.
4. Composition and Paragraph Writing

Suggested Readings:

मध्य प्रदेश हिन्दी ग्रंथ आकादमी द्वारा प्रकाशित पुस्तकें

FACULTY OF SCIENCE
CLASS: B.SC MATHEMATICS
YEAR: I ST
GROUP-FOUNDATION COURSE
SUBJECT -DEVELOPMENT OF ENTREPRENEURSHIP
PAPER:-II
PAPER CODE:FC(Y-104B)

UNIT I

Entrepreneurship Development- Concept and importance, function of Enterpriser, Goal determination – Problems Challenges and Solutions,

UNIT II

Project Proposal – need and objects- Nature of organization, Production Management, Financial Management, Marketing Management, Consumer Management.

UNIT III

Role of regulatory Institutions, Role of development Organization, and self employment oriented schemes, various growth schemes.

UNIT IV

Financial Management for Project- Financial Institution and their role, Capital estimation and arrangement, cost and price determination, accounting management.

UNIT V

Problem of entrepreneur- Problem relating Capital, Problem relating Registration, administration problem and how to overcome from above problems.

Suggested Readings:

मध्यप्रदेश हिन्दी ग्रंथ आकादमी द्वारा प्रकाशित पुस्तकें





Faculty of Science
Class- Microbiology IST Year
Subject-Chemistry
Title of paper-Inorganic Chemistry
Paper - I
CODE- BSCMB(Y-101A)

Unit - I Atomic Structure:

Dual Nature of matter idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of ψ and ψ^2 , Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule Electronic configuration of the elements, effective nuclear charge.

Unit - II Chemical Bonding - Part I

Covalent Bond - Valence bond theory and its limitations. Directional characteristics of covalent bond. Various types of hybridization and shapes of simple inorganic molecules ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_2O , SF_4 , ClF_3 , and H_2O , MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy.

Unit III Chemical Bonding Part II:

Ionic Solids- Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born- Haber cycle, solvation energy and solubility of ionic solids, polarizing power and Polarizability of ions, Fajan's rule. Metallic bond- free electron, valence bond and band theories. Weak Interactions- Hydrogen bonding, van der waals forces.

Unit IV: s- Block Elements:

Comparative study Li and Mg, diagonal relationships, salient features of hydrides, Solvation and complexation tendencies including their functions in bio systems and introduction to alkyls and aryls.

Unit V: p- Block Elements Part - I:

Comparative study Be and Al (including diagonal relationship) of group 13-17 elements. Compound like hydrides, Oxides, Oxyacids and halides of groups 13-16.

p- Block Elements Part- II: Hydrides of boron-diborane and higher boranes, borazine, borohydrides, Fullerenes, fluorocarbons, silicates (structural principle), tetrathiothiurtriantride, basic properties of halogens, interhalogens and polyhalides.

Reference Books:

1. Inorganic Chemistry, - J D Lee, Pearson Education
2. Inorganic Chemistry- Cotton and Wilkinson, John Wiley
3. Inorganic Chemistry - Huheey, Harper Collins Pub. USA
4. Inorganic Chemistry - GR Chhatwal, Himalaya Publication




Faculty
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)

Faculty of Science
Class- Microbiology 1ST Year
Subject- Chemistry
Title of paper- Physical Chemistry
Paper - II
CODE- BSCMB(Y-1018)

Unit - I Gaseous States and Molecular Velocities:

Critical Phenomenon: PV isotherms of ideal gases, Andrew's experiment, continuity of state, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constants, Root mean square, average and most probable velocities Qualitative discussion of the Maxwell's distribution of molecular velocities, Collision numbers, mean free path and collision diameter.

Unit - II Liquid State:

Intermolecular forces, structure of Liquids (a qualitative description) Liquid crystals: Difference between liquid crystal. Solid and liquid. Classification, Structure of nematic and cholesteric phases. Thermography and seven segment cell.

Unit III Chemical Kinetics:

Chemical kinetics and its scope, rate of a reaction. Factors influencing the rate of a reaction, concentration, temperature, pressure, solvent, light and catalyst. Dependence of rate on concentration, mathematical. Characteristics of simple chemical reaction-zero order, First order, second and pseudo order, half - life and mean life. Determination of the order of reaction, Differential method, Integration method and half life method. Study of chemical kinetics by polarimetry and spectrophotometry. Effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy. Simple collision theory. Transition state theory (equilibrium hypothesis).

Unit IV: Radioactivity and Nuclear Chemistry:

Natural and artificial radioactivity, radioactive radiations, detection and measurement of radioactive radiation, theory of radioactivity. Group displacement law of soddy, radioactive disintegration, nuclear reactions, nuclear fission and nuclear fusion, half life period, isotopes. Isobars and isomers, application of radiochemistry.

Unit V:

A. Chemical Equilibrium :

Law of mass action, Equilibrium constant, Lechatelier's Principles.

B. Colloidal Solutions: Classification, lyophilic and lyophobic colloids, properties: Kinetic, optical and electrical, coagulation, Hardy- Schulze rule, gold number, emulsions, gels and sols, application of colloids.

Reference Books:

- 1- Physical Chemistry - Puri, Sharma and Pathania- Vikas Publications, New Delhi
- 2- Physical Chemistry - GM Barrow, International Student Edition McGraw Hills
- 3- The Elements of Physical Chemistry, PW Atkins, Oxford University Press
- 4- Physical Chemistry - R A Alberty, Wiley Eastern Limited
- 5- Physical Chemistry Through Problems, SK Dograjn

Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject-Chemistry
Title of paper-Organic Chemistry
Paper - III
CODE-BSCMB(Y-101C)

Unit - I Spectroscopy:

Nuclear Magnetic Resonance Spectroscopy. Proton Magnetic Resonance (1H NMR) Spectroscopy Nuclear shielding and dis-shielding, chemical shift and molecular structure, spin-spin coupling and coupling constant, region of signals, Explanation of PMR spectra of simple organic molecules like ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromo ethane, ethyl acetate, toluene and acetophenone. Applications of UV, IR and PMR spectroscopy for simple organic compounds.

Unit - II Organo- Metallic compounds:-

Organ magnesium compound- Grignard reagent, preparations, structure and chemical reactions. Organ zinc compounds- Preparations and chemical reactions. Organ lithium compounds- Preparations and chemical reactions.

Unit III Fat, Oil and Detergents:

Natural fat, edible and industrial oil of plant origin, Normal fatty acids, glycerides, Hydrogenation of unsaturated oil, saponification value, iodine value and acid value. Synthetic Detergents:- Alkyl and aryl Sulphonate.

Unit IV -

Amino Acid, Peptide, Protein and nucleic acid, Classification of amino acids, structure and stereo chemistry, Acid base behavior, isoelectric point and electrophoresis. Preparations and chemical reactions of alpha amino acids.

Unit V -

Introductory ideas about five- and six - membered condensed heterocyclic compounds, Indole, Quinaline and isoquinoline- preparations and chemical properties (Fischer- Indole synthesis, Skraup's synthesis, BischlerNapieralsky synthesis) Electrophilic substitution reactions of Indole, Quinoline and Isoquinoline

Reference Books:

1. Organic Chemistry, Morrison and Boyd, Prentice Hall
2. Organic Chemistry, LG Wade Jr, Prentice Hall
3. Fundamentals of Organic chemistry, Solomon, John Wiley



Registrar
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of Science
BSC MICROBIOLOGY 1ST YEAR
Subject - Chemistry
First Year
Paper - Practical BSCMB(Y-101P)

Physical Chemistry

(A) Any one experiment

- (i) Determination of melting point
- (ii) Determination of boiling point
- (iii) Weighing and preparation of Solution

(B) Any one experiment

- (i) Determination of surface tension/percentage composition of given liquid mixture using surface tension method.
- (ii) Determination of viscosity/ percentage composition of given liquid mixture using viscosity method

Inorganic Chemistry

- (i) Inorganic mixture analysis Mixture analysis for 2 cation and 2 anion
- (ii) Separation of cations by paper chromatography

Organic Chemistry

- (i) Crystallization
- (ii) Sublimation
- (iii) Detection of elements
- (iv) Identification of functional group


Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject-Botany
Title of paper-Diversity of Lower Plants
Paper – I
Code-BSCMB(Y- 102A)

Unit I: Viruses and Prokaryotes: Characteristics of Viruses, general account of TMV and T4 bacteriophage, bacterial structure, nutrition, reproduction and economic importance. General account of Mycoplasma, Cyanobacteria and Actinomycetes.

Unit II: Algae: General characters, classification and economic importance. Important features and life history of Chlorophyceae- Volvox, Oedogonium, Charophyceae- Chara, Xanthophyceae, Vaucheria, Phaeophyceae- Ectocarpus, Rhodophyceae- Polysiphonia.

Unit III Fungi: General characters, Classification and economic Importance, important features and Life history of Oomycetes- Albugo, Zygomycetes: Mucor, Ascomycetes: Yeast, Peziza, Basidiomycetes: Puccinia, Deuteromycetes: Alternaria. General account of Lichens

Unit IV Bryophyta: General characters and classification, study of morphology, anatomy and reproduction of Hepaticopsida: Riccia, Marchantia, Anthocerotopsida: Anthoceros, Bryopsida: Polytrichum

Unit V: Pteridophyta: Important Characters and classification. Stele organization. Morphology and anatomy of Rhynia. Structure anatomy and reproduction in Lycopodium, Selaginella, Equisetum and Marsilea.

Suggested Readings

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth. J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA


Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)

Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject-Botany
Title of paper-Diversity of Higher Plants
Paper – II
Code: BSCMB(Y- 102B)

Unit-I Gymnosperms: General Characters and Classification of Gymnosperms, Heterospory and Origin of seed habit, Diversity of gymnosperms, Geological time scale and Fossilization. Fossil Gymnosperms: Lyginopteris and Williamsonia.

Unit-II Gymnosperm: Morphology, Anatomy, Reproduction and life cycle of cycas, Pinus and Ephedra.

Unit-III Taxonomy: Origin and Evolution of Angiosperms; Principles and rules of Botanical nomenclature, Museum, Herbarium and Botanical gardens; Classification of Angiosperms: Bentham and Hooker, and Modern trends in Taxonomy including Molecular taxonomy. APG IV System.

Unit-IV Terminology for plant description in semi-technical language; Diagnostic characteristics and Economic Importance of families- Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, and Apocynaceae.

Unit-V Taxonomy: Diagnostic characteristics & Economic Importance to Families- Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae, and Poaceae.

Suggested Readings:

Agarwal, S.B 2007 Unified Botany, Shival Agarwal & Company.

Gangulee H.C & Kar A.K 2006 College Botany Vol-III, New Central book agency p (Itd) London.

Vashita P.C 2005. Botany for degree students Vol-V


Principal
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



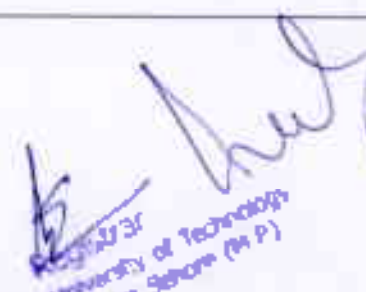
Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject- Botany
First Year
Paper – Practical
CODE-BSCMB(Y-102P)

Practical

1. Study of meristems through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
4. Root: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circumtropous, amphitropous/ Campylotropous.
9. Female gametophyte: *Polygonum* (monosporic) type of Embryo sac Development (Permanent slides/photographs).
11. Pollination types and seed dispersal mechanisms (including appendages, aril, Caruncle) (Photographs and specimens).

Suggested Readings

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA


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Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject-Microbiology
Title of paper-General Microbiology and Cell Biology-I
Paper - I
Code: BSCMB(Y-103A)

UNIT I

Introduction to Microbiology, History, Scope and Development of Microbiology, Branches of Microbiology, Concept of disease, Contributions of various microbiologists of India and Abroad, Applications of Microbiology in human welfare.

UNIT II

Classification, general characteristics and structure of bacteria (Eubacteria and Archaeobacteria), Ultrastructure of bacterial cell. Surface appendages- flagella, pili, pili, pili and fimbriae, Surface layers of bacteria- sheath, glycocalyx and cell wall, Internal cell structures- cell membrane, internal membrane system, Mesosomes and Gas vacuoles, Cytoplasmic matrix- Ribosomes, Nucleoid and cytoplasmic inclusions, Dormant structures- Endospores. Cysts and Endospore structure of Cyanobacteria, Actinomycetes, Mycoplasma, Rickettsia and Chlamydia with emphasis on function of each part components.

UNIT III

Classification, brief introduction to classes of fungi, general characteristics, cell wall, mycelium modification, nutrition, heterokaryosis, structure with emphasis on function of each part and components of cell, Sexual and asexual reproduction, Economic importance of fungi.
Classification, general characteristics, morphology and structure of phages, phage nucleic acids, Virus host, General features of virus reproduction, Lytic and lysogenic cycle and their mechanism, DNA and RNA viruses, T4, TMV, Pot virus, Prions, Viroids, Virusoid and Viroid

UNIT IV

Structural organization and function of cell organelles, Cell cycle, cell division, Membrane transport and intracellular transport, cell locomotion, cellular responses, cell differentiation and senescence.

UNIT V

Isolation and maintenance of Microorganisms, Pure, mixed, mixed culture, serial, isolate, clone- Definitions, Pure culture techniques, Dilution, Plating- pour plate method, spread plate method, streak plate method, Enrichment culture and micro-manipulator, Maintenance and preservation of pure cultures, subculturing, overlaying, cultures with mineral oils, lyophilization, sand cultures, storage at low temperature, Major Microbial Culture Collection Centers in India


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9. Isolation of bacteria by pour plate method.
10. Isolation of bacteria by streak plate method.
11. Isolation of bacteria by spread plate method.
12. Preparation of smear and microscopic examinations of Fungi – *Mucor* spp., *Aspergillus* spp., *Penicillium* spp. & *Alternaria* spp. Bacteria – *Staphylococcus* spp. *Lactobacillus* spp. *Escherichia* spp. *Vibrio* spp. & *Leptospira* spp.
13. Staining techniques – Simple staining, Differential staining (Gram's, Ziehl-Neelsen), Spore and Capsular staining methods.
14. Designing of at least two innovative experiments based on the available facility in the college/ University related to subject.


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Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject-Microbiology
Title of paper-General Microbiology and Cell Biology-II
Paper - II
Code:85CMB(Y-103B)

UNIT I

Principle and working of Bright field Microscopy, Dark Field Microscopy, Phase Contrast Microscopy, UV and Fluorescent Microscopy, Electron Microscopy, Types of Electron Microscope (TEM & SEM), Preparation of Specimen, Advantages, limitations and applications of microscopy, Use of Software in Microscopy.

UNIT II

Instrumentation techniques, basic principle, function and applications of Autoclave, Oven, BOD incubator, Laminar Air Flow, Coliforms, Spectrophotometer, Centrifugation, Basic principles of sedimentation, methods and applications, Chromatography, types of chromatography and applications of Chromatography.

UNIT III

Order and stage microscopy, Cell count, Hemacytometry, Use of Covers Lucids, Stain and staining techniques- Chemistry of dyes and stains, Fixation, Stains, Types of staining- Monochromic, negative staining, Differential staining - Organ staining and Acid Fast staining, Cell wall staining, Metachromatic granule staining, Capsule staining.

UNIT IV

Types of media, Preparation of media, Characteristics of growth medium, Sterilization, Mode of action of antimicrobial agents, Physical agents, Applications of high temperatures for destruction of Microorganisms- Moist heat, boiling water Penetration, dry-heat, Incubation, low temperatures, desiccation, lyophilization, Osmotic pressure, plasmolysis and plasmoptysis, Radiation- Ultraviolet light, X- rays, Gamma rays, Cathode rays.

Chemical Agents, Characteristics of an ideal antimicrobial chemical agent, disinfectant, antiseptic, sanitizer, germicide, fungicide, bacteriostatic, antimicrobial agent, Criteria for selection of chemical agent for practical applications, Major groups of chemical antimicrobial agents and their mode of action.


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UNIT V

Principle of Biostatistics, Classification of Data, Tabulation and graphical representation, Measure of Central tendency, Mean, Mode, Median- merits and demerits. Measure of Dispersion Range, Mean Deviation, Variance and Standard Deviation, χ^2 (Chi square), t-test and F-test.

Bioinformatics, Basic Organization of Computer, Computer Hardware, Software, Bit, Byte, Computer Memory, Binary Code, Binary System, Introduction to Bioinformatics, Database and applications of Bioinformatics.

List of suggested books:

- Microbiology-Pelczar MJ, Chan ECS & Krieg NR, 5th edition (Tata McGraw-Hill, New Delhi).
- Fundamentals of Microbiology-Frothingham M, Hindle RD, Crabtree RT & Goodheart CB, 4th edition (W.B. Saunders Co.).
- Fundamental Principles of Bacteriology -Salle AJ, 7th edition (Tata McGraw-Hill, New Delhi).
- Microbiology- Prescott LM, Harley JP & Klein DA, 7th edition (Wm. C. Brown Publishers, USA) Elementary Microbiology-Modi, HA (Vol.1), 1st edition (Elite Publication, Noida).
- A Handbook of Elementary Microbiology-Modi, HA, 1st edition (Sri Sai Publication, Sahakar).
- A Textbook of Microbiology- Dubey RC & Maheshwari EK, 2nd edition (S Chand & Co. N. Delhi).
- General Microbiology (Vol I, II, III)- Power CB & Deginnola HF, 2nd edition (Himalaya Publication, Bombay).
- Biostatistics - Arom PN, Malhotra PK, 1st edition (Himalaya Publishing House, Mumbai). How computers work-White R, 10th edition (Que Publishing).
- How the internet works-Graff F, 6th edition (Que Publishing).
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (Methods of Biochemical Analysis -Bamernis AD, Ouellette EFF, 1st edition (John Wiley & Sons).
- Bioinformatics: Sequence, Structure, and Database: A Practical Approach-Higgins D, Taylor W, 1st edition (Oxford University Press).


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Faculty of Science
Class- B.Sc. Microbiology 1ST Year
Subject-Microbiology
Code:BSCMB(Y-103P)

List of Practicals based on paper I and II for B.Sc. I Year (MDM, 50):

Teachers should give instruction to the students to take necessary precautions while working in Microbiology laboratory.

1. Demonstration and briefing about principles and working of basic instruments, autoclave, incubator, hot air oven, pH meter, laminar air flow, spectrophotometer and centrifuge.
2. Basic media preparation, autoclaving, cleaning and sterilization of glass wares.
3. Media preparation Liquid media – Peptone water, Nutrient broth. Solid media – Nutrient agar (Agar slant, Agar plate) Enriched Medium – Blood agar, Differential medium – MacConkey agar, Enrichment Medium – Selenite F broth, Selective medium – EMB
4. Culture characteristics of Microorganisms on different media.
5. Demonstration of selective and differential media.




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FACULTY OF SCIENCE
CLASS: B.SC MICROBIOLOGY
GROUP-FOUNDATION COURSE
Moral Value & Language
नैतिकमूल्य औरभाषा
Paper - I
Paper Code: FC(Y-104A)

UNIT I

हिन्दी भाषा

1. स्वतंत्रता पुकारती (कविता) -जयशंकर प्रसाद
2. पुष्प की अभिलाषा (कविता) - माखनलाल चतुर्वेदी
3. वाक्य संरचना और अशुद्धियाँ (संकलित)

UNIT II

हिन्दी भाषा

1. नमक का दरोगा (कहानी)- प्रेमचंद
2. एक थे राजा भोज (निबंध) - डॉ. विजयननाथ शुक्ल
3. पर्यायवाची, विलोम, एकायीं अनेकार्थी, एवं शब्दयुग्म शब्द (संकलित)

UNIT III

नैतिक मूल्य

1. नैतिक मूल्य परिचय एवं वर्गीकरण (आलेख) -डॉ. ललिता राव
2. जाचरण की सम्भलत (निबंध) -सरदार पूर्णसिंह
3. अंतर्राज और नैतिक जीवन (लेख) -डॉ. लक्ष्मणस्त्री राधाकृष्णन
4. अप्य दीपो जल (लेख) - स्वामि महाराज

UNIT IV

1. Where the minis without fear: Rabindranath Tagore
2. The Hero: R.K.Narayan
3. Tryst with Destiny: Jawaharlal Nehru
4. Indian weavers: Sarjini Naidu
5. The Portrait of a lady: Khushwani Singh
6. The Solitary Reaper : William Wordsworth

UNIT V

1. Basic Language Skills: Vocabulary, Synonyms, Antonyms, Word formation, Prefixes, Suffixes
2. Basic Language Skills: Uncountable Noun, Verbs, Tenses, Adverbs.
3. Comprehension/Unseen Passage.
4. Composition and Paragraph Writing

Suggested Readings:

मध्यप्रदेश हिन्दी ग्रंथ आकादमी द्वारा प्रकाशित पुस्तकें

FACULTY OF SCIENCE
CLASS: B.SC MICROBIOLOGY
YEAR: 1 ST
GROUP-FOUNDATION COURSE
SUBJECT -DEVELOPMENT OF ENTREPRENEURSHIP
PAPER:-II
PAPER CODE:FC(Y-1D4B)

UNIT I

Entrepreneurship Development- Concept and importance, function of Enterpriser, Goal determination – Problems Challenges and Solutions,

UNIT II

Project Proposal – need and objects- Nature of organization, Production Management, Financial Management, Marketing Management, Consumer Management.

UNIT III

Role of regulatory Institutions, Role of development Organization, and self employment oriented schemes, various growth schemes.

UNIT IV

Financial Management for Project- Financial Institution and their role, Capital estimation and arrangement, cost and price determination, accounting management.

UNIT V

Problem of entrepreneur- Problem relating Capital, Problem relating Registration, administration problem and how to overcome from above problems.

Suggested Readings:

मध्यप्रदेश हिन्दी शोध अकादमी द्वारा प्रकाशित पुस्तकें



Sri Satya Sai University of Technology and Medical Sciences

(Established under Govt. of M.P. Registered under UGC 2(F) 1956)

Bhopal-Indore Road, Opp. Pachama oilfed plant, Pachama, Dist.-Sehore M.P. PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@sssutms.co.in

MINUTES OF BOARD OF STUDIES MEETING

Name of Department:- Science and Computer Science

Minutes of Board of Studies Committee Meeting, held on Dated on 22/11/2021

The Board of Studies Committee Meeting was held in the room of Department of Science and Computer science at 3:00 PM, on 22/11/2021, Following members were present.

1. Dr. Sanjay Rathore, Dept. of Science -Chairman
2. Dr. K.W Shah, Professor Botany Govt PG College Pipariya, Hoshangabad-External
3. Dr. Mohit Arya, Professor Zoology, Govt KRG College, Gwalior- External
4. Dr. Pushendra Sharma, Professor, Chemistry
5. Dr. Neelu Jain, Professor, Chemistry
6. Dr. Syed Shahab Ahmed, Professor, Botany
7. Dr. Geeta Khoobchandani, Associate Professor, Physics
8. Dr. Shobha Malviya, Professor, Microbiology
9. Dr. Syed Shahnawaz Ali, Professor, Mathematics
10. Dr. Tabassum Khan, Professor, Hindi
11. Dr. Babina Bohra, Assistant Professor, English
12. Ms. Dhanvarsha Kushwaha, Assistant Professor, Mathematics
13. MS. Khushboo Vaidhya, Assistant Professor, Environment Science

The chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda: 1 The new syllabus and scheme of the UG (B.Sc., BCA) courses is discussed by the members of the Board of Studies. In which it is discussed that in the First Year of B.Sc. and BCA syllabus has



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been taken from the syllabus published by Madhya Pradesh Higher Education Dept. according to National Education Policy, 2020.

Discussion: All members discussed the agenda on scheme and syllabus of B.Sc. and BCA for the Academic Session 2021-22. All members agree to implement the proposed scheme and syllabus as per New National Education Policy 2020.

Resolution: It is resolved that the new syllabus and scheme of the UG (B.Sc. and BCA) courses is recommended by all members of relative subjects present in the Board of Studies meeting.

The new syllabus and scheme were recommended for implementation from academic session 2021-22 for the student admitted in session 2021-22. Minutes of the meeting may be placed before the academic council for approval

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairperson)



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FACULTY OF EDUCATION
DEPARTMENT OF SCIENCE
ANNUAL SCHEME OF BSC 1ST YEAR
SESSION 2021-22

S.No.	Course Code	Subject	Course Title	Credit	Pre-Requirement (If Any)	Theory		CCE/Internal				Practical/Project		Total Marks
						Max	Min	Class Test	Assignment/Prese-ntation		Max.	Min.		
									Max.	Min.				
Core Course/Major Subject (Select Any One Group)														
Group- A	51-BOTA1T	Botany	Applied Botany Paper-I	4	PCB	75	25	15	5	10	3	-	-	100
	51-BOTA1P	Botany Practical	Applied Botany Practical Paper-I	2	PCB	-	-	-	-	25	3	75	25	100
	51-BOTA2T	Botany	Basic Botany Paper-II	4	PCB	75	25	15	5	10	3	-	-	100
	51-BOTA2P	Botany Practical	Basic Botany Practical Paper-II	2	PCB	-	-	-	-	25	8	75	25	100
Group- B	51-CHEM1T	Chemistry	Fundamental of Chemistry Paper-I	4	PCM/PCB	75	25	15	5	10	3	-	-	100
	51-CHEM1P	Chemistry Practical	Qualitative & Quantitative Chemical Analysis Practical Paper-I	2	PCM/PCB	-	-	-	-	25	3	75	25	100



Signature of the Registrar
Registrar
Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

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SI-CHEM2T	Chemistry	Analytical Chemistry Papers-II	4	PCM/PCB	75	25	15	5	10	3	-	-	100
SI-CHEM2P	Chemistry Practical	Analytical Processes & Techniques Paper-II	2	PCM/PCB	-	-	-	-	25	8	75	25	100
SI-COSC1T	Computer Science	Computer System Architecture Paper-I	4	PCM	75	25	15	5	10	3	-	-	100
SI-COSC1P	Computer Science Practical	Computer Architecture Lab Paper-I	2	PCM	-	-	-	-	25	8	75	25	100
SI-COSC2T	Computer Science	Programming Methodology & Data Structure Paper-II	4	PCM	75	25	15	5	10	3	-	-	100
SI-COSC2P	Computer Science Practical	Office Tools & Programming Methodology Lab Paper-II	2	PCM	-	-	-	-	25	8	75	25	100
SI-MATH1T	Mathematics	Algebra Vector Analysis And Geometry Paper-I	6	PCM	75	25	15	5	10	3	-	-	100
SI-MATH2T	Mathematics	Calculus And Differential Equations Paper-II	6	PCM	75	25	15	5	10	3	-	-	100
SI-MIBIO1T	Microbiology	General Microbiology & Cell Structure Paper-I	4	PCB	75	25	15	5	10	3	-	-	100

Group-C
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Group-D
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	SI-MBIO1P	Microbiology Practical	Study of Microorganisms Paper-I	2	PCB	-	-	-	-	25	8	75	25	100
	SI-MBIO2T	Microbiology	Microbial Techniques Paper-II	3	PCB	75	25	15	5	10	3	-	-	100
	SI-MBIO2P	Microbiology Practical	Microbial Tools & Techniques Paper-II	2	PCB	-	-	-	-	25	8	75	25	100
Group-F	SI-PHYS1T	Physics	Thermodynamics & Statistical Physics Paper-I	4	PCM	75	25	15	5	10	3	-	-	100
	SI-PHYS1P	Physics Practical	Thermodynamics & Statistical Physics Lab Paper-I	2	PCM	-	-	-	-	25	8	75	25	100
	SI-PHYS2T	Physics	Mechanics & General Properties of Matter Paper-II	4	PCM	75	25	15	5	10	3	-	-	100
	SI-PHYS2P	Physics Practical	Mechanics & General Properties of Matter Lab Paper-II	2	PCM	-	-	-	-	25	8	75	25	100
Group-G	SI-ZOO11T	Zoology	Animal Diversity : Non-Chordata Paper-I	4	PCB	75	25	15	5	10	3	-	-	100



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SI-ZOOCL1P	Zoology Practical	Invertebrata Paper-I	2	PCB	-	-	-	25	8	75	25	100
SI-ZOOCL2P	Zoology	Cell biology, Reproductive Biology and Developmental Biology Paper-II	4	PCB	75	25	15	5	3	-	-	100
SI-ZOOCL2P	Zoology Practical	Cytology, Reproductive Biology and Embryology Paper-II	2	PCB	-	-	-	25	8	75	25	100

Minor Subject (Select Any One Subject Other Than Major Subject)

1	SI-BOTA2T	Botany	Basic Botany	4	PCB	75	25	15	5	10	-	-	100
	SI-BOTA2P	Botany Practical	Basic Botany Practical	2	PCB	-	-	-	-	25	75	25	100
2	SI-CHEM2T	Chemistry	Analytical Chemistry	4	PCM/ PCB	75	25	15	5	10	-	-	100
	SI-CHEM2P	Chemistry Practical	Analytical Processes & Techniques	2	PCM/ PCB	-	-	-	-	25	75	25	100
3	SI-COSC2T	Computer Science	Programming Methodology & Data Structure	4	PCM	75	25	15	5	10	-	-	100
	SI-COSC2P	Computer Science Practical	Office Tools & Programming Methodology Lab	2	PCM	-	-	-	-	25	75	25	100



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4	SI-MATHZT	Mathematics	Calculus And Differential Equations	6	PCM	75	25	15	5	10	3	-	-	100
	SI-MBIO2T	Microbiology	Microbial Techniques	4	PCB	75	25	15	5	10	3	-	-	100
	SI-MBIO2P	Microbiology Practical	Microbial Tools & Techniques	2	PCB	-	-	-	-	25	8	75	25	100
6	SI-PHYS2T	Physics	Mechanics & General Properties of Matter	4	PCM	75	25	15	5	10	3	-	-	100
	SI-PHYS2P	Physics Practical	Mechanics & General Properties of Matter Lab	2	PCM	-	-	-	-	25	8	75	25	100
7	SI-ZOO2T	Zoology	Cell biology, Reproductive Biology and Developmental Biology	5	PCB	75	25	15	5	10	3	-	-	100
	SI-ZOO2P	Zoology Practical	Cytology, Reproductive Biology and Embryology	2	PCB	-	-	-	-	25	8	75	25	100




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**Elective Subject-Select Any One Subject Other Than Major & Minor Core Subject
OR Open Elective (General Elective Course)- Select Any One Subject**

1	S1-BOTA2T	Botany	Basic Botany	4	PCB	75	25	15	5	10	3	-	-	100
	S1-BOTA2P	Botany Practical	Basic Botany Practical	2	PCB	-	-	-	-	25	8	75	25	100
2	S1-CHEM2T	Chemistry	Analytical Chemistry	4	PCM/ PCB	75	25	15	5	10	3	-	-	100
	S1-CHEM2P	Chemistry Practical	Analytical Processes & Techniques	2	PCM/ PCB	-	-	-	-	25	8	75	25	100
3	S1-COSC2T	Computer Science	Programming Methodology & Data Structure	4	PCM	75	25	15	5	10	3	-	-	100
	S1-COSC2P	Computer Science Practical	Office Tools & Programming Methodology Lab	2	PCM	-	-	-	-	25	8	75	25	100
4	S1-MATH2T	Mathematics	Calculus And Differential Equations	6	PCM	75	25	15	5	10	3	-	-	100
5	S1-MBIO2T	Microbiology	Microbial Techniques	4	PCB	75	25	15	5	10	3	-	-	100
	S1-MBIO2P	Microbiology Practical	Microbial Tools & Techniques	2	PCB	-	-	-	-	25	8	75	25	100
	S1-PHYS2T	Physics	Mechanics	4	PCM	75	25	15	5	10	3	-	-	100



Rectified by
Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

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	SI-PHYS2P	Physics Practical	Mechanics & General Properties of Matter Lab	2	PCMA	-	-	-	-	25	0	75	25	100
	SI-ZOOL2T	Zoology	Cell biology, Reproductive Biology and Developmental Biology	4	PCB	75	25	15	5	10	3	-	-	100
	SI-ZOOL2P	Zoology Practical	Cytology, Reproductive Biology and Embryology	2	PCB	-	-	-	-	25	0	75	25	100
1	CI-COMM1G	Commerce	Basics of Business Studies	4	Open For All	75	25	15	5	10	3	-	-	100
2	CI-COMM2G	Commerce	Fundamental Of Accounting	4	Except The Students Of Commerce	75	25	15	5	10	3	-	-	100
3	AI-RBAN2G	Rural Banking	Banking institutions in India	4	Open For All	75	25	15	5	10	3	-	-	100
4	AI-RBAN1G	Rural Banking	Money and Banking	4	Open For All	75	25	15	5	10	3	-	-	100
5	CI-COMB-1G	Commerce	Business Organization and Management	6	Except The Students Of Commerce	75	25	15	5	10	3	-	-	100



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6	AI-ECON-2G	Economics	Indian Economy And Introduction	4	Open For All	75	25	15	5	10	3	-	-	100
7	AI-HIST-2G	History	Constitutional History of India	4	Open For All	75	25	15	5	10	3	-	-	100
8	AI-ELIT-1G	English literature	Generic English	4	Open For All	75	25	15	5	10	3	-	-	100
9	AI-FHIN-1G	Hindi	Hindi (अनुसंधान के लिए)	4	Open For All	75	25	15	5	10	3	-	-	100
10	AI-BECCD-1G	Psychology	Organizational Behavior	6	Open For All	75	25	15	5	10	3	-	-	100
11	AI-POSC-1G	Political Science	Indian Political System	6	Open For All	75	25	15	5	10	3	-	-	100
12	AI-SOCH-1G	Sociology	Introduction to Sociology	4	Open For All	75	25	15	5	10	3	-	-	100
13		NCC	NCC Awareness	4	Open For All	75	25	15	5	10	3	-	-	100
		NCC PRACTICAL	NCC Training	2	Open For All							100	33	100
14	NSS-101	NSS	Concept Of National Service Scheme	4	Open For All	75	25	15	5	10	3	-	-	100
	NSS-102	NSS	Project Tools OFNSS	2	Open For All							100	33	100

Vocational Subject (Select Any One)

	AI-BOT-MPLT	Medical Plants	Medicinal Plants	4	Open For All	50	17	-	-	-	-	50	17	100
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2	VI-PSY-DEVT	Personality development	Personality Development	4	Open For All	50	17	-	-	-	50	17	100
3	VI-CDS-WEBT	Web Designing	Web Designing	4	Open For All	50	17	-	-	-	50	17	100
4	VI-COM-DIGT	Digital Marketing	Digital Marketing	4	Open For All	50	17	-	-	-	50	17	100
5	VI-ORA-HNDT	Handicrafts	Handicrafts	4	Open For All	50	17	-	-	-	50	17	100
6	VI-ZOO-VERT	Vermicomposting	Vermicomposting	4	Open For All	50	17	-	-	-	50	17	100
Foundation Course (Compulsory)													
1	XI-FCEAIT	Foundation Course	Hindi Language (अथवा अंग्रेजी)	2	Open For All	50	17						50
2	XI-FCHBIT	Foundation Course	English Language and Indian Culture	2	Open For All	50	17						50
3	XI-FCACIT	Foundation Course	Environmental Education	2	Open For All	50	17						50
4	A1-FCEAIT	Yoga Science	Yoga And Meditation	2	Open For All	50	17						50
Inter/Intra Faculty (Compulsory)													
1		Project/internship/Field	Project/internship/Field	4	Open For All						100	33	100
TOTAL CREDIT													



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Part A Introduction		
Program: Certificate	Class: B.Sc. 1st year	Year : 2021 Session: 2021-22
Subject: Botany		
1	Course Code	SI-BOT101
2	Course Title	Applied Botany (Paper-I)
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course
4	Pre-requisite (if any)	To study this course, a student must have had the subject Biology/ Life Sciences/ Agriculture in class/12th
5	Course Learning outcomes (CLO)	By the end of this course the student should have: <ul style="list-style-type: none"> • Understood the significance and role of botany. • Learnt the basic aspects of applied botany. • Gained knowledge about employment opportunities in field of botany • Gained knowledge about start-up opportunities in the field of botany • Learnt about opportunities of social services • Gain knowledge about best health practices
6	Credit Value	04 Credits
7	Total Marks	Max. Marks: 25+75 Min. Passing Marks:33
Part B- Content of the Course		
Total No. of Lectures- 60 Hours Tutorials- 00 Practical -00 (04 hours per week):		
L-T-P:		
Unit	Topics	No. of Lectures
I	1.1 Introduction, objectives and importance of Applied botany 1.2 History and evolution of botany 1.3 Relation of plants to man and relation with other services 1.4 Various disciplines of botany and their applications to human welfare	12
II	1.1 Definition and types of pollution and pollutants 1.2 Phytoremediation: Air, water, soil, noise and thermal pollutants (Any 5 plants with botanical name, family) and their role in pollution control. 1.3 Bioremediation: definition and types	12
III	1.1 Ancient agricultural practices. 1.2 Modern agriculture practices: Polyhouse, Drip irrigation, hydroponics, computer-based agriculture,	12




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	<p>terrace farming, 1.3 Organic farming: Introduction, objective and brief technique 1.4 Horticulture: Definition and role in human welfare 1.5 Forestry: Definition, branches and role in human welfare 1.6 Silviculture: Definition and management practices</p>	
IV	<p>1.1 Role of Botany in Rural development 1.2 Ethnobotany: Introduction and importance 1.3 Ethnomedicine: Definition and examples. (Local name, Botanical name, family and importance of Neem, Aloe, Clove, Ginger, Tulsi, Turmeric, Giloy, Emblica, Ashwagandha, Arandi) 1.4 Ethno-fibres: Definition and examples (Local name, Botanical name, family and importance of. Jut Coconut, elephant grass, cotton) 1.5 Ethno-food crops: Definition and examples (Local name, Botanical name, family and importance of Garadu, Singada, Kuzaki, Sama, Kodo, Bahua, Sehjan, Jowar, Makka, Bajra, Jau)</p>	12
V	<p>1.1 Plant tissue culture: Definition, types and Importance. 1.2 DNA Recombinant technique: Introduction, tools and importance 1.3 Role of recombination in present era 1.4 Bioinformatics: Definition, concept and tools 1.5 Introduction of bioinformatics software: Basic idea of BLAST and FASTA Importance of bioinformatics</p>	12

Keywords/Tags: Applied Botany, History of Botany, Evolution of Botany, Botany in human welfare, : Pollution, Pollutants, Phytoremediation, Bioremediation, Hydroponics, polyhouse, Terrace farming, Organic farming, Horticulture, Silviculture, Ethnobotany, Ethnomedicine, Ethnofibers, Ethno-food crops, Bioinformatics, BLAST, FASTA, Recombinant DNA, Plant tissue culture

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Levelin E. and McMahon K. "Plants and Society" McGraw Hill Education. 2007
2. Minir Rodriguez H. G. and Thakur A. S. "Applied Botany" American Academic Press. 2017
3. Negi S.S. "Forest Botany" M/s Bishen Singh Mafendra Pal Singh. 2012.
4. Agrahari R. P. "Environmental Ecology, Biodiversity, Climate Change and Disaster Management" McGraw Hill Education. 2020



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2. Suggestive digital platforms web links

Suggested equivalent online courses:

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 25marks University Exam (UE) 75 marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 + 10 Total =25
External Assessment : University Exam Section; 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) Four Short Questions (200 Words Each) Section (C) : Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09 = 36 02 x 15 = 30 Total 75



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Part A Introduction			
Program: Certificate	Class: B.Sc. Pyear	Year: 2021	Session: 2021-22
Subject: Botany			
1	Course Code	SI-HOFAIP	
2	Course Title	Applied Botany Practical (paper, I)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject Botany, Biology, Life Science in class/12th/.	
5	Course Learning outcomes (CLO)	<p>On completion of this course, learners will be able to: By the end of this course the student should have knowledge of practical skill related with ethnobotany, tissue culture, application of bioinformatics software and tools of recombinant DNA technology.</p>	
6	Credit Value	2 Credits	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33
Part B- Content of the Course			
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:			
Unit	Topics	No. of Lectures	
I	<ol style="list-style-type: none"> 1. Identification of ethnomedicinal plants 2. Preparation of soil health card of any agricultural field 3. Study of vermicompost and composting of kitchen waste 4. Use of BLAST and FASTA 5. Prepare the list of important air, water and soil pollutants of local areas 6. Plant tissue culture technique: sterilization, inoculation, culture media, acclimatization and hardening. 7. Preparation of list of ethnomedicinal, food, fibre plant locally available 8. Tools of recombinant DNA technology: Restriction enzymes, plasmid vectors, other enzymes 9. Study of global warming, acid rain and water 	30	




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	quality (pH and Conductivity), 10. Study of local plants grown around agricultural field 11.* Practical can be decided on theory basis according to availability. 12.* Case and field study can be designed accordingly.	
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Keywords/Tags:

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Levetin E. and McMahon K. "Plants and Society" Mc Graw Hill Education. 2007
2. Maiti R., Rodriguez H. G. and Thakur A. S. "Applied Botany" American Academic Press. 2017
3. Negi S. S. "Forest Botany" M/s Bishen Singh Mafendra Pal Singh. 2012.
4. Agrahari R. P. "Environmental Ecology, Biodiversity, Climate Change and Disaster Management" Mc Graw Hill Education. 2020
5. Sharma D. K. "Biodiversity Conservation: Current Status and Future Strategies" Write and Print Publication. 2017
6. Singh J. "Biodiversity Environment and Sustainability" MD Publications Pvt Ltd/ 2008
7. Gupta P. K. "Molecular Biology and Genetic Engineering" Rastogi Publications. 2005
 Sharma V., Munjal A. and Shankar A. "Bioinformatics" Rastogi Publications. 2008.
 Suggestive digital platforms web links

Suggested equivalent online courses:

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)	10	Table work / Experiments	50
TOTAL	25		



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Part A Introduction			
Program: Certificate	Class: BSc-I	Year: 2021	Session: 2021-22
Subject: Botany			
1	Course Code	SI-BOTA2T	
2	Course Title	Basic Botany Paper - II	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject botany in class/12th/ certificate/diploma.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms. It gives an accounts of plant adaptations from aquatic condition to colonize terrestrial habitat. The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated. The economic importance and significance of plants in nature will be understood. They will be acquainted with locally prevalent microbial diseases of plants and humans 	
6	Credit Value	4 Credits	
7	Total Marks	Max. Marks: 25-75	Min. Passing Marks: 33
Part B- Content of the Course			
Total No. of Lectures- 60Tutorials- 0 Practical =0 (theory 4 hours per week); L-T-P:			
Unit	Topics	No. of Lectures	
I	1.1 History of Botany and Indian Contributions. 1.2 Morphological Characteristics of lower and higher plants(Angiosperms). 1.3 Types of leaves, Inflorescence, Flowers and Fruits. 1.4 Structure of Plant cell and cell organelles, Prokaryotic and Eukaryotic Cells. types of Cell division. 1.5 Microscope structure and function of light microscope (magnification and resolving power). 1.6 Various types of Microscopes: Bright field, Phase Contrast, SEM and TEM.	12	
II	1. Algae 1.1 General characteristics 1.2 Range of thallus organization, reproduction. 1.3 Types of life-cycles in algae 1.4 Role of algae in nature and its economic importance.	12	




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	<p>2Bryophytes :</p> <p>2.1General characteristics, Ecology.</p> <p>2.2Range of thallus organization, morphology, anatomy(internal and external features) and reproduction of any one Bryophyte.</p> <p>2.3Economic importance of Bryophytes</p>	
III	<p>I Pteridophytes</p> <p>1.1General characteristics and morphology.</p> <p>1.2Stelar organization and reproduction.</p> <p>1.3Heterospory and seed habit.</p> <p>1.4Economic importance</p> <p>2.Gymnosperms</p> <p>2.1General description and their distribution.</p> <p>2.2Economic importance of Gymnosperms.</p> <p>3.Paleobotany</p> <p>3.1Indian contribution in Paleobotany.</p> <p>3.2Brief knowledge of Fossils and Geological time scale.</p>	12
IV	<p>I Fungi</p> <p>1.1 General characteristics and cell wall composition.</p> <p>1.2 Mode of nutrition</p> <p>1.3 Types of reproduction</p> <p>1.4 Economic importance</p> <p>1.5Parasexuality and Mycorrhiza</p> <p>2.Lichens: Brief knowledge and their significance.</p>	12
V	<p>I Microbes</p> <p>1.1Brief outline of various types of Microbes</p> <p>1.2Archaeaebacteria, Eubacteria, Cyanobacteria, Mycoplasma, Actinomycetes and Virus.</p> <p>1.3 Beneficial and harmful roles.</p>	12

Keywords/Tags: History of Botany, Paleobotany, Prokaryotes, Eukaryotes, Algae, Bryophyta, Pteridophyta, Gymnosperms, Fungi, Mycorrhiza, Lichens, Bacteria, Virus

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Oladele Ogunseitan, Microbial Diversity: Form and Function in Prokaryotes, Wiley Blackwell, 2008.
2. Pelczar, M.J et al., Microbiology, Tata McGraw-Hill Co, New Delhi, 5th edition, 2001.
3. Prescott, L. Harley, J. and Klein, D., Microbiology, Tata McGraw-Hill Co, New Delhi, 6th edn., 2005.
4. Fritsch F.E., The Structure & Reproduction of Algae, Vol. I & Vol. II., Cambridge University Press, Cambridge, U.K. 1945.
5. Smith, G.M., Cryptogamic Botany, Vol. I: Algae, Fungi, & Lichens, McGraw-Hill Book Co., New York, 1955.
6. Ian Morris, An Introduction to the Algae, Hutchinson, London, 1967.



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Suggested equivalent online courses:

Part D Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 25marks University Exam (UE) 75 marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation Total	15 10 25
External Assessment : University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) Four Short Questions (200 Words Each) Section (C) Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09 = 36 02 x 15 = 30 Total 75

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Part A Introduction			
Program: Certificate		Class: 1st year	Year: 2021 Session: 2021-22
Subject: Botany Practical			
1	Course Code	SI-WOTA2P	
2	Course Title	Basic Botany Practical (Paper/II)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject of Biology/ Life science/Agriculture in class 12th.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> Students will learn to carry out practical work in the laboratory. Interpreting plant morphology and anatomy of various groups of lower and higher plants. Students will be able to identify the major groups of microorganisms. 	
6	Credit Value	2	Credits
7	Total Marks	Max. Marks: 25/75	Min. Passing Marks:33
Part B- Content of the Course			
OTotal No. of Practical- 30 HoursTutorials- 00 -Practical (2 hours per week): L-T-P:			
Unit	Topics	No. of Practical	
Unit V	<ol style="list-style-type: none"> Study of various types of leaves , inflorescence, Flowers and fruits. Understanding various parts of Microscope(simple and compound microscope) Study of plant cells (e.g. Onion etc.) Study of permanent slides of Mitosis and meiosis Study of Electron Micrographs of Cell and organelles from Internet, You -Tube. Identification of various algae from specimens, slides and temporary mounts of water from nearby areas like <i>Nostoc</i>, <i>Oscillatoria</i>, <i>Volvox</i>, <i>Spirochira</i>, <i>Oedogonium</i>, <i>Chara</i> and specimens and pictographs of marine algae like <i>Ectococcus</i>, <i>Sargassum</i>, <i>Polysiphonia</i>. Study and identification of some Bryophytes like <i>Riccia</i>, <i>Marchantia</i>, <i>Anthoceros</i>, <i>Funaria</i> and Field visit. Study of some fossils (specimens and slides) Study of some Pteridophytes like <i>Lyopodium</i>, <i>Sellaginella</i>, <i>Equisetum</i>, <i>Marselia</i> and study of any one fern 	30	



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10. Section cutting of Pteridophytes and Gymnosperms: Stem, root and leaves
11. Specimen study of Pteridophytes and Gymnosperms Cones
12. Study of fungal structures and preparation of temporary mounts of *Mucor*, *Rhizopus*, *Asperigillus*, *Yeast*, *Pencillium*, *Alternaria*, *Albugo*, *Helimenthospotium*.
13. Permanent slides of Puccinia on host.
14. Study of various fungal plant diseases
15. Observation of symptoms of virus and bacteria on plants.
16. Gram staining techniques

Keywords/Tags: Microscope, Algae, Bryophyta, Pteridophyta, Gymnosperm Fungi

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Bendre Ashok and Ashok Kumar , A Textbook of Practical Botany, vol. 1, Rastogi Pub., Meerut, 1984.
2. Pandey B.P Modern Practical Botany,., vol. I, S. Chand and Co. Ltd., N. Delhi, 17th edn., 1999.
3. Singh M.P., Chaudhary S.B. and Sahu H. BA Textbook of Practical Botany, Daya Pub. House, N. Delhi, 2005.
4. Shahezad, Aki I Mohd., Practical Botany, Shanti Prakashan, Gwalior, 2016.
5. Elizabeth Margarel and Angela G Practical manual of Botany, vol.1, New Age (Pub.) Ltd., Delhi, 2007.

Suggestive digital platforms web links --

Suggested equivalent online courses: ---

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of / Lab Visits/ Survey / Industrial visit)	10	Table work / Experiments	50
TOTAL	25		75

Any remarks/ suggestions: Practical may be adjusted accordingly by the teachers.



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Part A Introduction			
Program-CERTIFICATE	Class-B.Sc	Year- First	Session- 2021-2022
Subject - Chemistry			
Course Code	SI-CHEMIT		
Course Title	Fundamentals of Chemistry (Paper-I)		
Course Type	Core Course		
Pre-requisite (if any) Course Learning Outcomes (CLO)	By the end of this course students will learn the following aspects of Chemistry. <ol style="list-style-type: none"> 1. Ancient Indian chemical techniques. 2. Various theories and principles applied to reveal atomic structure. 3. Significance of quantum numbers. 4. Concept of periodic properties of elements. 5. Theories related to chemical bonding. 6. Acid-base concepts, pH, buffer. 7. Factors responsible for reactivity of chemical kinetics. 8. Properties of electrolytes. 		
Credit Value	4		
Total Marks	Maximum Marks: CCE - 25 University Exam (CE) - 25	Minimum Passing Marks: 33	

Part B Content of the course





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Total No. of Lectures- Tutorials-Practical (in hours per week):

L.-T-P: 60-0-30

Unit	Topic	No. of Lectures
I	<p>(a) Chemical techniques in ancient India: General Introduction</p> <p>(b) Contribution of ancient Indian scientists in chemistry e.g. metallurgy, dyes, pigments, cosmetics, Ayurveda, Charak Sanhita.</p> <p>Atomic Structure:</p> <p>(i) Review of Bohr's theory and its limitations. Atomic spectrum of Hydrogen. Dual nature of particles and waves, de Broglie's equation, Heisenberg's Uncertainty principle and its significance.</p> <p>(ii) Quantum numbers and their significance. Rules for filling electrons in various orbital, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau principle and its limitation. Variation of orbital energy with atomic number.</p> <p>Electronic configurations of the atoms. Stability of half filled and completely filled orbital's, concepts of exchange energy. Relative energies of atomic orbital's, Anomalous electronic configurations.</p> <p><i>Keywords/Tags: Metallurgy, Dyes, Cosmetics, Charak Sanhita Hydrogen spectrum, Hund's rule, Aufbau principle.</i></p>	2+4



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2	<p>Elementary idea of the following properties of the elements with references to s & p-block elements in periodic table.</p> <ul style="list-style-type: none">• Effective nuclear number (EAN), shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.	6
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- Atomic radii (van der Waals)
- Ionic and crystal radii.
- Covalent radii (octahedral and tetrahedral)

Detailed discussion of the following properties of the elements, with reference to s & p-blocks.

- Ionization energy-Successive ionization energy and factors affecting ionization energy. Applications of ionization energy.
- Electro negativity-Pauling's / Mulliken's electronegativity scales.

Variation of electronegativity with bond order, partial charge. Hybridization

Keywords/Tags: EAN, Atomic radii, Ionic Radii, Crystal Radii, Ionization Energy.




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3	<p>Chemical Bonding</p> <p>i. Ionic Binding: General characteristics of ionic bonding. Ionic bonding & Energy: Lattice & solvation energies and their importance in the context of stability and solubility of ionic compounds.</p> <p>Statement of Born-Landé equation for calculation of lattice energy, Madelung constant, Born-Haber cycle and its applications. Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules.</p> <p>ii. Covalent bonding: Lewis structure, Valence Bond theory (Heitler-London approach).</p> <p>Hybridization-Concept, types (sp, sp^2, sp^3, dsp^2, d^2sp^3) with suitable examples of inorganic and organic molecules.</p> <p>Ionic character in covalent compounds - dipole moment and percentage ionic character.</p> <p>Valence shell electron pair repulsion theory (VSEPR) theory: Assumptions, need of theory, application of theory to</p>	20
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explain geometries or shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements such as: NH_3 , H_2O , SF_4 , ClF_3 , PCl_5 , SF_6 , ClF_5 , XeF_4 .

Molecular orbital (MO) concept of bonding

The approximations of the theory, Linear combination of atomic orbitals (LCAO) (elementary pictorial approach)

Rules for the LCAO method, bonding and antibonding MOs. Characteristics for s-s, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals.

MO diagrams of homonuclear diatomic molecules: H_2 , Li_2 , Be_2 , B_2 , C_2 , N_2 , O_2 , F_2 and their ions.

Molecular orbitals of heteronuclear diatomic molecules: CO , NO , CN , HF .

Bond parameters:

Definition and factors affecting – bond orders, bond lengths, bond angles.

Keywords/Tags: Ionic Bonding, Covalent Bonding, Hybridization, VSEPR Theory, LCAO, MO Diagrams, Bond Parameters.



4	<p>Acid-Base concept</p> <p>Arrhenius concept, Bronsted-Lowry's concept, conjugate acids and bases, relative strength of acids, Lewis concept. pH, buffer solutions. Acid-base neutralisation curves, Handerson equation.</p> <p>Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.</p> <p>Indicator, choice of indicators.</p>	4
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	<p>Keywords/Tags: <i>Acid-Base Concept, Bronsted-Lowry's Concept, Conjugate Acids And Bases, pH, Buffers Solution, Indicator.</i></p>	
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5

(a) Fundamentals of Organic Chemistry

12

Structure, shape and reactivity of organic molecules:

Physical Effects, Electronic Displacements: Inductive Effects, Electromeric Effect, Resonance and Hyperconjugation.

Cleavage of Bonds: Homolysis and Heterolysis.

Reactive Intermediates: Carbocations, Carbanions and free radicals, Nucleophiles and electrophiles.

(b) Stereochemistry of Organic compounds:

Concepts of isomerism.

Geometrical Isomerism.

Determination of configuration of geometric isomers. E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Optical Isomerism:

Elements of symmetry, molecular chirality, enantiomers & their properties, stereogenic centre, optical activity of enantiomers. Concept of chirality (up to two carbon atoms): chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythroisomers, meso isomer, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

Conformations and Conformational analysis

Conformations of ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newman, Sawhorse and Fischer representations.

Keywords/Tags: Electronic Displacements, Nucleophiles, Electrophiles, Isomerism, Molecular Chirality, Enantiomers.

Sequence Rules, Conformation.



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6	<p>Chemical Kinetics:</p> <p>Rate of reaction, Definition and difference of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for half-life period. Methods to determine the order of reactions. Arrhenius equations, concept of activation energy.</p> <p>Ionic Equilibria:</p> <p>Strong, moderate and weak electrolysis, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Common ion effects. Salt hydrolysis- calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Solubility and solubility product of sparingly soluble salts-applications of solubility product.</p> <p>Keywords/Tags: Order of Reaction, Molecularity of Reaction, Arrhenius Equation, Activation Energy, Electrolytes, Salt Hydrolysis, Solubility Product.</p>	12
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Part C - Learning resources

Text Books, Reference Books, Other Resources



Text Books:

1. Lee, J.D., Concise Inorganic Chemistry, ELBS, 1991
2. Khara, H.S., Guru, J.N., Singh, J., Chemistry For B.Sc. 1st Year, Pragati prakashan.
3. Bariyar, A. & Goyal, S., B.Sc. Chemistry Combined. (In Hindi) Krishna Educational Publishers Year: 2019.
4. Puri, B.R., Pathania, M.S., Sharma, L.R., Principles of Physical Chemistry, Vishal Publishing Co. 2020.
5. Guru, J.N., Guru A., Advanced Physical Chemistry, Pragati Prakashan, Meerut, ISBN: 9789386633347, 9386633345; Edition: IV, 2017
6. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.
7. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.
8. Kalsi, P.S., Stereochemistry Confirmation and Mechanism, new Age International, 2005.
9. Finar, L.L., Organic Chemistry (Vol. I & II), E.L.B.S.
10. Morrison, R.T. & Boyd, R.N., Organic Chemistry, Pearson, 2010.
11. Clayden, J., Greeves, N., Warren, S., Wothers, P., Organic Chemistry, Oxford University Press, 2nd Edition, 2012.
12. Atkins' Physical Chemistry, 10th Edition, Oxford University Press, 2014.

Reference Books:

Reference Books:



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1. Prakash, S., Founders of Sciences in Ancient India, published by The research Institute of Ancient Scientific Studies, New Delhi, 1965 (OCoLC)594302452.
2. Acharya Prafulla Chandra Ray - A Collection of Writings, Volume IIIA : A History of Hindu Chemistry (Volume-I), Edition : Prof. Anil Bhattacharyya, Publisher : University of Calcutta, Online information: <https://www.caluniv.ac.in/news/APCR%20Publication/acharya-prafulla.htm>
3. Chemistry in India, in Traditional & Practice of India, Textbook for Class XI, Module 2, Central Board of Secondary Education.
4. Subbarayappa, B.V., Chemistry and Chemical Techniques in India. Centre for Studies in Civilizations, 2004 ISBN 818758601X.
5. Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K., Inorganic Chemistry: principles of Structure and Reactivity, Pearson Education India, 2006.
6. Douglas, B.F., McDaniel, D.H. & Alexander, J.J., Concepts and Models in Inorganic Chemistry, John Wiley & Sons, 1994.
7. Graham Solomon, T.W., Fryhle, C.b. & Snyder, S.A. Organic Chemistry, John Wiley & Sons, 12th Edition, 2016.
8. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning New Delhi (1988).
9. Sykes, p., A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi (1988).
10. Barrow, G.M. Physical Chemistry, Tau McGraw-Hill(2007).



Suggested equivalent online courses:

(all URLs accessed in May 2021)

- MOOC: <https://alison.com/course/fundamentals-of-chemistry>
- NPTEL: <https://nptel.ac.in/course/104/106/1041061196/>;
<https://nptel.ac.in/course/104/101/104101121>
- MIT: <https://ocw.mit.edu/courses/chemistry/5-12-organic-chemistry-i-spring-2005/syllabus/>



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Web sources

(all URLs accessed in May 2021)

<https://www.sydney.edu.au/science/chemistry/~george/1108/ShapesOfMolecules.pdf>

<https://ansandculture.google.com/exhibit/rasashala-ancient-indian-chemical-lab-national-council-of-science-museums/Kw/CaPIRF0y-KO?hl=en>

<https://sanskrit.ugbv.de/events/new/Ancient-Indian-chemistry.pdf>

https://insa.nic.in/writer-adddata:UploadFiles/JHS/Vol01_1_1_PRAY.pdf

https://asi.nic.in/Ancient_India/Ancient_India_Volume_9/article_8.pdf

https://ddcentkal.ac.in/Syllabus/MA_history/paper_23.pdf

https://vym.org.in/study_material/ENG%20%Indian%20Contributions%20to%20Science.pdf

<https://www.pgurus.com/chemistry-in-ancient-india/> https://en.wikipedia.org/wiki/History_of_chemistry





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Part D- Assessment and Evaluation				
Suggested	Continuous	Evaluation	Methods: Continuous	Marks
Internal Evaluation Shall be Based on Allotted Assignment and Class Tests. The marks shall be as follow.				
Assessment and presentation of assignment				04
Class Test-I (Objective Questions)				04
Class Test-II (Descriptive Questions)				04
Class Test-I (Objective Questions)				04
Class Test-II (Descriptive Questions)				04
Overall performance throughout the Year (includes Attendance, Behavior, Discipline, Participation in Different Activities)				05
Total				25
Elaboration: Assessment Theory				
External Assessment				
Theory Paper	Section A	3 Very short question (50 words each)		$03 \times 03 = 09$
	Section B	4 short question (200 words each)		$04 \times 09 = 36$
	Section C	2 Long question (500 words each)		$02 \times 15 = 30$
	Total			75
Grand Total				100

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PRACTICAL			
Program-Certificate	Class- B.Sc.	Year-First	Session-2021-2022
Subject –Chemistry			
1	Course Code	SI-CHEM1P	
	Course Title	Qualitative& Quantitative Chemical analysis (Paper-I)	
2	Course Type	Core Course	
3	Course Learning Outcomes(CLO)	By the end of this course students will learn the following aspects of Laboratory exercises in Chemistry: <ol style="list-style-type: none"> 1. Importance of chemical safety and lab safety while performing experiments in laboratory 2. Qualitative inorganic analysis 3. Elements analysis of organic compounds (non-instrumental) 4. Qualitative identification of functional group of organic compounds. 5. Techniques of pH measurements 6. Preparation of buffer solutions 	
4	Credit Value	2	
	Total Marks	Maximum Marks: University Exam (UE)-75, CCE-25	Minimum Passing Marks:33

	External Assessment	Marks
1	Experiments to be performed in laboratory	50




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Qualitative inorganic analysis

20 Marks

Identification of simple inorganic mixture (5 radicals) with two/three acidic and two/three basic radicals (including typical combinations). special emphasis on learning theoretical concept of strong, moderate and weak electrolytes, ionic product, common ion effect, Solubility and solubility product.

Qualitative organic analysis

7+8 Marks

1. Detection of hetero-elements (N, S, Cl, Br, I) in organic compounds



2. Functional group tests for alcohol, aldehyde, carboxylic acid, carbohydrate, phenols, nitro, amine and amide.

Quantitative analysis of acid, alkali and buffer solutions

15 Marks

Ionic Equilibrium

1. Measurement of pH of different solutions of acids and alkalies using pH-meter (may use aerated drinks, fruits juices, shampoos and soaps)

Note- use dilute solution of soaps and shampoos to prevent damage to the glass electrode.

2. Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

3. Preparation of buffer solution and determination of their pH and buffer capacity:

(i) Sodium acetate-acetic acid

(ii) Ammonium chloride-ammonium hydroxide



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Part C – Learning resources

Text Books, Reference Books, Other Resources

Text Books:

1. Goswami A.K., Mehta, A., Khanam Rehanan, O.R.S., UGC Practical Chemistry VOL. 1, Pragati Prakashan, 2015
2. Goyal, S., B.Sc. Chemistry Practical, Krishna Publication, 2017.
3. Vogel, A.I., A Textbook of Quantitative Inorganic Analysis. ELBS.
4. Svehla, G., Vogel's Quantitative Inorganic Analysis, Pearson Education, 2012.
5. Mendham, J., Vogel's Quantitative Chemical Analysis, Pearson, 2009.



6. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
7. Mann, F.G., & Saunders, B.C., Practical Organic Chemistry, Pearson Education (2009)
8. Khosla, B.S., Garg, V.C., & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).

References:

9. Mann, F.G. & Saunders, B.C., Practical Organic Chemistry Orient-Longman, 1960.
10. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R., Practical Organic Chemistry, 5th Ed., Pearson (2012)
11. Ahluwalia, V.K., & Saunders, B.C., Practical Organic Chemistry Preparation and Quantitative Analysis, University Press(2000).
12. Prof. Robert H. Hill Jr., David C. Finster, Laboratory Safety for Chemistry: Students, 2nd Edition Wiley ISBN:978-1-119-02766-9 May 2016.
13. Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Version, ISBN 978-0-309-13864-2 | DOI 10.17226/12654, The National Academies Press, Washington D.C.

Suggestive digital platforms web links:

<https://nptel.ac.in/courses/104/105/104105102/>





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Suggested equivalent online courses:

1. <https://www.youtube.com/watch?v=EhyemWlluXO>
2. <http://amrita.olabs.edu.in/?sub=73&brch=7&sim=31&cm1=1>
3. <http://amrita.olabs.edu.in/?sub=73&brch=7&sim=180&cm1=1>
4. <http://www.rhmccollege.ac.in/sites/default/files/files/reading%20material/inorganic-qualitative-analysis-pdf>
5. <https://courses.lumenlearning.com/boundlesschemistry/chapter/qualitative-chemical-analysis/>
6. [https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_\(Analytical_Chemistry\)/Qualitative_Analysis](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Qualitative_Analysis)
7. <https://courses.lumenlearning.com/boundlesschemistry/chapter/buffer-solutions/>
8. https://bio.libretexts.org/Bookshelves/Biotechnology/Lab_Manual%3A_Introduction_to_Biotechnology/01%3A_Techniques/1.07%3A_pH_and_Buffers
9. [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_12_Experiments/05%3A_A_pH_Measurement_and_Its_Applications_\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_12_Experiments/05%3A_A_pH_Measurement_and_Its_Applications_(Experiment))
10. https://www.mt.com/mt_ext_files/Editorial/Generic/1/Guides_1_p_Electrochemical_Analysis_0x000240f0b0825c9a00093c4a_files/guideph.pdf
11. <https://web.cortland.edu/sternfeld/ph.pdf>
12. https://webhost.bridgew.edu/c2king/CHEM142/Lab/7_Buffers%20and%20Properties.pdf






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Part D- Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
<p>Class Interaction Chemical and Lab Safety</p> <ol style="list-style-type: none"> 1. Toxicity of the compounds used in chemistry laboratory. 2. Safety symbol on labels of pack of chemicals and its meaning 3. What is MSDS sheets? Find out MSDS sheets of some hazardous chemicals ($K_2Cr_2O_7$), Benzene, cadmium nitrate, sodium metal, etc) 4. Precautions in handling and storage of Hazardous substances like concentrated acids, ammonia, organic solvents, etc. <p><i>Notes: description to be written in practical record.</i></p>	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10




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Assignments (Chart/Model Seminar/Rural Service/Technology Dissemination/Report of Excursion/ Lab Visit/Survey/Industrial visit)	10	Table work/Experiments	50
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TOTAL	25		75
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Part A Introduction			
Program- CERTIFICATE	Class- B.Sc.	Year- First	Session- 2021-2022
Subject – Chemistry			
	Course Code	SI-CHEM21	
	Course Title	Analytical Chemistry (Paper II)	
	Course Type	Core Course	
	Pre-requisite (if any)	To study this course students must have had the subject Chemistry in class +2 or equivalent.	
	Course Learning Outcomes (CLO)	By the this course students will learn the following aspects of Chemistry; <ol style="list-style-type: none"> 1. Basic concepts of Mathematics for Chemists. 2. Fundamentals of analytical chemistry and steps involved in analysis. 3. Basic Knowledge of Computer for chemists. 4. Basic Concepts of Chemical equilibrium. 5. Principles of Chromatography and chromatographic techniques. 6. Various techniques of Spectroscopic Analysis. 	
	Credit Value	4	
	Total marks	Maximum Marks: CCE-25, University Exam (UE)-75	Minimum Passing Marks:33



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Part B – Content of the course

Total No. of Lectures-Tutorials-Practical (In hours per week): L-T-P: 90-0-30

Unit	Topic	No. of Lectures
1	<p>Mathematics for Chemists Straight line equation, Logarithmic relation, curve sketching, linear graphs & calculation of slopes, Differentiation, differentiation of functions like kx, e^x, x^n, $\sin x$, $\log x$, maxima & minima, partial differentiation, Integration of some useful relevant functions. <i>Keywords/Tags: Linear graphs, Logarithmic Relation, Differentiation, Integration.</i></p>	10
2	<p>Basic Analytical Chemistry: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling, Importance of accuracy, precision and sources of error in analytical measurement. Presentation of experimental data and results, from the point of view of significant figures, statistical terms: mean, mean deviation, median standard deviation, Numerical Problems.</p> <p>Calculations used in Analytical Chemistry Some Important units of measurements- SI Units, distinction between mass and weight, mole, milli mole and Numerical Problems. Solution and their concentrations- Concept of Molarity, molality and normality, Expressing the concentration in parts per million (ppm), parts per billion (ppb), Numerical Problems. Chemical Stoichiometry- Empirical and Molecular Formulas, Stoichiometric Calculations, Numerical Problems. <i>Keywords/Tags: Accuracy, Precision, SI units, Units of Concentration, Chemical stoichiometry.</i></p>	10



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3	Computer for chemists Introduction to computer, Introduction to operating systems like- DOS, Windows, Linux and Ubuntu. Use of computer programs	10
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	<p>Running of standard programs & packages such as MS-word, MS-excel, PowerPoint, Execution of linear regression x-y Plot. Use of software's for drawing structures and molecular formulae.</p> <p><i>Keywords/Tags: Operating systems, MS-word, MS-excel, PowerPoint.</i></p>	
4	<p>Chemical Equilibrium: Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van's Hoff reaction isotherm, Le-Chevelier's principle and its applications.</p> <p><i>Keywords/Tags: Chemical Equilibrium, Equilibrium constant, Free Energy, Chemical Potential.</i></p>	10
5	<p>Chromatography: Introduction, Principle and Classification. Mechanism of separation: adsorption, partition & ion-exchange. Development of chromatograms: frontal, elution and displacement methods. Paper Chromatography (ascending, descending and circular), Thin layer Chromatography (TLC) and Column Chromatography (CC), Gas Chromatography (GC) and High Pressure Liquid Chromatography (HPLC), types of column and column selection, applications, limitations.</p> <p>Principle and Application of:</p> <ul style="list-style-type: none"> • Flash chromatography, • Ion-exchange chromatography and • Chiral chromatography. <p><i>Keywords/Tags: Chromatography, Ion Exchange, Column Selection, Adsorption.</i></p>	10




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6	<p>Spectrum techniques of analysis</p> <p>Basic of absorption spectroscopy: Electromagnetic radiation, Spectral range, Absorption, Absorptivity, Molar Absorptivity, Fundamental Laws of Absorption, Lambert-Beer Law and its limitations.</p> <p>Constitution & working of photometer, spectrometer, colorimeter.</p> <p>Ultraviolet (UV) absorption spectroscopy-</p>	10
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Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, Hyperchromic and hypochromic shifts. UV spectra of conjugated polyenes and enones.

Infra-red (IR) absorption spectroscopy-

Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, Measurement of IR spectrum, finger print region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

Keywords/Tags: *Hypsochromic, Hypochromic, Absorption, Spectrum*

Part C- Learning resources

Text Books, Reference Books, Other Resources



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Text Books

1. Gaur.S., Computer for Chemists, Neel Kamal Prakashan,2017.
2. Khopkar, S.M. Basic Concept of Analytical Chemistry, New Age, Internations Publisher, 2009.
3. Kaur H, Analytical Chemistry, Pragati Prakashan(2008).
4. Gupta. Alka L., Analytical Chemistry , Pragati Prakashan (2020).
5. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.
6. Kaur H, Instrumental Methods of Chemical Analysis, Pragati Prakashan, 2018.
7. Sharma B.K., Chromatography, Krishna Prakashan,2019.
8. Sharma Y.R., Elementry Organic Spectroscopy, S Chand, 2013.
9. Singh, DR Saxena, G., Singh, B., Inorganic Chemicals, Shivlal Aggrawal & Company, Agra.
10. Srivastava, S.S., Gchlot, A.S., Chemistry, Ratan Prakashan Temple, Indore.



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11. Soni, P.L. Organic Chemistry, Sultan Chand and Sons, Delhi.
12. Singh, R.K.P., Modern Chemistry, Sahitya Bhavan, Agra.
13. Agnihotri, P.K, Sahu, D
14. P., Pillai, A., Sahu, M., Yugbodh Chemistry, Yugbodh Publications, Raipur.

Reference Books:

1. Mitra Surbhi, Handbook of Computer Science & IT, Arihant, 2018.
2. Harris, D.C. Quantitative Chemical Analysis, 6th Ed., Freeman (2007).
3. Christian, Gary D; Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
4. Barrow, G.M. Physical Chemistry, Tata McGraw-Hill (2007)
5. Atkins' Physical Chemistry, 10th Edition, Oxford University Press 2014.
6. Guru J.N. Guru A. Advanced Physical Chemistry, Pragati Prakashan, Meerut, ISBN:9789386633347, 9386633345; Edition: IV, 2017.
7. Atkins, P.W. & Paula, J. Physical Chemistry. Oxford Press, 2016.
8. Finar, I.L. Organic Chemistry (Vol. I & II), E.L.B.S.
9. Morrison, R.T. & Boyd, R.N. Organic Chemistry, Pearson, 2010.
10. Banwell, Molecular Spectroscopy, 2017.
11. Silverstein Robert, Spectrometric Identification of Organic Compounds, Wiley, 2014.
12. Dyer J.R., Applications of Absorption Spectroscopy of Organic Compounds, 2009.

Suggested equivalent online courses:

MOOC: <https://www.edx.org/course/basic-analytical-chemistry>

NPTEL: <https://nptel.as.in/courses/104/105/104105084/>



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Web sources


1. <https://www.freebookcentre.net/Chemistry/Analytical-Chemistry-Books.html>
2. <https://nptel.springer.com/journal/216>

Part D- Assessment and Evaluation



Suggested Continuous Evaluation Methods: Continuous Internal Evaluation Shall be Based on Allotted Assignment and class Tests. The marks shall be as follows:	Marks
Assessment and presentation of assignment	04
Class Test-I (Objective Questions)	04
Class Test-II (Descriptive Questions)	04
Class Test-I (Objective Questions)	04
Class Test-II (Descriptive Questions)	04
Overall performance throughout the year (includes Attendance Behavior Discipline Participation in Different Activities)	05
Total	25
Elaboration: Assessment Theory	
External Assessment	
Theory Paper	75
Grand Total	100




PRACTICAL

Program- CERTIFICATE	Class- B.Sc.	Year- First	Session: 2021-2022
Subject – Chemistry			
1	Course Code	ST-CHEM1P	
	Course Title	Analytical Processes and Techniques (paper-II)	



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2	Course Type	Core Course	
3	Course Learning Outcomes (CLO)	<p>By the end of this course students will learn the following aspects of Laboratory exercises In Chemistry:</p> <ol style="list-style-type: none"> 1. Concepts and analytical methods in Chemistry. 2. Preparation of solutions of different concentrations. 3. Standardization of the solution. 4. Identification of Organic compounds by chromatographic techniques. 5. Analysis by Spectral Techniques. 	
4	Credit Value	2	
	Total Marks	Maximum Marks: University Exam (UE)-75, CCE-25	Minimum Passing Marks: 33

External Assessment		Marks
Experiments to be performed in laboratory		50
1	<p>Basic analytical exercises</p> <ul style="list-style-type: none"> • Calibration of different weights and glass apparatus (measuring cylinder, burette, pipette, volumetric flasks). • Preparation of solutions of different molarity/normality by weighing and dilution. 	10



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2	Quantitative Analysis <ul style="list-style-type: none">● Titrimetric Analysis<ul style="list-style-type: none">● Standardization of NaOH with Oxalic acid.● Determination of carbonate and hydroxide present in mixture.● Determination of carbonate and bicarbonate present in a mixture.● Determination of free alkali present in different soaps/detergents.	20
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3	<p>Quantitative Analysis by Colorimetry</p> <ul style="list-style-type: none">• Verification of Lambert-Beer Law• Determination of concentration of coloured compounds (e.g., CuSO_4, KMnO_4)	10
4	<p>Qualitative Analysis</p> <ul style="list-style-type: none">• Systematic identification of organic compound by qualitative analysis.• Chromatography: Identification by determination of the R_f values of the given organic/ inorganic compounds by paper/thin layer chromatography. <p><i>Keywords/Tags: Analytical, Authentication, Molarity/ Normality, Standardization, Colorimetry, Qualitative Analysis</i></p>	10

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Part C- Learning resources

Text Books, References Books, Other Resources

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References:

1. Skoog, D.A. and Leary, J.J.: Instrumental Methods of Analysis, Saunders College Publications, New York, 1992.
2. Vogel's textbook of quantitative chemical analysis, 7th edition.
3. Goswami A.K., Mehta Anita, Khannam Rehnaa, ORS., UGC Practical Chemistry VOL. I, Pragati Prakashan, 2015.
4. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
5. Tandon, M.N., unified Rasayan Vigyan, Shival Agarwal & Company, 2018.

Suggestive digital platforms web links:

1. <https://www.youtube.com/watch?v=QAImRDzuTh8>
2. <http://amrita.olabs.edu.in/?sub=73&brch=8&sim=133&cnt=1>
3. <http://chemcollective.org/vlabs>
4. <http://mas-iitit.vlabs.ac.in/exp6/Quiz.html>
5. [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_9_Experiments/02%3A_Paper_Chromatography_of_Gel_Ink_Pens_\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_9_Experiments/02%3A_Paper_Chromatography_of_Gel_Ink_Pens_(Experiment))
6. <https://edu.rsc.org/experiment/leaf-chromatography/189/article>
7. <https://edu.rsc.org/experiments/chromatography-of-sweets/455/article>
8. http://swc.mit.edu/outreach/virtual_resources/paper_chromatography.pdf
9. <http://www.chem.latech.edu/~deddy/chem104/104Standard.htm>
10. https://www.chem.purdue.edu/course/chem224/Miscellaneous/Model_report_Expt2-revised_2009.pdf



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11. <https://www.webpages.uidaho.edu/ifu/heng/Chem%20253/labsExperiments%203.pdf>
12. <http://faculty.ccbcmd.edu/e-cvuu/122%2007%20Acid-base%20titration%20AUG%2013.pdf>
13. <https://labbalances.net/blog/guide-to-calibration-weights>
14. https://cdn2.hubspot.net/hubfs/2203666/Beamex_White_Papers/Beamex%20White%20Paper%20-%20Weighing%20scale%20calibration%20ENG.pdf?_hssc=107807261.6.1518193235316&_hsfp=2102249448&hsCtaTracking=8918cffa-b755-4f72-b4b1-24c1fa8d1a6d%7C12eb2e3f-4b62-43eb-ba00-2da2a5d102b6

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction on- <ul style="list-style-type: none"> • Common glassware and lab wares for solution preparation and analysis. • Numerical problems related to solution preparation. • Any other discussion. <p><i>Note: description to be written in practical record.</i></p>	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10




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Assignment (Charts/Model Seminar/Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Survey/Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75



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PART -A Introduction

Program :Certificate

Class: B.Sc.

Year :

Session:



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		I Year	2021-2022
Subject : Computer Science			
1.	Course Code	SI-CDSC11	
2.	Course Title	Computer System Architecture (Paper I)	
3.	Course Type (Core Course/Elective/Generic Elective/Vocational)	Core Course	
4.	Pre-Requisite (If any)	To study this course ,a students must have had the subject Physics/Maths in 12 th class .	
5.	Course Learning Outcomes(CLO)	On the Completion of this course ,learners will be able to: <ol style="list-style-type: none"> 1. Understands the basic structure ,operation and characteristics of digital computer . 2. Be able to design simple combinational digital circuits based on given parameters . 3. Familiarity with working of arithmetic and logic units as well as the concept of pipelining . 4. Know about hierarchical memory system including cache memories and virtual memory . 5. Understand concept and advantage of parallelism,threading ,multiprocessor and multicore processor . 6. Know the contributions of Indians in the field of computer architecture and related technologies. 	
6.	Credit value	Theory-4 Credits	
7	Total Marks	Max ,Marks : 25+75	Min. Passing Marks :33

Part B:Content Of the Course

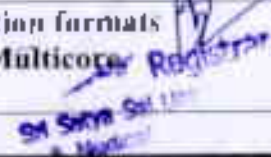
No. of Lectures (In hours per week): 2 Hours per week

Total No. of Lectures :60 HRS.

Module	Topics	No. of Lectures
I	Fundamentals of Digital Electronics;Data types ,Complements , Fixed –Points Representation, floating point representation , Binary and other Codes ,Error Detection Codes. Logic Gates : Boolean Algebra ,Map Simplification ,Combinational Circuits ,Sequential Circuits ,Simple Combinational Circuits design	10

	problems . Circuits: Adder- Subtractor , Multiplexer , Demultiplexer, Decoders, Encoders ,Flip Flops ,Registers ,Counters.	
II	Basic Computer Organization:Instruction Codes, Computer Register, Computer Instructions, Timing &control , Instruction Cycles, Memory Reference Instruction ,Input- out put& Interrupts, Complete Computer description & design of basic computer.	10
III	Instructions :Instruction formats ,Addressing modes,Instruction codes, Machine language, Assembly language . Register Transfer and micro operations :Register Transfer Language ,Register Transfer ,Bus and Memory Transfer ,Arithmetic Micro Operations ,logics Micro Operations ,Shift Micro Operations.	10
IV	Processor and Control Units : Hardwired vs. Micro Programmed Control Units ,General Register Organization ,Stack Organization, Instruction Formats ,Data Transfer & Manipulation , Program control ,Introductory concepts of RISC,CISC, advantages of both . Pipelining –Concept of pipe lining ,Introduction to Pipelined data path and control –Handling data hazard & Control hazards.	10
V	Memory and I/O System –Peripheral Device ,I/O Interface ,Data Transfer Scheme- Program Control ,Interrupt ,DMA Transfer I/O Processor . Memory Hierarchy ,Processor Vs Memory Speed , Memories ,main memory , Auxiliary memory ,Cache Memory , Associated Memory, Interleaving ,Virtual Memory ,Memory management.	10
VI	Parallelism – Meaning ,Types of Parallelism ,Introduction to Instruction level Parallelism , Parallelism ,Parallel processing challenge ,applications. Flynn's Classification -Introduction to SISD,SIMD,MISD,MIMD. Hardware Multithreading -Introduction ,types, advantages and applications . Multicore Processors – Introduction ,advantages ,difference from multiprocessors .	8
VII	Indian contribution to the field – Contributions of reputed scientists of Indian origin like – Dr. VinodDham – Father of Intel Pentium Processor ,Dr. Ajay Bhat- Cu –Investor of USB Technology,Dr. VinodKhosla –co founder of Sun Microsystems,Dr. Vijay P Bhatkar – architect of India's national initiative in supercomputing ,and many others . Parallel Computing project of India –PARAM, ANUPAM,FLOSOLVER ,CHIPPS etc.Other relevant contributors and contributions .	2

Keywords /Tags : Digital Electronics,Logic gates ,circuits ,Instruction formats ,Addressing modes , Parallelism ,Pipelining ,Memory Hierarchy, Multicore, Register, Multithreading ,SISD,SIMD,MISD,MIMD,PARAM,


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 Sehore (M.P.)

ANUPAM,FLOSOLVER,CHIPPS

PART C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- M.Morris Mano, "Computer System Architecture " PHI
- Heurling Jordan ,"Computer System Design & Architecture" (A.W.I.)
- William Stalling ," Computer Organization & Architecture " . Pearson Education Asia.
- V.CarlHamacher ," Computer Organization " TMH
- Tannenbaum ,"Structured Computer Organization " PIII.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=4TzMyXuzL8M>
2. <https://nptel.ac.in/course/106/106/106106166/>
3. <https://nptel.ac.in/course/105/106/106106134/>

Suggested equivalent online course

<http://nptel.ac.in/courses/106/105/106105163/>

Part D : Assessment and Evaluation

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25 Marks Shall be based on allotted assignment and Class Tests.The marks shall be as follows :		External Assessment: University Exam (UE) :75 Marks Time : 02,00 Hours	
Assessments and presentation of assignment	10 Marks	Section (A) : Three Very Short Questions (50Word) OR Nine MCQ Questions	03x03=9 Marks Or 09x01= 9 Marks
Class Test I (Objective Questions)	05 Marks		
Class Test II (Descriptive Questions)	05 Marks	Section (B) : Four Short Questions (200 Word)	04x09=36 Marks
Class Test III(Based on solving circuit design problems)	05 Marks	Section (C) : Two Long Questions (500 Word)	02x15=30 Marks
Total	25 Marks	Total	75 Marks

Any remarks /Suggestions ; Learning In the course should be emphasized more on practical aspects and real world problems and their solutions.



(Handwritten Signature)
Dr. Satya Sai
 Director



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Program :Certificate		Class: B.Sc.	Year : I Year	Session: 2021- 2022
Subject : Computer Science				
1.	Course Code	SI-COSCIP		
2.	Course Title	Computer Architecture Lab (Paper I)		
3.	Course Type (Core Course/Elective/Generic Elective/Vocational)	Core Course		
4.	Pre-Requisite (if any)	To study a student must have had the subject Physics /Maths in 12th Class		
5.	Course Learning Outcomes(CLO)	On the Completion of this course learners will be able- <ol style="list-style-type: none"> 1. Realization of the basic logic and Universal gates . 2. Verifying the behavior of logic gates using truth table. 3. Implement Binary to Gray,Gray to Binary code conversion . 4. Design half and full adder using basic gates . 5. Design and construct flip flops and verify the excitation tables . 		
6.	Credit value	Practical -2 Credits		
7.	Total Marks	Max .Marks : 25+75	Min. Passing Marks :33	
PART B:Content Of the Course				
No. of Lab Practcal's(In hours per week): 2Hrs. Per week				
Total No. of Labs =30 hours				
Suggested list of Practicals				




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	<p>List of Practical</p> <ol style="list-style-type: none"> 1. To study basic gates (AND ,OR, NOT) and verify their truth table. 2. To convert a given binary number in Gray code using IC 7486 . 3. To study and verify NAND as Universal gates using IC 7400 . 4. To study half adder using basic gates and verify its truth table . 5. To study full adder using basic gates and verify its truth table . 6. To realize basic gates (AND ,OR, NOT) from Universal gates (NAND and NOR). 7. To verify truth table of 4-bit adder using IC 7483. 8. To design and construct RS flip Flop using gates and verify the truth table . 9. To design and construct JK flip Flop using gates and verify the truth table . 10. To verify DeMorgan's Theorem . 	
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Keyword /Tags: Digital Electronics ,Logic gates ,AND ,OR,NOT ,IC 7486,IC 7400,NAND ,NOR,IC 7483, Circuit , Flip Flop , Demorgan's Theorem

Part C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- M.Morris Mano, "Computer System Architecture " PHI
- Heuring Jordan , "Computer System Design & Architecture" (A.W.I.)
- William Stalling , " Computer Organization & Architecture " , Pearson Education Asia.
- V,CarlHamacher , " Computer Organization " TMH
- Tannenbaum , "Structured Computer Organization " PHI.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=4TzMyXmzIL8M>
2. <https://nptel.ac.in/course/106/106/106106166/>
3. <https://nptel.ac.in/course/106/106/106106134/>

Suggested Equivalent online course

<http://nptel.ac.in/course/106/105/106105163>

Part D : Assessment and Evaluation (theory)

Internal Assessments : Continuous Compressive Evaluation (CCE) :25 Marks		External Assessments : University Exam(UE):75 Marks Time :02.00 Hours	
Internal Assessment	Marks	External Assessment	Marks
Hands -on Lab Practice	5 Marks	Practical Record File	10 Marks
Lab Test Practical list & Internal Viva	12 Marks	Viva Voce on Practical	15 Marks
Assignments/ Charts/Seminar/Rural	8 Marks	Table Work /Experiments	50 Marks



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Service/Technology Dissemination/Report of Excursion/ Lab Visits/Survey/Industrial Visit)			
Total	25	Total	75

Any remarks /Suggestions : Learning in the course should be emphasized more on practical aspects and real world problems and their solutions



PART A : Introduction

Program : Certificate		Class: B.Sc.	Year : I Year	Session : 2021- 2022
Subject : Computer Science				
1.	Course Code	SI-COSC21		
2.	Course Title	Programming Methodology & Data Structure (Paper II)		
3.	Course Type (Core Course/Elective /Generic Elective/Vocational)	Core Course		
4.	Pre-Requisite (if any)	To study this course, a student must have had the subject Physics/Maths in 12 th class .		
5.	Course Learning Outcomes(CLO)	<p>On the Completion of this course ,learners will be able to:</p> <ol style="list-style-type: none"> 1. Develop simple algorithm and flow chart to solve the problem with programming using top down design principles . 2. Writing efficient and well structured computer algorithms/programs . 3. Learn to formulate iterative solutions and array processing algorithms for problems . 4. Use the recursive technique ,pointers and searching methods in programming . 5. Will be familiar with fundamental data structure ,their implementation ; become accustomed to the description of algorithm in both functional and procedural styles . 6. Have knowledge of complexity of basic operations like insert ,delete ,search on these data structure . 7. Posses ability to choose a data structure to suitably model any data used in computer applications . 8. Design programs using various data structure including hash table ,Binary and general search Tree ,heaps ,Graphs etc. 9. Assess efficiency tradeoffs among different data structure implementations. 		

		<p>10. Implement and know the applications of algorithms for searching and sorting etc. 11. Know the contributions of Indian in the field of programming data structures.</p>	
6.	Credit value	Theory-4 Credits	
7	Total Marks	Max. Marks : 25+75	Min. Passing Marks :33

Part B:Content Of the Course

No. of Lectures (in hours per week): 2 Hours per week

Total Nu. of Lectures :60 HRS.

Module	Topics	No. of Lectures
I	<p>Introduction to Programming :Program concepts ,Characteristics of programming, Stages in program Development, Algorithms, Notations ,Design ,Flow chart, Types of programming Methodologies .</p> <p>Introduction to C++ Programming :Basic Program Structure In the C++,Data types,Variable,Constants ,Operators and basic I/O .</p> <p>Variable:Declaring ,defining and initializing variables, scope of variables ,using named constants ,Keywords,Casting of data types ,Operators(Arithmetic,Logical and Bitwise),Using comments in programs,Character I/O (getc,getchr,putc,putchr etc.),Formatted and console I/O(printf(),scanf(),cin,cout),using basic header files (stdio.h,iostream.h,conio.h etc.).</p> <p>Simple Expressions in C++ : (Including unary operator Expressions,Binary operator expressions), understanding operator precedence in expressions .</p>	8
II	<p>Iterativestatements :while ,do-while and for loops,use break and continue loops,Using nested Statements (Conditional as well as Iterative).</p> <p>Functions:Top-Down design,Pre-defined functions, Programmer defined functions,local variable and global variables,Functions with default Arguments ,Call by Value and Call by References, Parameters, Recursions.</p> <p>Introduction to Arrays: Declaration and Referring Arrays,Arrays in Memory,Initializing Array, Arrays in Functions,Multi-</p>	10




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	Dimentional Arrays,	
III	Structures :Member Accessing ,Pointers to Structure ,Structure and Functions ,Array of Structure . Unions :Declaration and Initialization. Strings:Reading and Writing Strings,Arrays of Strings,Strings and Structures, Standard String and Structure, Standard String library Functions. Searching Algorithms:Linear Search,Binary Search . File Handling :Use of Files for data input and output ,merging and copying files .	8
IV	Data Structure :Basic Concepts, Linear and non linear data structure . Algorithm Specification –Introduction,recursive algorithms,Data Abstraction, Performance Analysis. Linked List: Singly Linked List, Operations. Concatenating,Circularly linked list ,Doubly linked list – Operations. Array: Representation of single,Two Dimensional arrays, sparse matrices-array and linked Representation. Stacks:Operations array and linked implementations,applications infix to postfix conversion, postfix expression evaluation, Recursion Implementation.	12
V	Queue –Definition, operation,array and linked implementations . Circular Queue- insertion and deletion operations ,Deque (Double ended Queue) ,priority Queue-Implementation. Trees : Binary Tree Representation –Properties of Binary Tree ,Binary Tree Representation,-Array and Linked Representation, Binary Tree Traversal,Threaded Binary Tree. Heap: Definition,Insertion,Deletion.	10
VI	Graphs – Graph ADT, Graph Representation Graph Traversals, searching. Hashing - Introduction, Hash tables, Hash functions, Overflow Handling Sorting Methods – Comparison Sorting Methods. Search Tree-Binary Search Tree,Avl Tree –definition and Examples.	10
VII	Indian contribution to the field – Innovation in India, Origin of Java Programming Language, Indian Engineers who designed new programming Languages, open source languages ,Dr. Sanjay Subni-Computer Scientist- pioneer of Data Structures, other relevant contributors and contributions.	2
<p>Keywords /Tags :Programming, C++,Data Structure, Expressions, Control,File Handling, Arrays, Stack, Queue, Linked List, Tree, Graphs, Structure, Union, Search,Algorithm.</p>		



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PART C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- Lipschutz: Schaum's outline series Data Structure ,Tata Mcgraw Hill
- Problem Solving and Program Design in C,J.R.Hanly and E.B.Koffman ,Pearson.2015
- E.Balaguruswamy,"C++TMH Publication ISBN O-07-462038-X.
- HerbertzShield,"C++ the complete References" TMH Publication.
- R.Lafare, "Object Oriented Programming C++.
- N. Dale and C .Weems ,Programming and Problem solving with C++ :brlef editlon,Jones& Bartlett learnlg.
- Adam Drozdek," Data structure and Algorithms In C++",Thlrd editlon Cengage Learning.
- SartajSahani. Data Structure ,Algorithms and Applications with C++ ,McGraw Hill.
- Robert L. Kruse," Data Structure and Program Design inC++",Pearson.
- D.S. Malik.Data Structure using C++,Second Editlon .Cengage Learning.
- M.A. Weiss ,Data structure and Algorithms Analysis in C,2nd editlon ,Pearson.
- M.A. Weiss,Data structure and Algorithm Analysis In C,2ndeditlon,Pearson.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=BC1S40yzsxA>
2. <https://www.youtube.com/watch?v=vLqPwxZdW4Y&vl=en>
3. <https://www.youtube.com/watch?v=Umm1ZQ5hZw>
4. https://www.youtube.com/watch?v=AT141CXuMKI&list=PLdu5W4Nhy211bbk1zrsKIMpu_gsuLISLU



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Suggested equivalent online course

<http://nptel.ac.in/courses/106/105/106105151/>

<http://nptel.ac.in/courses/106/106/106106133/>

Part D : Assessment and Evaluation

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25 Marks Shall be based on allotted assignment and Class Tests.The marks shall be as follows :		External Assessment: University Exam (UE) :75 Marks Time : 02.00 Hours	
Assessments and presentation of assignment	10 Marks	Section (A) : Three Very Short Questions (50Word)	03x03=9 Marks
Class Test I (Objective Questions)	05 Marks	OR Nine MCQ Questions	Or 09x01= 9 Marks
Class Test II (Descriptive Questions)	05 Marks	Section (B) : Four Short Questions (200 Word)	04x09=36 Marks



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 Recd. on 11/11/2023
 09/11/23

Class Test III (Based on solving circuit design problems)	05 Marks	Section (C) : Two Long Questions (500 Word)	02x15=30 Marks
Total	25 Marks	Total	75 Marks

Any remarks / Suggestions : Focus of the course / teaching should be on developing ability of the student in analyzing a problem, building the logic and efficient code for the problem .



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PART A : Introduction

Program :Certificate		Class: B.Sc.	Year : I Year	Session: 2021-2022
Subject : Computer Science				
1.	Course Code	SI-COSC2P		
2.	Course Title	Office Tools & Programming Methodology Lab (Paper 2)		
3.	Course Type (Core Course/Elective/Generic Elective/Vocational)	Core Course		
4.	Pre-Requisite (if any)	To study a student must have had the subject Physics /Maths in 12th Class		
5.	Course Learning Outcomes(CLO)	<p>On the Completion of this course learners will be able-</p> <ol style="list-style-type: none"> 1. Develop simple algorithms and flow Chart to solve a problem with programming using top down design principles. 2. Writing efficient and well structured computer algorithms/programs. 3. Learn to Formulate iterative solutions and array processing algorithms for problems . 4. Use recursive techniques, pointers and searching methods in programming. 5. Possess ability to choose a data Structure to suitably model any data used in computer applications. 6. Implementation of algorithms for searching and sorting . 		
6.	Credit value	Practical -2 Credits		
7.	Total Marks	Max .Marks : 25+75	Min. Passing Marks :33	




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PART B: Content Of the Course

No. of Lab Practical's (In hours per week): 2 Hrs. Per week

Total No. of Labs = 30 Hours

Suggested list of Practical's

List of Practical

I. Office Tools .

Using a Text Editor Tool

1. Create a documents and apply different Editing options .
2. Create Banner for your college .
3. Design a Greeting card using word art for different festivals.
4. Design your Bio Data and use page borders and shading .
5. Create a documents and insert header and footer,apgetitle,date,time ,apply various page formatting feature etc.
6. Implement Mail Merge.
7. Insert a table into a document and try different formatting options for the table .

30
Hours

Using a spreadsheet Tool

1. Design your class Time Table .
2. Prepare a Mark Sheet of your class result .
3. Prepare a salary slip of an employee of an organization.
4. Prepare a bar chart & pie chart for analysis of election result.
5. Prepare a generic Bill of a Super Market.
6. Work on the following exercise on answer book;
 - a. Copy an existing Sheet
 - b. Rename the old Sheet
 - c. Insert a new Sheet into an existing Workbook
 - d. Delete the renamed sheet.
7. Prepare an attendance sheet of 10 students for any 6 subjects of your syllabus.calculate their total attendance,total percentages of attendance of each students and average of attendance.
8. Create a worksheet of students list of any 4 facilities and perform following database function on it.
 - a. Sort data by Name
 - b. Filter data by Class
 - c. Subtotal of students by class

Using a Presentation Tool



1. Design a presentation of your Institute using auto content wizard, design template and blank presentation.
2. Design a presentation illustrating insertion of pictures, Word Art and Clipart .
3. Design a presentation, learn how to save it in different formats, copying and opening an existing presentation.
4. Design a presentation illustrating Insertion of movie, animation and sound.
5. Illustrate use of custom animation and slide transition (using different effects).
6. Design a presentation using charts and tables of the marks obtained in class.

II. Given a problem statements ,students are required to formulate problem,developflowchart/Algorlyhm,write code in C++,execute and test it. Students should be given assignments on following :

1. A. To learn elementary technique involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators)and control structures,

R. Learn how to use functions and parameter passing in functions ,writing recursive programs,

2. Write a program to swap the contents of two variables.
3. Write a program for finding the roots of a quadratic equation.
4. Write a program to find area of a circle,rectangle,square using switch case.
5. Write a program to check whether a given number is even or odd.
6. Write a program to print table of any number.
7. Write a program to print Fibonacci series.
8. Write a program to find factorial of given number.
9. Write a program to convert decimal (Integer) number in to equivalent binary number.
10. Write a program to check given string is pallndrome or not.
11. Write a program to perform multiplications of two matrices.
12. Write a program to print digits of entered number in reverse order .
13. Write a program to print sum of two matrices .
14. Write a program to print multiplication of two matrices.
15. Write a program to generate even/odd series from 1 to 100.
16. Write a program whether a given number is prime or not.
17. Write a program for call by value and call by reference.
18. Write a program to generate a series



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	$1+1/1!+2/2!+3/3!.....+n/n! .$ 19. Write a program to create a pyramid structure <pre> * ** *** **** </pre>	
	20. Write a program to create a pyramid structure <pre> 1 12 123 1234 </pre>	
	21. Write a program to check entered number is Armstrong or not. 22. Write program for traversing an Array. 23. Write a program to input N numbers, add them and find average. 24. Write a program to find largest element from an array. 25. Write a program for linear search. 26. Write a program for binary search. 27. Write a program for bubble sort. 28. Write a program for selection sort.	

Keyword /Tags: Digital Electronics ,Logic gates ,AND ,OR,NOT ,IC 7486,IC 7400,NAND ,NOR,IC 7483, Circuit , Flip Flop , Demorgan's Theorem

Part C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- M.Morris Mano, "Computer System Architecture " PHI
- Heuring Jordan ,"Computer System Design & Architecture" (A.W.L.)
- William Stalling ," Computer Organization & Architecture " , Pearson Education Asia.
- V.CarlHamacher ," Computer Organization " TMH
- Tannenbaum ,"Structured Computer Organization " PHL.

Suggested Digital Platforms ,Web links :

4. <https://www.youtube.com/watch?v=4TzMyXmzLL8M>
5. <https://nptel.ac.in/course/106/106/106106166/>
6. <https://nptel.ac.in/course/106/106/106106134/>

Suggested Equivalent online course

<http://nptel.ac.in/course/106/105/106105163>

Part D : Assessment and Evaluation (theory)

Internal Assessments : Continuous Compressive Evaluation (CCE) :25 Marks		External Assessments : University Exam(UE):75 Marks Time :02.00 Hours	
Internal Assessment	Marks	External Assessment	Marks
Hands –on Lab Practice	5 Marks	Practical Record File	10 Marks
Lab Test Practical list &	12 Marks	Viva Voce on Practical	15 Marks



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Internal Viva			
Assignments(Charts/Seminar/Rural Service/Technology Dissemination/Report of Excursion/ Lab Visits/Survey/Industrial Visit)	8 Marks	Table Work /Experiments	50 Marks
Total	25	Total	75

Any remarks /Suggestions : Focus of the course /Teaching should be on developing ability of the students in analyzing a problem, building the logic and efficient code for the problem.

Part A- Introduction			
Program: Certificate	Class: B.Sc. I Year	Year: 2021	Session: 2021-2022
Subject: Mathematics			
Course Code	SI-MATH11		
Course Title	Algebra, Vector Analysis and Geometry(Paper-1)		
Course Type (Core/Elective/ Generic Elective/Vocational)	Core course		
Pre-requisite (if any)	To study this course, a student must have had the subject Mathematics in 12 class.		
Course Learning	The course will enable the students to:		

Outcomes (CLO)	<ol style="list-style-type: none"> 1. Recognize consistent and inconsistent of a system of linear equations by the reducing echelon form of the augmented matrix, using the rank of matrix. 2. To find the Eigen values and corresponding Eigen vectors for a square matrix. 3. Using the knowledge of vector calculus in geometry. 4. Enhance the knowledge of three dimensional geometrical figures (cone and cylinder etc). 	
Credit Value	6	
Total Marks	Max. Marks: 25+75	Min. Marks: 33

Part B- Content of the Course

Total numbers of Lectures(in hours per week): 3 hours per week

Total Lectures: 90 hours

Unit	Topics	Numbers of Lectures
1	1.1 Historical background: 1.1.1 Development of Indian Mathematics: Later Classical Period (500 -1250) 1.1.2 A brief biography of Varāhamihira and Aryabhatta 1.2 Rank of a Matrix 1.3 Echelon and Normal form of a matrix 1.4 Characteristic equations of a matrix 1.4.1 Eigen-values 1.4.2 Eigen-vectors	15
2	2.1 Cayley Hamilton theorem 2.2 Application of Cayley Hamilton theorem to find the inverse of a matrix. 2.3 Application of matrix to solve a system of linear equations 2.4 Theorems on consistency and inconsistency of a system of linear equations 2.5 Solving linear equations up to three unknowns	18
3	3.1 Scalar and Vector products of three and four vectors 3.2 Reciprocal vectors 3.3 Vector differentiation 3.3.1 Rules of differentiation 3.3.2 Derivatives of Triple Products 3.4 Gradient, Divergence and Curl 3.4.1 Directional derivatives	18

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	3.6 Vector Identities 3.7 Vector Equations	
4	4.1 Vector Integration 4.2 Gauss theorem (without proof) and problems based on it 4.3 Green theorem (without proof) and problems based on it 4.4 Stoke theorem (without proof) and problems based on it	15
5	5.1 General equation of second degree 5.2 Tracing of conics 5.3 System of conics 5.4 Cone 5.4.1 Equation of cone with given base 5.4.2 Generators of cone 5.4.3 Condition for three mutually perpendicular generators 5.4.4 Right circular cone 5.5 Cylinder 5.5.1 Equation of cylinder and its properties 5.5.2 Right Circular Cylinder 5.5.3 Enveloping Cylinder	24
<p>Keywords/Tags: Indian Mathematics, Rank of a Matrix, Scalar and Vector Products, Vector Differentiation, Vector Identities, Vector Integration, General Equation of Second Degree, Tracing of Conics, System of Conics, Equation of Cone, Equation of Cylinder.</p>		

Part C-Learning Resources
Text Books, Reference Books, Other resources


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Suggested Readings:

Text Books:

1. K. B. Dana: Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi 2000.
2. Shanti Narayan: A Text Book of Vector Calculus, S. Chand & Co., New Delhi. 1987.
3. S. L. Loney: The Elements of Coordinate Geometry part-1, New Age International (p) Ltd. Publishers, New Delhi. 2016.
4. P. K. Jain and Khalil Ahmad: A text book of Analytical Geometry of Three Dimensions, Willey Eastern Ltd, 1999.
5. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, vol.3, 2005.

Reference Books:

1. Chandrika Prasad: A Text Book on Algebra and Theory of Equations, Pothishala Pvt., Ltd., Allahabad, 2017.
2. N. Jacobson: Basic Algebra Vol. I and II, W. H. Freeman, 2009.
3. I. S. Luther and I. B. S. Passi: Algebra Vol. I & II, Narosa Publishing House, 1997.
4. N. Saran and S. N. Nigam: Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad, 1990.
5. Murray R. Spiegel: Vector Analysis, Schaum Publishing Company, New York. 2017.
6. Gorakh Prasad and H. C. Gupta: Text Book on Coordinate Geometry, Pothishala Pvt.Ltd., Allahabad, 2000.
7. P. K. Jain and Khalil Ahmad: A text book of Analytical Geometry of Two Dimensions Macmillan Indian Ltd., 1994.
8. S. L. Loney: The Elements of Coordinate Geometry Part-2, Macmillan, 1923.
9. N. Saran and D. N. Gupta: Three Dimensional Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad, 1994.
10. R. J. T. Bell: Elementary Treatise on Coordinate Geometry of Three Dimensions, Macmillan India Ltd., 1994.
11. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House, 1962.

Suggested Digital Platforms Web links:

<https://epgp.inflibnet.ac.in>

<https://freevideolectures.com/university/iit-roorkee>

<https://www.highereducation.mp.gov.in/?page=shzlQmpZwkyIQo2b%2Fy5G7w%3D%3D>

<https://www.bhojvirtualuniversity.com>

Suggested Equivalent online courses:

<https://nptel.ac.in/courses/111105122/>

<https://nptel.ac.in/courses/111107112/>

<https://nptel.ac.in/courses/111/101/111101080/>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 marks

Continuous Comprehensive Evaluation (CCE): 25 marks

University Examination: 75 marks

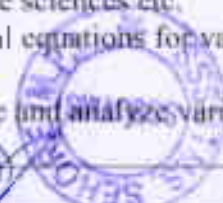
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Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	15 10 Total: 25 marks
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30 Total = 75

Part A- Introduction			
Program: Certificate	Class: B.Sc. 1 Year	Year: 2021	Session: 2021-2022
Subject: Mathematics			
Course Code	SI-MATH2T		
Course Title	Calculus and Differential Equations (Paper-2)		
Course Type (Core/Elective/ Generic Elective/Vocational/...)	Core course		
Pre-requisite (if any)	To study this course, a student must have had the subject Mathematics in 12 class.		
Course Learning Outcomes (CLO)	The course will enable the students to:		
	<ol style="list-style-type: none"> 1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference. 2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc. 3. Formulate the Differential equations for various Mathematical models. 4. Using techniques to solve and analyze various Mathematical models. 		

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Credit Value	6	
Total Marks	Max. Marks: 25+75	Min. Marks: 33

Part B- Content of the Course

Total numbers of Lectures(In hours per week): 3 hours per week

Total Lectures: 90 hours

Unit	Topics	Numbers of Lectures
1	1.1 Historical background: 1.1.1 Development of Indian Mathematics ancient and early classical period (Till 500 Cen.) 1.1.2 A brief biography of Bhaskaracharya (with special reference to Lilavati and Madhava) 1.2 Successive Differentiation 1.2.1 Leibnitz Theorem 1.2.2 Maclaurin's series Expansion 1.2.3 Taylor's series Expansion	18

	1.3 Partial Differentiation 1.3.1 Partial Derivatives of higher order 1.3.2 Euler's theorem on homogeneous functions 1.4 Asymptotes 1.4.1 Asymptotes of algebraic curves 1.4.2 Condition for Existence of Asymptotes 1.4.3 Parallel Asymptotes 1.4.4 Asymptotes of polar curves	
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2	2.1 Curvature 2.1.1 Formula for radius of Curvature 2.1.2 Curvature at origin 2.1.3 Centre of Curvature 2.2 Concavity and Convexity 2.2.1 Concavity and Convexity of curves 2.2.2 Point of inflexion 2.2.3 Singular point 2.2.4 Multiple points 2.3 Tracing of curves 2.3.1 Curves represented by Cartesian equation 2.3.2 Curves represented by Polar equation	18
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3	3.1 Integration of Transcendental Functions 3.2 Introduction to Double and Triple Integral 3.3 Reduction formulae 3.4 Quadrature 3.4.1 For Cartesian coordinates	18
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	3.4.2 For Polar coordinates 3.5 Rectification 3.5.1 For Cartesian coordinates 3.5.2 For Polar coordinates	
4	4.1 Linear Differential Equations 4.1.1 Linear equation 4.1.2 Equations reducible to the linear form 4.1.3 Change of variables 4.2 Exact Differential equations 4.3 First order and higher degree Differential equations 4.3.1 Equations solvable for x, y and φ 4.3.2 Equations homogenous in x and y 4.3.3 Clairaut's equation 4.3.4 Singular solutions 4.3.5 Geometrical meaning of Differential equations 4.3.6 Orthogonal trajectories	18
5	5.1 Linear Differential equation with constant coefficients 5.2 Homogeneous linear ordinary Differential equations 5.3 Linear Differential equations of second order 5.4 Transformation of equations by changing the Dependent/Independent variables 5.5 Method of Variation of parameters	18
Keywords/Tags: Indian Mathematics, Successive Differentiation, Partial Differentiation, Asymptotes, Curvature, Tracing of Curves, Quadrature, Rectification, Linear Differential Equations, Method of Variation of Parameters.		

Part C-Learning Resources Text Books, Reference Books, Other resources


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Suggested Readings:

Text Books:

1. Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd, Allahabad, 2016.
2. Gorakh Prasad: Integral Calculus, Pothishala Private Ltd., Allahabad, 2015.
3. M. D. Raisinghania: Ordinary and Partial Differential equations. S Chand & Co Ltd., 2017.
4. Gerard G. Emch, R. Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, vol. 3, 2005.
5. Madhya Pradesh hindi granth academy books.

Reference Books:

1. N. Piskunov: Differential and Integral Calculus, CBS Publishers, 1996.
2. G. F. Simmons: Differential Equations, Tata McGraw Hill, 1972.
3. E. A. Codington: An introduction to ordinary differential Equation, Prentice Hall of India, 1961.
4. D. A. Murray: Introductory Course in Differential Equations. Orient Longman (india), 1967.
5. H. T. H Piaggio: Elementary Treatise on Differential Equations and their Application, C. B.S. Publisher & Distributors Delhi, 1985.
6. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House, 1962.

Suggested Digital Platforms Web links:

- <https://ecgp.inflibnet.ac.in>
<https://freevideolecures.com/university/iiit-roorkee>
<https://www.highereducation.mp.gov.in/?page=xh7kQmpZwkyIQo2b%2Fy5G7w%3D%3D>
<https://www.bhojvirtualuniversity.com>

Suggested Equivalent online courses:

- <https://nptel.ac.in/courses/111105122/>
<https://nptel.ac.in/courses/111107112/>
<https://nptel.ac.in/courses/111/101/111101080/>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 marks

Continuous Comprehensive Evaluation (CCE): 25 marks

University Exam (UE): 75 marks

Internal Assessment:	Class Test Assignment/Presentation	15 10 Total: 25 marks
External Assessment:	Section(A) : Three Very Short Questions Section(B) : Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30 Total = 75



	Part A Introduction
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Program Certificate Course		Class: B.SC.	Year : FIRST Year	Session :2021-2022 onwards
Subject : Microbiology				
1	Course Code	SI-MBIO11		
2	Course Title	General Microbiology and Cell Structure(Paper-I)		
3	Course Type	Core Course		
4	Pre- requisite (if any)	To study this course a student must have had the subject Biology in class 12th.		
5	Course Learning outcomes (CLO)	After completing this course in Microbiology, a student vshall have understanding of. <ul style="list-style-type: none"> • Indian traditional knowledge and historical background of Microbiology. • Structure and transmission of viruses. • Cell structure and cell organization of bacteria. • Different kinds of unicellular prokaryotic and eukaryotic microorganisms based on specific characteristics. • General characteristics of important Eubacteria. 		
6	Credit Value	4		
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33	
Part B- Content of the Course				
Total no of Lectures –60 Lectures- Tutorials- practical (in hours per week) L-T-P P:4-0-0				
Unit	Topics	No. of Lectures		

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<p>I</p>	<p>The Microbial World</p> <p>1.1 Indian traditional knowledge and global historical background of Microbiology.</p> <p>1.2 Theory of Biogenesis, Germ theory of disease, Fermentation.</p> <p>1.3 Significance of Microbiology-</p> <p>(a) Branches of microbiology</p> <p>(b) Thrust area of microbiology- Genetic engineering and Biotechnology.</p> <p>1.4 Contribution of following scientists in the field of microbiology-</p> <p>Louis Pasteur, Robert Koch, Edward Jenner, Alexander Fleming, Joseph Lister, serge N. Winogradsky, Marti us beijernik, Dmitri Ivanowsky, and Hans Christian Gram.</p> <p>Keywords: History of Microbiology, Renowned microbiologists, Genetic Engineering, Biotechnology.</p>	<p>15</p>
<p>II</p>	<p>2. Acellular and Prokaryotic Microorganisms</p> <p>2.1 Virus- General characters of following viruses- Bacteriophage (T4 phage) , plant viruses (TMV), Prions and Viroid.</p> <p>2.2 Whittaker's System- of Five kingdom Classification: Mon era, Protista, fungi, Plantae and Animal a.</p> <p>2.3 Carl Weser's Three Domain system of classification:</p> <p>Achuea and Eubacteria.</p> <p>2.4 Bacteria- Study of Spirochete, Rickettsia, Chlamydia, Mycoplasma, and Actinomyces.</p> <p>2.5 Cyanobacteria- Study of anabaenas and spiraling.</p> <p>Keywords: Prokaryotes, Whittaker, Carl Whose , Bacteria, cyanobacteria.</p>	<p>15</p>

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III	<p>Eukaryotic Microorganisms</p> <p>3.1 Basic Knowledge of Eukaryotic organisms and their evolutionary pattern.</p> <p>3.2 Fungi- Study of Saccharomyces cerevisiae, Mucor, Aspergillus, Rhizopus and Penicillium.</p> <p>3.3 Protozoa- Study of Euglena, Trypanosome, Leishmania, Amoeba, Entamoeba and Plasmodium.</p> <p>Key words: Eukaryotes, Fungi, Protozoa</p>	15
IV	<p>4. Introduction to Microbial Cell Structure</p> <p>4.1 Study of Bacteria- Size, shape, and arrangement of bacterial cells.</p> <p>4.2 Structures External to plasma Membrane- Glyo calyx, capsule slime layer, flagella, stalk, protean and cell wall of Gram + v e and Gram -v e bacteria..</p> <p>4.3 Structures internal to cell wall- Cell membrane, cytoplasm, cytoplasmic inclusions, genome, spores and cysts.</p> <p>4.4 Reproduction in bacteria- Binary fission, budding and fragmentation.</p> <p>Keywords: Bacterial cells, Gram positive Bacteria, Gram negative Bacteria, Binary fission.</p>	15

Part C-Learning Resources

Text books, Reference Books, Other resources

Suggested Reading:

1. Pelzer, M.J., , E.C.S and Krieg, N.R. "Microbiology" Tata McGraws Hill, New DELHI,(2001)
2. Tortuga G.J, Finke Br, Case "Microbiology". An Introduction, 9th edition Pearson Education (2008)
3. Willey J.M., Sherwood L.M., Wool verton C.J., "PRESCOTT'S Microbiology", 10th edition (2013)
4. Prescott, A.T., Starino, J.M., Dunlap, P.V. AND Clark D.P. "Block Biology of Microorganisms, 12th edition, Pearson Benjamin Cummings, San Francisco (2009).
5. Sum Ball, Gaeta and Mathura, R.S., "Principles of Microbiology" McGraw Hill edition,(2017)



6. AgathaNarayan, R. and Picnicker, C.K.S., "Text book of microbiology", 6th edition Oriental Longman Publication, U.S.A (2000).
7. Dublety, R.C., And Maheshwari, D.K., "Text book of microbiology". S. Chand & Company Ltd., New Delhi,(2008).
8. Sharma, P.D., "Microbiology". Kasogi Publications, Meerut, (2014).
9. Singh, R.P., "Applied Microbiology", Kaljan Publishers, New Delhi. (2007)
10. Shimmy, Q.J., "Microbiology"-I". Kallias Sudden, Bhopal.

Suggested equivalent online courses:

1. <https://www.cam.ac.uk/course/small-and-mighty-introduction-microbiology-futurelearn>
2. <https://www.mooc-list.com/course/microbiology-saylororg>
3. <https://www.mooc-list.com/course/bacteria-and-chronic-infections-course4>
4. <https://www.coursera.org/lecture/bacterial-infections/1-1-introduction-to-bacteria-by-bioinformaticscian-phd-peder-worning-1Z64m>
5. <https://www.opentax.org/books/microbiology/pages/1-1-types-of-microorganisms>
6. <https://opentax.org/books/microbiology/pages/4-1-prokaryotic-habitats-relationships-and-microbiomes>
7. <https://swayam.gov.in/explorer?searchText=microbiolog>

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Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100
Continuous Comprehensive Evaluation (CCE):	25
University Exam (UE):	75

Internal Assessment Continuous Comprehensive Evaluation(CCE):25	Class Test	15
	Assignment / Presentation	10
	Total	25
External Assessment University Exam Section:25 Time: 02.00Hours	Section (A): Three Very Short Questions (50 Words Each)	3x3=30
	Section (B): Four Short Questions (200 Words Each)	4x9=36


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	Section (C): Two Long Questions (500 Words Each)		2x15=30
	Total		75

Part A Introduction

Program Certificate Course	Class: B.SC.	Year : FIRST Year	Session :2021-2022 onwards
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Subject : Microbiology

1	Course Code	ST-MB101P	
2	Course Title	Study of Microorganisms (Paper I)Practical	
3	Course Type	Core Course	
4	Pre- requisite (if any)	To Study this course a student must have had the subject	
5	Course Learning outcomes (CLO)	On completion of this course, learners will be able to understand: <ul style="list-style-type: none"> • Isolation of various types of bacteria and yeasts. • Microscopic examination of various types of bacteria, fungi and protozoa. • Structure of important animal, plant, bacterial viruses using electron micrographs. 	
6	Credit Value	2	
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33

Part B – Content of the Course

Total No. of Lectures:30

Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2

S. No.	Name of the Exercise	No. of Lab Hours
1.	Isolation of autotrophic bacteria and cyanobacteria, Rhizobia from root nodules	4
2.	Isolation of lactobacillus from curd	6

3	Isolation of yeast from ripened fruits.	2
4.	Preparation of temporary wet mount and microscopic examination of Mucor, aspergilla's and penicillium.	2
5.	Preparation of smear and microscopic examination of Staphylococcus, Lactobacillus, Escherichia, Vibrio, and Leptospira.	3
6.	Preparation of temporary wet mount and microscopic examination of Amoeba, Euglena, Paramecium, and Chlamydomonas.	3
7.	Study of the structure of important animal viruses(rabid, influenza, paramour, hepatitis B and retrovirus	3
8.	Study of the structure of important plant viruses (calico, Gemini, tobacco, ring spot, cucumber mosaic and alpha –alpha mosaic viruses) using electron microscope	3
9.	Any other experiment may be designed on the basis of theoretical aspects.	3

KEYWORDS: Isolation of bacteria, bacteria cell structure fungi cell structure protozoa cell structure virus.

Part- C Learning Resources

Text Books, References, and other Resources

Books

Suggested reading:

- 1.Cappuccino ,J and Sherman, N., "Microbiology : A Laboratory Manual ", 9th editlon .Pearson Eduction Limited .(2010).
- 2.Dubey , R.C. and Maheswari, D.K. , "Practical Microbiology" ..S. Chand &Co.Ltd.,New Delhi
- 3.M. Gopool Reddy , M., Reddy m.n. Saigopal , D.V.R. and Mallaiah K.V.," Laboratory Experiments in Microbiology", Himaliya Publishing House , Mumbai (2007).
- 4.Aneja , K.R., "Laboratory Manual of Microbiology and Biotechnology, 2: Edition", Meditech Scientific International .(2018).
- 5.Patel, Rakesh J and Patel Kiran, R., " Experiments

Microbiology Vol. I and Vol. II", Aditya Prakashan Ahmadabad. (2009).

6. Varghese, Naveen and Joy, V, "Microbiology Laboratory Manual - E.T. Aromatic and Medicinal Plants Research Station, Odakkali, Ernakulam, Kerala. (2014) onwards

7. Shammi, Q.J. "Microbiology-Tools and Techniques",

Kailash Pustaksadan ISBN 978-81-89900-38-0 (In hindi also)

8. Grainger. John, Hurst Janet and Burdass. Dariel, "Basic Practical Microbiology: A Manual". The Society for General Microbiology. (2001).

Suggested Digital Platform /Web Links:

1. <https://www.mooc-list.com/course/introduction-practical-microbiology-futurelearn>

2. [https://study.com/articles/List of Free Online Microbiology Courses and Training Options.html](https://study.com/articles/List_of_Free_Online_Microbiology_Courses_and_Training_Options.html)

Part-D Assessment and evaluation

Internal assessment	Marks	External assessment	Marks
Class interaction Quiz	10	Viva voce on practical	15
Attendance	05	Practical record file	10
Assignment (Charts /Model Seminar /Rural service technology/Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)	10	Table work/Experiments	50
Total	25		75

Any remarks suggestions: Nil



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Subject : Microbiology			
1	Course Code	SI-MBI02F	
2	Course Title	Microbial Techniques (Paper II)	
3	Course Type	Core Course	
4	Pre- requisite (if any)	To Study this course a student must have had the subject	
5	Course Learning outcomes (CLO)	After completing this course in Microbiology, a student shall have understanding of- <ul style="list-style-type: none"> • Recall the basic lab glassware to be used in the laboratory. • Summarize different methods of sterilization and isolation of pure cultures. • Understand the working of different kinds of instruments and microscopes. • Apply serial dilution technique to isolate the bacteria. • Practice different methods to culture bacteria in the laboratory • Illustrate a method to differentiate between gram positive and gram negative bacteria. 	
6	Credit Value	4	
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33
Part B- Content of the Course			
Total no of Lectures –60			
Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0			
Total No. of Lectures: 15			
Unit	Topics	No. of Lectures	

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<p>I</p>	<p>MICROSCOPY AND STAINING 1.1 MICROSCOPY- PRINCIPLES AND APPLICATION OF SIMPLE AND COMPOUND Bright- field microscopy, phase- contrast microscopy, transmission electron microscopy and scanning electron microscopy. 1.2 Preparation for light microscope Examination- wet mount and hanging – drop techniques preparation for simmer and fixation 1.3 Staining- principles of staining, negative staining, simple staining, differential staining (Gram and acid fast staining), flagella staining capsule and endospore staining. Key word: microscopy, light microscope, wet mount, Hanging drop method, Bacterial staining.</p>		<p>15</p>
<p>II</p>	<p>Instruments Electronic Balance, autoclave, centrifuge ,colony counter, deep freezer, homogenizer, hot air oven,incubator,laminar air flow, magnetic stirrer, P h meter, spectrophotometer, vortex mixture, water bath, water distiller chromatography chamber anaerobic chamber and electrophoresis apparatus.</p>		<p>15</p>
<p>III</p>	<p>Sterilization and culture medium 3.1 Physical methods of sterilization: Dry heat, moist heat, radiation, filtration, and incineration. 3.2 Chemical methods of sterilization- Phenol and phenolic compounds, Alcohol, Halogens, and detergents. 3.3 Types of culture media- Natural, synthetic, complex, enriched, and selective. Anaerobic (Trio glycol atc broth, Robertson's media,) broth culture of aerobic bacteria. Registrar Sri Satya Sai University of Technology & Medical Sciences (M.P.) Keywords: Physical sterilization, Chemical sterilization, microbial</p>		<p></p>

	culture media.		
IV	<p>Isolation, Cultivation and preservation</p> <p>4.1 Natural microbial population- Pure culture</p> <p>4.2 Isolation of microbial population- From air, water, and soil.</p> <p>4.3 Methods for isolation: Streak plate, pour plate and spread plate. Serial dilution and micromanipulator methods. Cultivation on liquid and solid media, Isolation of micro organisms on potato slice and bread.</p> <p>4.4 Maintenance and preservation for short term and long term.</p> <p>4.5 Cultivation OF Anaerobic bacteria, and accessing non- cultivable microorganisms.</p> <p>Key words: Pure culture, isolation of microbes, preservation of culture.</p>		

Part C-Learning Resources

Text books, Reference Books, Other resources

Suggested Reading:

11. Pezzer, M.J., , E.C.S and Krieg, N.R. "Microbiology" Tata McGraw- Hill, New DELHI.(2001)
12. Tortuga G.J, Finke Br, Case "Microbiology", An Introduction, 9th edition Pearson Education (2008)
13. Willey J.M., Sherwood L.M., Wool verton C.J. "PRESCOTT'S Microbiology", 9th edition (2013)
14. Madigan, M.T., Martin, J.M., Dunlap, P.V, AND Clark D.P., "Brock Biology of Microorganisms, 12th edition, Pearson Benjamin Cummings, San Francisco (2009).
15. Siva Bali, Gaeta and Mathura, R.S., "Principles of Microbiology" M.C. Grew Hill edition (2017)
16. Agnity Narayan, B. and Picnicker, C.K.S., "Text book of microbiology", 6th edition Oriental Longman Publication, U.S.A (2006).
17. Dhillon, R.G., And Maheshwari, D.K., "Text book of microbiology", S. Chand & Company Ltd., New Delhi.(2008).
18. Sharma, P.D., "Microbiology", Kasugi Publications, Meerut. (2014).
19. Singh, R.P., "Applied Microbiology", Kallan Publishers, New Delhi. (2007)
- 10 Shimmy, Q.J., "Microbiology"-I", Kailās Sadden, Bhopal.



Suggested equivalent online courses:

9. <https://www.com.mooc-list.com/course/small-and-mighty-introduction-microbiology-futurelearn>
10. <https://www.mooc-list.com/course/microbiology-saylororg>
11. <https://www.mooc-list.com/course/bacteria-and-chronic-infections-coursera>
12. [https://www.coursera.org/lecture/bacterial-infections/1-1-introduction-to-bacteria-by-bioinformaticstician-\(dul-peder-worning-1Z64m\)](https://www.coursera.org/lecture/bacterial-infections/1-1-introduction-to-bacteria-by-bioinformaticstician-(dul-peder-worning-1Z64m))
13. <https://www.openstax.org/books/microbiology/pages/1-3-types-of-microorganisms>
14. <https://openstax.org/books/microbiology/pages/4-1-prokaryotic-habitats-relationships-and-microbiomes>
15. <https://swayam.gov.in/explorer?searchText=microbiology>

Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100
Continuous Comprehensive Evaluation (CCE):	25
University Exam (UE):	75

**Internal Assessment
Continuous
Comprehensive
Evaluation(CCE):25**

Class Test	15
Assignment / Presentation	10
Total	25

**External Assessment
University Exam
Section:25
Time: 02.00Hours**

Section (A): Three Very Short Questions (50 Words Each)	3x3=30
Section (B): Four Short Questions (200 Words Each)	4x9=36
Section (C): Two Long Questions (500 Words Each)	2x15=30
Total	75

Part A Introduction

Program Certificate Course	Class: B.SC.	Year : FIRST Year	Session :2021- 2022 onwards
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Subject : Microbiology



1	Course Code	SI-MB102P	
2	Course Title	Microbial Tools and Techniques (Paper II) Practical	
3	Course Type	Core Course	
4	Pre-requisite (if any)	To Study this course a student must have had the subject	
5	Course Learning outcomes (CLO)	<p>On completion of this course, learners will be able to understand:</p> <ul style="list-style-type: none"> • Basic Knowledge of glassware, microscopes and different kinds of instruments used in the microbiology laboratory. • Basic media preparation technique, autoclaving, cleaning and sterilization of glassware. • Preparation of liquid and solid culture media. • Isolation of microorganisms by different plating methods. 	
6	Credit Value	2	
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33

Part B – Content of the Course

Total No. of Lectures:30

Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2

S. No.	Name of the Exercise	No. of Lab Hours
1.	Demonstration and briefing about principles and working of basic instruments.	4
2.	Basic media preparation technique, autoclaving, cleaning and sterilization of glass ware.	6
3.	Preparation of liquid culture media- Peptone water, nutrient broth	2
4.	Preparation of solid culture media – Nutrient agar (agar slant/ agar plate)	2
5.	Isolation of microbes from water, soil and air by serial dilution agar plating method.	3
6.	Isolation of fungi from water, soil and air by serial dilution agar plating method.	3
7.	Isolation of microorganisms by pour plate method.	3

8.	Isolation of microorganisms by streak plate method	3
9.	Isolation of microorganisms by spread plate method.	3
10.	Any other experiment may be designed on the basis of theoretical aspects.	1

Keywords: Basic instruments, Culture media, pour plate, streak plate, spread plate.

Part- C Learning Resources

Text Books, References, and other Resources Books

1. Cappuccino J and Sherman, N., "Microbiology : A Laboratory Manual", 9th edition .Pearson Education Limited .(2010).
2. Dubey , R.C. and Maheswari, D.K. , "Practical Microbiology" ,S. Chand &Co.Ltd.,New Delhi
3. M. Gopool Reddy , M., Reddy m.n. Saigopal , D.V.R. and Mallaiah K.V., " Laboratory Experiments in Microbiology", Himaliya Publishing House , Mumbai (2007).
4. Aneja , K.R., " Laboratory Manual of Microbiology and Biotechnology,2:Edition", Meditech Scientific International .(2018).
5. Patel, Rakesh J and Patel Kiran, R., " Experiments Microbiology Vol. I and Vol. II" .. AdityaPrakashan Ahmadabad. (2009).
6. Varghese, Naveen and Joy , V," Microbiology Laboratory Manual " ED.1, Aromatic and Medicinal Plants Research Station, Odakkali, Ernakulam, Kerala. (2014).
7. Shammi, Q.J. " Microbiology-Tools and Techniques", KailashPustaksadan ISBN 978-81-89900-38-0 (In hindi also)
8. Grainger. John , Hurst Janet and Burdass. Dariel , "Basic Practical Microbiology: A Manual".The Society for General Microbiology.(2001).

Suggested Digital Platform /Web Links:

2. <https://www.mooc-list.com/course/introduction-practical-Microbiology-futurelearn>
3. https://study.com/articles/List_of_Free_Online_Microbiology_Courses_and_Training_Options.html

Part-D Assessment and evaluation

Internal assessment	Marks	External assessment	Marks
Class interaction Quiz	10	Viva voce on practical	15



Attendance	05	Practical record file	10
Assignment(Charts /Model Seminar /Rural service technology(Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)	10	Table work/Experiments	50
Total	25		75
Any remarks suggestions:Nil			

Part A- Introduction			
Program: Certificate	Class: B.Sc. I Year	Year: 2021	Session: 2021
Subject: Physics			
Course Code	SI-PHYS1		
Course Title	Thermodynamics and Statistical Physics (Paper-I)		
Course Type (Core/Elective/ Generic Elective/Vocational/...)	Core course		
Pre-requisite (if any)	To study this course, a student must have had the subject Physics in 12 th class.		
Course Learning Outcomes (CLO)	<ol style="list-style-type: none"> 1. The course would enable the students to understand the basic Physics of heat and temperature in relation to energy, work, radiation and matter 2. The students are expected to learn that "how laws of thermodynamics are used in a heat engine to transform heat into work". 3. This course will also develop an understanding of the various concepts of statistics and the methods to apply them in thermodynamics. 4. Students will understand the importance of studying statistical mechanics with the behavior of particles under classical and quantum Conditions. 		
Credit Value	4		
Total Marks	Max. Marks: 25+75	Min passing Marks :33	


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Part B- Content of the Course		
Total numbers of Lectures(in hours):60		
Unit	Topics	Numbers of Lectures
1	<p>Historical background & Laws of thermodynamics</p> <p>1. Historical background:</p> <p>1.1 A brief historical background of thermodynamics and statistical Physics in the context of India and Indian culture, Contribution of S.N Bose in Statistical Physics.</p> <p>2. Laws of thermodynamics:</p> <p>2.1 Thermodynamical system and thermodynamical coordinates, Thermal equilibrium, Zeroth law of thermodynamics, The concept of path function and point function, work done by and on the system.</p> <p>2.2 First law of thermodynamics, Internal energy as a state of function, Reversible and irreversible change, Heat engine and its efficiency, Carnot's cycle, Carnot's engine and its efficiency, Carnot's theorem, Otto engine, diesel engine.</p> <p>2.3 Second law of thermodynamics, Statement of Kelvin-Planck and Clapeyron, Absolute scale of temperature: Zero of absolute scale, Size of degree, Identity of perfect gas scale and absolute scale.</p> <p>Keywords / Tags: Thermodynamics, Internal energy, Heat engine, Absolute scale</p>	12


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<p>II</p>	<p>Entropy</p> <ol style="list-style-type: none"> 1. Concept of entropy. Clausius theorem, Entropy as point function, changes in entropy in reversible and irreversible processes. 2. Change in entropy of an ideal gas, change in entropy when two liquids at different temperatures are mixed (or two liquids at different temperatures are kept in contact). 3. Principle of increase of Entropy, change in entropy of the universe in an irreversible process, Disorder and heat death of universe. 4. Physical significance of Entropy, Temperature-entropy (T-S) diagram, third law of thermodynamics. 5. <p>Keywords/Tags: Reversible process, Entropy, Ideal gas.</p>	<p>12</p>
<p>III</p>	<p>Thermodynamic potentials and kinetic theory of gases.</p> <p>1. Thermodynamic potential and its application:</p> <p>1.1 Thermodynamic potentials, Thermal equilibrium, Internal energy, Helmholtz free energy, Enthalpy and Gibbs free energy.</p> <p>1.2 Derivation of Maxwell's relations from thermodynamic potentials. Gibbs- Helmotz equation, Thermodynamic energy equation for ideal and van der Waal gas.</p> <p>1.3 Tds equation. Derivation of expressions for $C_p - C_v$ and their special cases for ideal and van der Waal gases, Derivation of the expression $E_s/E_t = C_p/C_v$.</p> <p>1.4 Clausius -clapeyron latent heat equation, Temperature change in adiabatic process, Principle of refrigeration, Joule -Thomson effect, cooling by adiabatic demagnetization, Production and measurement of very low temperatures.</p> <p>2. Kinetic theory of gases:</p> <p>2.1 Behavior of a real gas and its deviation from an ideal gas, Virial equation, Andrews experiment on CO₂ gas.</p> <p>2.2 Critical constant, continuity of the liquid and gaseous state, Vapor and gas state, Boyle temperature, van der Waals equation for real gas, Values of critical constant, Law of the corresponding state.</p> <p>Keywords/Tags: Potential, Enthalpy, Adiabatic, Real gas, Critical constant.</p>	<p>12</p>



<p>IV</p>	<p>Classical Statistics</p> <ol style="list-style-type: none"> 1. Probability, Distribution of N particles in two identical boxes, probability of occurrence of either event, probability of composite events, weightage probability. 2. Probability distribution and its narrowing with the increase in number of particles, Expression for average properties, constraints, accessible and non-accessible microstates. 3. Ensemble theory(Micro-canonical, Canonical and Grand canonical), Macro and micro states with examples. Principle of equal a priori probability, Concept of phase space 4. Boltzmann Canonical distribution law: Application: average energy of one dimensional harmonic oscillator. 5. Derivation of law of equipartition of energy from statistics, Equilibrium between two system in thermal contact and β parameter, Statistical interpretation of entropy and relation $S=k \log W$. 6. Boltzman partition function and derivation of expression for internal energy, Helmotz free energy, Enthalpy and Gibbs free energy. <p>Keywords/Tags: Probability, Microstate, Ensemble theory, Partition function.</p>	<p>12</p>
<p>V</p>	<p>Quantum Statistics</p> <ol style="list-style-type: none"> 1. Indistinguishability of particles and its consequences, Maxwell-Boltzmann statistics (Classical statistics): Maxwell -Boltzmann statistics distribution law of velocity and speed, Maxwell- Boltzmann statistics and its distribution law. 2. Quantum statistics: Bose -Einstein statistics and distribution law, Derivation of Planck's radiation law from B-E statistics, Rayleigh - Jeans law, Wien's displacement law and Stefan's law. 3. Fermi-Dirac statistics and Is distribution law, Explanation of free electron theory, Fermi level and Fermienergy. 4. Comparison between the Maxwell - Boltzmann, Bose Einstein and Fermi - Dirac statistics <p>Keywords/Tags: Indistinguishability, Velocity distribution, Fermi level.</p>	



Text Books, Reference Books, Other resources

Suggested Readings:

1. Zemansky M. W. & Dittman R., "Heat and Thermodynamics", Tata McGraw-Hill
2. Sears and Salinger, "Thermodynamics, Kinetic Theory & Statistical Thermodynamics", Narosa.
3. Garg S. C. & Ghosh C. K., "Thermal Physics", Tata McGraw-Hill.
4. Subrahmanyam N., Brij Lal, Hemne P.S., "Heat Thermodynamics and statistical", S Chand, 2012.

Suggested equivalent online courses:

1. <https://www.edx.org/course/thermodynamics> Thermodynamics course.

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25	Class Test	15
	Assignment/Presentation	10
External Assessment: University Exam Section:75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each)	03 x 03 = 09
	Section (B): Four Short Questions (200 Words Each)	04 x 09= 36
	Section (C): Two Long Questions (500 Words Each)	02 x 15 = 30 Total 75

Any remarks/ suggestions:

1

Part A- Introduction

Program: Certificate	Class: B.Sc. 1 Year	Year: 2021	Session: 2021
Subject: Physics			
Course Code	SI-PHYS1		
Course Title	Thermodynamics and Statistical Physics (Paper I)		
Course Type (Core/Elective/ Generic/ Elective/Vocational)	Core course		

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Pre-requisite (if any)	To study this course, a student must have had the subject Physics in 12 th class.	
Course Learning Outcomes (CLO)	<ol style="list-style-type: none"> The students would gain practical knowledge about heat and radiation by performing various Experiments. The students will acquire knowledge about the different forms of distribution of subatomic particles in the system using statistical methods. The students will be able to use various thermodynamical instruments in daily life. 	
Credit Value	2	
Total Marks	Max. Marks 25+75	Min passing Marks :33

Part B- Content of the Course

Total numbers of Lectures(in hours):60

Sr.No	List of experiments	Number of Practical (in hours)
1	Determination of the mechanical equivalent of heat by Callendar & Barne's method.	30
2	Determination of efficiency of electrical Kettle with variable volages.	
3	Determination of temperature coefficient of a resistance using platinum resistance thermometer.	
4	Determination of electromotive force of a thermocouple.	
5	Determination of thermal conductivity of a bad conductor by Lees disc method.	
6	Verification of Newton's law of cooling.	



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7	Determination of the ratio of specific heat of air by Clement-Desorme's method	
8	Determination of specific heat of a liquid with the help of Newton's law of cooling.	
9	Determination of the coefficient of thermal conductivity of a metal by Searl's method.	
10	Determination of thermal conductivity of the rubber using Calorimeter.	
11	Determination of mechanical equivalent of heat (J) using Joule Calorimeter.	
12	Determination of Stefan's constant using thermocouple.	
13	Study of statistical distribution and determination of standard deviation with the help of black and white dice.	
14	Determination of the temperature coefficient of a resistance with the help of Carey-Foster bridge.	
15	Determination of the critical constant of a gas/vapour.	

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Prakash I. & Ramakrishna, "A Text Book of Practical Physics". KitabMuhul, 2011, 11/e.
2. Squires G. L., "Practical Physics", Cambridge University Press, 2015, 4/e.
3. Flihi B. L. and Worsnop H. T., "Advanced Practical Physics for students, Asia Publishing House, 197.
4. Chattopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics", New Central Book Agency.

Suggestive digital platforms web links

1. <https://www.vlab.co.in/broad-area-physical-sciences>
2. https://storage.googleapis.com/unique_courses/online.html

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
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Class Interaction/Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar/ Rural Service Technology Dissemination/ Report of Excursion/ Lab Visits/Survey / Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75
Any remarks/ suggestions:			

Part A- Introduction			
Program:Certificate	Class:B.Sc.IYear	Year: 2021	Session: 2021-2022
Subject: Physics			
Course Code	SI-PHY82T		
Course Title	Mechanics and General Properties of Matter Paper 2		
Course Type (Core/Elective/ Generic Elective/Vocational/...)	Core course		
Pre-requisite (if any)	To study this course, a student must have had the subject Physics in 12 th class.		




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<p>Course Learning Outcomes (CLO)</p>	<ol style="list-style-type: none"> 1. The course would empower the students to develop the idea about the behavior of physical bodies. 2. It will provide the basic concepts related to the motion of all the objects around us in daily life. 3. The students would be able to build foundation to various applied field in science and technology especially in the field of mechanical engineering. 4. The students will acquire the knowledge of basic mathematical methods to solve the various problems in physics. 5. The students will be able to understand the relativistic effect and the relation between energy and mass. 		
<p>Credit Value</p>	<p align="center">4</p>		
<p>Total Marks</p>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Max. Marks: 25+75</td> <td style="width: 50%; text-align: center;">Minimum passing Marks: 33</td> </tr> </table>	Max. Marks: 25+75	Minimum passing Marks: 33
Max. Marks: 25+75	Minimum passing Marks: 33		

<p align="center">Part B- Content of the Course</p>		
<p align="center">Total numbers of Lectures(in hours):60</p>		
<p>Unit</p>	<p>Topics</p>	<p>Numbers of Lectures</p>
<p align="center">1</p>	<p>Historical background and Mathematical Physics</p> <p>1. Historical background:</p> <p>1.1. A brief historical background of mathematics and mechanics in the context of India and Indian culture.</p> <p>1.2. A brief biography of Varahamihira and Vikram Sarabhai with their major contribution to science and society.</p> <p>2. Mathematical Physics:</p> <p>2.1. Scalar and vector fields, Gradient of a scalar field and its physical significance.</p> <p>2.2. Vector integral: line integral, surface integral and volume integral, Divergence of a vector field and its physical significance. Gauss divergence theorem.</p> <p>2.3. Curl of a vector field and its physical significance, Stokes's theorem, Green's theorem, Numerical problems based on the above topics.</p>	<p align="center">12</p>

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	<p>Keywords/Tags: Scalar field, Vector field, Vector integral, Gradient, Divergence, Curl.</p>	
11	<p>Mechanics of Rigid and deformable bodies</p> <p>1. Rigid body mechanics:</p> <p>1.1. System of particles and concept of rigid body, Torque, centre of mass: position of the centre of mass, Motion of the centre of mass, Conservation of linear & angular momentum with examples, Single stage and multistage rocket.</p> <p>1.2. Rotatory motion and concept of moment of inertia, Theorems on moment of inertia: theorem of addition, theorem of perpendicular axis, theorem of parallel axis, Calculation of moment of inertia of rectangular lamina, disc, solid cylinder, solid sphere.</p> <p>2. Mechanics of deformable bodies:</p> <p>2.1. Hooks law, Young's modulus, Bulk modulus, Modulus of rigidity and Poisson's ratio. Relationship between various elastic moduli.</p> <p>2.2. Possible values of Poisson's ratio, Finding Poisson's ratio of rubber in the laboratory, Torsion of a cylinder, Strain energy of twisted cylinder.</p> <p>2.3. Finding the modulus of rigidity of the material of a wire by Barton's method, Torsional pendulum and Maxwell's needle, Searl's method to find Y, η and σ of the material of a wire, Bending of beam, Cantilever, Beam supported at its ends and loaded in the middle.</p> <p>Keywords/Tags: Rigid body, Centre of mass, Moment of Inertia, Poisson's ratio.</p>	12

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<p>III</p>	<p>Fluid mechanics</p> <p>1. Surface Tension: 1.1. Inter-molecular forces and potential energy curve, force of cohesion and adhesion. 1.2. Surface tension, Explanation of surface tension on the basis of intermolecular forces, Surface energy, Effect of temperature and Impurities on surface tension, Dally life application of surface tension. 1.3. Angle of contact, The pressure difference between the two sided of a curved liquid surface, Excess pressure inside a soap bubble, Capillarity, determination of surface tension of a liquid capillary rise method, Jaeger's method.</p> <p>2. Viscosity: 2.1. Ideal and viscous fluid, Streamline and turbulent flow, Equation of continuity. Rotational and Irrational flow, Energy of a flowing fluid, Euler's equation of motion of a non-viscous fluid and its physical significance. 2.2. Bernoulli's theorem and its applications (Velocity of efflux, shapes of wings of airplane, Magnus effect, Filter pump, Bunsen's burner) 2.3. Viscous flow of a fluid, Flow of liquid through a capillary tube, Derivation of Poiseuille's formula and limitations, Stocks formula, Motion of a spherical body falling in a viscous fluid.</p> <p>Keywords/Tags: Inter-molecular force, Surface tension, Angle of contact, Capillarity, Viscosity, Euler's equation, Poiseuille's formula</p>	<p>12</p>
<p>IV</p>	<p>Gravitational potential and central forces</p> <p>1. Gravitational potential: 1.1. Conservative and non-conservative force field, Conservation of energy in motion under the conservative and non-conservative forces, Potential energy. 1.2. Conservative force, Conservation of energy, Gravitational potential and gravitational potential energy, Gravitational potential and intensity of gravitational field due to uniform spherical shell and a uniform solid sphere. 1.3. Gravitational self-energy, Gravitational self-energy of a uniform spherical shell and a uniform solid sphere.</p> <p>2 Central forces: 2.1. Motion under Central forces, Conservative ve characteristics of central forces. 2.2. The motion of a two particles system in Central force, Concept of reduced mass, Reduced mass of positronium and hydrogen. 2.3. Motion of particles in an inverse-square central force, Motion of celestial bodies and derivation of Kepler's laws, 2.4. Elastic and inelastic scattering (elementary idea).</p> <p>Keywords/Tags: Conservative force field, Gravitational potential, Gravitational self-energy, Central force, reduced mass, Scattering</p>	<p>12</p>

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v	<p>Relativistic Mechanics and Astrophysics</p> <p>1. Relativistic Mechanics: 1.1. Frame of references, Galilean transformation, and Michelson Morley experiment. 1.2. Postulates of special theory of relativity, Lorentz Transformation, Simultaneity and order of events, Length contraction, Time dilation, Relativistic transformation of velocities, Variation of mass with velocity. 1.3. Mass-energy. Equivalence and its experimental verification.</p> <p>2. Astrophysics: 2.1. Introduction to the Universe, Properties of the Sun, Concept of Astronomical Distance. 2.2. Life cycle of stars, Chandrasekhar Limit, H-R diagram, Red giant star, White dwarf star, Neutron star, Black hole, 2.3. Big Bang Theory (elementary Idea).</p> <p>Keywords/Tags: Transformation, Mass-energy equivalence, Astronomical distance, Chandrasekhar limit, Black hole.</p>	12

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Spiegel M. R., "Vector Analysis: Schaum Outline Series", McGraw Hill Education, 2017.
2. Mathur D. S., "Mechanics", S. Chand, 2012.
3. Ghatak A. K., Goyal I.G. and Chua S.J., "Mathematical Physics", Laxmi Publications Private Limited, 2017.
4. Mathur D. S., "Properties of Matter", Shyamal Charitable Trust, New Delhi.
5. Sears and Zetlemansky, "University Physics", Pearson Education.



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Suggested equivalent online courses:

1. <https://nptel.ac.in/courses/115/103/115103036/> Mathematical Physics by Dr. Saurabh Basu, Department of Physics, Indian Institute of Technology Guwahati

2. <https://nptel.ac.in/courses/115/106/115106090/> Mechanics, Heat, Oscillations and Waves by Prof. V. Balakrishnan, Department of Physics, Indian Institute of Technology, Madras

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 10
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) : Four Short Questions (200 Words Each) Section (C) : Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09= 36 02 x 15 = 30 Total 75

Any remarks/ suggestions:

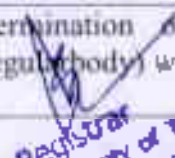
Part A- Introduction

Program: Certificate	Class: B.Sc. I Year	Year: 2021	Session: 2021
Subject: Physics			
Course Code	SI-PHYS2P		
Course Title	Mechanics and General Properties of Matter Lab (Paper2)		
Course Type Core/Elective/ Generic Elective/Vocational/...	Core course		
Pre-requisite (if any)	To study this course, student must have had the subject Physics in 12 th class.		
Course Learning Outcomes (CLO)	1. The students would acquire basic practical knowledge related to mechanics through the experiments.		

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	2. Students will be familiar with various measurement devices by which they can measure various physical quantities with accuracy. 3. The students will develop the concept related to the mechanics and properties of matter.	
Credit Value	2	
Total Marks	Max. Marks: 25+75	Min passing Marks :33

Part B- Content of the Course		
Total numbers of Lectures(in hours):60		
Sr.No	List of experiments	Number of Practical (in hours)
1	Determination of Young's modulus, modulus of rigidity and Poisson's ratio of material of a wire using Searle's method.	30
2	Determination of Young's modulus of material of a metallic bar by bending of beam method.	
3	Determination of acceleration due to gravity (g) using Bar pendulum.	
4	Determination of acceleration due to gravity (g) using Kater's reversible pendulum.	
5	Determination of modulus of rigidity of a rod with the help of Barton's apparatus.	
6	Determination of coefficient of viscosity of liquid using Poiseuille's method.	
7	Determination of the moment of inertia of a flywheel about its axis of rotation	
8	Determination of the moment of inertia of a given body (irregular body) with the help of inertia table.	


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9	Verification of laws of the parallel/perpendicular axes of moment of inertia.
10	Determination of modulus of rigidity of material of a wire with the help of Maxwell's needle.
11	Determination of Young's Modulus of a material of a rod using Cantilever method.
12	Determination of modulus of rigidity of material of a wire with the help of torsional pendulum.
13	Determination of force constant of a spring.
14	Determination of Poisson's ratio of rubber.
15	Determination of surface tension of a liquid by Jaeger's method.

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Prakashl, & Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 2011, 11/e.
2. Squires G. L, "Practical Physics", Cambridge University Press, 2015, 4/e.
3. Flint B. L, and Workshop H. T., "Advanced Practical Physics for 2015, students", 4/e Asia Publishing House, 197.
4. Chattopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics", New Central Book Agency.

Suggestive digital platforms web links

1. <https://www.vlab.co.in/broad-area-physical-sciences>
2. <https://storage.googleapis.com/unique-courses/online.html>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

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Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar/ Rural Service Technology Dissemination/ Report of Excursion/ Lab Visits/Survey / Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75
Any remarks/ suggestions:			

Part A Introduction			
Program :	Class : I Year	Year : 2021	Session : 2021-2022
Certificate/Diploma/Degree			
Subject:Zoology			
1	Course Code	SI-ZOO01T	
2	Course Title	Animal Diversity: Non-Chordata(Paper1)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational)	Core Course	
4	Pre-Requisite (if any)	To study this course a student must have had the subject Biology in 12 th Class	
5	Course Learning outcomes (CLO)	Upon completion of the course student should be able to <ul style="list-style-type: none"> Learn about the importance of systemic, taxonomy and phylogeny to get a concrete idea of evolution of non-chordate phyla. 	


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		<ul style="list-style-type: none"> • Understand the various morphological, anatomical structures and functions of animals of different phyla. • Get the knowledge about economics, ecological and medical significance of various animals in human welfare. • Understand the important parasites and their control measures.
6	Credit Value	(Credit) 4
7	Total Marks	Max.Marks:25+75 Min,Passing Marks : 33

Part B - Content of the Course

Total No. of Lectures + Practical (in hours per week) : 2 Hours per week

Total No. of Lectures / Practical:

Module	Topics	No. of Lecture
I	<p>Taxonomy ,Phylogeny and Protozoa</p> <p>1.Taxonomy</p> <p>1.1 Elementary knowledge of Zoology Nomenclature and International Code</p> <p>1.2 Classification of Animal Kingdom upto Phylum of acoelomate and coelomate non-chordates according to parker and haswell 7thedition</p> <p>2. Phylogeny</p> <p>2.1 Definition and Examples</p> <p>3. Protozoa</p> <p>3.1 Phylum Protozoa :General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>3.2 Structure,Life history and pathogenicity of material parasite(Plasmodium Vivax)</p> <p>3.3 Protozoa and disease</p> <p>Keywords/Tags : ICZN ,Classification ,Protozoa , Plasmodium</p>	11
II	<p>Porifera , Coelenterata</p> <p>1.Porifera</p> <p>1.1 Phylum Porifera : General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>1.2 Type study of Sycon</p> <p>1.3 Canal system of Sponges</p> <p>2. Coelenterata</p> <p>2.1 Phylum Coelenterata :General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>2.2 Type study of Obelia</p> <p>2.3 Corals and Coral reef formation</p> <p>Keywords/Tags :Classification ,Porifera ,Sycon ,Coelenterata ,Obelia Coral reefs</p>	11

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<p>III</p>	<p>Platyhelminthes , Nemathelminthes ,Annelida 1. Platyhelminthes 1.1 Phylum Platyhelminthes : General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 1.2 External morphology and life history of Liver fluke 2. Nemathelminthes 2.1 Phylum Nemathelminthe : General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 2.2 Pathogenic symptoms of Nematodes and diseases 3. Annelida 3.1 Phylum Annelida : General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 3.2 Types study of Earthworm (Pheretima) 3.3 Structure and significance of Trochophore Larva Keywords/Tags : Classification , Platyhelminthes , Liver fluke Nematode disease, Annelida ,Pheretima , Trochophore.</p>	<p>14</p>
<p>IV</p>	<p>Arthropoda ,Mollusca 1. Arthropoda 1.1 Phylum Arthropoda :General Characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 1.2 Types study of Prawn 1.3 Larval forms of crustacean 1.4 Insects as a vectors of human disease 2. Mollusca 2.1 Phylum Mollusca : General Characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 2.2 Types study of Pila 2.3 Structure and Signification of Glochidium Larva Keywords/Tags : Classification , Arthropoda Prawn ,Crustacea Larva,Insects ,Mollusca ,Pila ,Glochidium.</p>	<p>12</p>
<p>V</p>	<p>Echinodermata ,Hemichordata Echinodermata 1.1 Phylum Echinodermata :General Characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 1.2 External features and water vascular system of Starfish (Asterias) 1.3 Larval forms of Echinodermata 2. Hemichordata 2.1 Phylum Hemichordata : General Characters of</p>	

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	the phylum and outline classification up to classes with distinctive characters and suitable examples 2.2 Balanoglossus-External morphology 2.3 Structure and Signification of Tornaria larva Keywords/Tags : Classification , Echinodermata , Asterias , Echinodermata Larva,Hemichordata, Balanoglossus , Tornaria	
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Part C- Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings :

- Parker, Haswell, WA, "A Text Book of Zoology", VII edition, Vol I & II ,Low price publications ,Delhi,1990.
- Barnes ,RD, "Invertebrate Zoology", VII Edition ,Cengage Learning,India,2006
- Pechenik ,JA, "Biology of the Invertebrates "Mc Grow-Hill Education,VII Edition,2015
- Sedgwick ,A, "A Students text book of Zoology", Vol I,II & Vol .III.,Low Price publication ,Delhi,1990.
- Dhali and Dhali , "Invertebrate Zoology"R.Chand & Co.India,2009
- Jordan and verma , "Invertebrate Zoology" S Chand &Company ,New Delhi,2013
- Agrwal, VK , "Zoology for Degree Students :Non-Chordata" ,S Chand &Company ,2017

Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100
Continuous Comprehensive Evaluation (CCE):	25
University Exam (UE):	75

Internal Assessment Continuous Comprehensive Evaluation(CCE):25	Class Test	15
	Assignment / Presentation	10
	Total Marks	25

External Assessment University Exam Section:25	Section (A): Three Very Short Questions (50 Words Each)	3x3=09
	Section (B): Four Short Questions (200 Words Each)	4x9=36
	Section (C): Two Long Questions (500 Words Each)	2x15=30
	Total	75

Practical Syllabus

	Part A Introduction
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(Signature)
 Head of Department
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(Signature)
 ASSISTANT PROFESSOR
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Program : Certificate/Diploma/Degree		Class : I Year	Year : 2021	Session : 2021-2022
Subject: Zoology				
1	Course Code	SI-ZOOOL1 P		
2	Course Title	Invertebrata (Paper-1)		
3	Course Type (Core Course/Elective/Generic Elective/Vocational)	Core Course		
4	Pre-Requisite (if any)	To study this course a student must have had the subject Biology in 12 th Class		
5	Course Learning outcomes (CLO)	Upon completion of the course student should be able to <ul style="list-style-type: none"> • Identify Invertebrate animals of different phyla and their histology through study of museum specimens and slides • Learn their different systems through dissections • Enhance collaborative learning and communication skills through practical sessions, team work, group discussions assignments and projects. 		
6	Credit Value	(Credit) 2		
7	Total Marks	Max.Marks:25+75	Min.Passing Marks : 33	

Part B - Content of the Course

Total No. of Lectures + Practical (in hours per week) : 2 Hours per week

Total No. of Lectures / Practical:

Module	Topics	No. of Lecture
1.	Study of museum specimens and slides relevant to the invertebrates	25
2.	Dissection (Demonstration Only -Through You Tube Video or Models or Charts) <ul style="list-style-type: none"> a. Earthworm -Digestive systems ,Nervous system b. Prawn -Nervous system and appendages c. Pila - Nervous system d. Cockroach -Digestive System, Nervous system(Easily available animal in residential areas which can be used for dissection and mounting) 	12
3.	Mounting <ul style="list-style-type: none"> a. Locally available small non-chordates, their larvae b. Mouth Parts of Insects 	5
4.	Examination of pond water for study of different kinds of microscopic non-chordates organisms	8


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5.	Economic Importance of any two Insects	5
6.	Parasitic Adaptation of any one parasite	5

Keywords/Tags: Museum specimens ,Slides ,Dissection , Mounting ,Benefited Insects, parasitic adaptation.

Part C- Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings :

- Arunum, N. Nair,NC,Leelavathy,S, Pandian, NS, Murugan,T. Jayasurya,"practical Zoology-Invertebrata",Volume-I, Saras Publication,2013
- Lal,SS,"A Text book of practical Zoology-Invertebrates",Rastogi Publications,2016
- Prakash ,Mand Arora,CX," Laboratory Animals",Anmol Publicadons,New Delhi, 1998
- Verma,PS," A Manual of practical Zoology-Invertebrates",S.Chand & Co,2013

Part-D Assessment and evaluation


Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	marks
Class Interaction/Quiz	10	Viva Voce on Practicals	15
Attendance	05	Practical Records File	10
Assignments (Charts/Models Seminar/Workshop/Service/Technology Dissemination/Reports of Excursion/Lab Visits/Survey/Industrial visit)	10	Tables works/Experiments	50
		a. Spotting	16
		b. Dissection	08
		c. Mounting	04
		d. Examination of Pond Water	10
		e. Economic Importance of Insects	06
		f. Parasitic Adaptations	06
Total	25		75
Any Remarks/Suggestion			

(Signature)
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(Signature)


<u>Part A Introduction</u>			
<u>Program Certificate Course</u>	<u>Class: B.SC.</u>	<u>Year : FIRST Year</u>	<u>Session :2021-2022 onwards</u>
<u>Subject : ZOOLOGY</u>			
<u>1</u>	<u>Course Code</u>	SI-ZOO1.21	
<u>2</u>	<u>Course Title</u>	<u>Cell biology, reproductive biology and developmental biology (paper II)</u>	
<u>3</u>	<u>Course Type</u>	<u>Core Course</u>	
<u>4</u>	<u>Pre- requisite (if any)</u>	<u>To study this course a student must have had the subject Biology in class 12th.</u>	
<u>5</u>	<u>Course Learning outcomes (CLO)</u>	<p><u>After completing this course in ZOOLOGY, a student shall have understanding of.</u></p> <ul style="list-style-type: none"> • <u>Develop deeper understanding of what life is and how it functions at cellular level.</u> • <u>Understand the nature and basic concepts of cell biology, Reproductive and Developmental biology.</u> • <u>Understand structure and functions of cell membrane, and cellular organelles.</u> • <u>Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare.</u> • <u>Understand the general patterns and sequential developmental stages during embryogenesis;& understand how the developmental processes lead to establishment of body plan of multicellular organisms.</u> • <u>Understand the the evolutionary development of various animals.</u> 	
<u>6</u>	<u>Credit Value</u>	<u>4</u>	


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		<u>Marks:25+75</u>	<u>Passing Marks:</u> <u>33</u>
<u>Part B- Content of the Course</u>			
<u>Total no of Lectures –60 organisms</u> <u>Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0</u>			
<u>Unit</u>	<u>Topics</u>	<u>No. of Lectures</u>	
<u>I</u>	<p><u>Cell biology:</u></p> <p>1.1 <u>Concept of prokaryotic and eukaryotic cell, difference between prokaryotic and eukaryotic cells.</u></p> <p>1.2 <u>Structure and functions of plasma membrane</u></p> <p>1.3 <u>Structure and functions of Golgi body, Mitochondria, Endoplasmic reticulum, ribosomes and lysosomes.</u></p> <p>1.4 <u>Structure and functions of Nucleus,</u></p> <p>1.5 <u>Structure and functions of Chromosomes and special types of chromosomes- Lamp brush and Polygenes chromosomes.</u></p> <p>1.6 <u>Cell cycle, Mitotic & Meiotic cell division and their significance.</u></p> <p><u>Keywords: Prokaryote, Eukaryote, cell organelles, chromosomes, cell cycle.</u></p>	<u>13</u>	
<u>II</u>	<p><u>2. Reproductive Biology:</u></p> <p>1.1 <u>Structure of Male reproductive system of Lupus.</u></p> <p>1.2 <u>Structure of Female reproductive system of Lupus.</u></p> <p>1.3 <u>Histology of testis, and Ovary of Lupus.</u></p> <p>1.4 <u>Gametogenesis- Spermatogenesis and oogenesis, difference between spermatogenesis and oogenesis.</u></p> <p>1.5 <u>Types of Eggs- based on amount and distribution of yolk with examples.</u></p> <p><u>Keywords: Reproductive system, Gametogenesis, sperms, eggs.</u></p>	<u>13</u>	
<u>III</u>	<p><u>Recent assisted Reproductive Techniques (ART):</u></p> <p>3.1 <u>Stem cell- Types and their uses.</u></p> <p>3.2 <u>Gene bank, sperm bank, superovulation, cryopreservation.</u></p>	<u>15</u>	



	<p><u>3.3 In Vitro Fertilization (IVF) and Embryo Transfer (ET), Zygote.</u></p> <p><u>3.4 Placentation- Types, examples and functions.</u></p> <p><u>3.5 Placenta Banking- placenta preservation benefits.</u></p> <p><u>Key words: Gene bank, sperm bank, superovulation, IVF, ET.</u></p>	
<u>IV</u>	<p><u>4. Developmental Biology:</u></p> <p><u>4.1 Fertilization</u></p> <p><u>4.2 Embryonic development of frog up to the formation of three layers</u></p> <p><u>4.3 Fate map construction in frog.</u></p> <p><u>4.4 Metamorphosis of Tadpole Larva.</u></p> <p><u>4.5 Parthenogenesis.</u></p> <p><u>Keywords: Fertilization, frog embryology, tadpole, metamorphosis, parthenogenesis.</u></p>	<u>11</u>
<u>V.</u>	<p><u>Embryonic Development of Chick:</u></p> <p><u>5.1 Structure of hen's egg.</u></p> <p><u>5.2 Embryonic development of chick embryo upto the formation primitive streak.</u></p> <p><u>5.3 Fate map construction in chick.</u></p> <p><u>5.4 Extra embryonic membranes of chick, formation and functions.</u></p> <p><u>Keywords/tags: Hens egg, chick embryology, fate map, chick embryo membranes.</u></p>	
<u>Part C-Learning Resources</u>		
<u>Text books, Reference Books, Other resources</u>		
<u>Suggested Reading:</u>		
<p>1. <u>Armstrong, "A TEXT BOOK OF EMBRYOLOGY", Sach's publications 2005.</u></p> <p><u>Babinski, BI, "an Introduction to Embryology," CEog age learning 2012.</u></p> <p><u>De Roberti's, EDP De Roberti's, EME, "Cell and molecular biology," 8th edition, Williams & Wilkins, Philadelphia, 2006.</u></p>		

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Handwritten signature and circular stamp of Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.).

4. Gupta, PK, "CELL BIOLOGY, Genetics and evolution", Rastogi publications 2013
5. Heffner, L, "Human reproduction at a glance," BWL Publications, 2013.
6. Larsen, Human Embryology," Churchill livingstone, 2001.
7. Powar, CB, "CELL BIOLOGY" Himalya publishing House, 2010.
8. Rastogi, VB, "Anatal Distribution and developmental biology ." KNRN Publication, 2020.
9. Rastogi, VB, " Introduction to Cytology," KNRN Publications, 1988.
10. Sastry, KV, " ENDOCRINOLOGY and Reproductive Biology", rastogi publication 2018
11. VERMA and AGRAWAL, " A text Book of cytology," S Chand & co, 1999
12. VERMA, PS, AGARWAL, VK "Chordate Embryology," S. Chand & co, 2000.
13. Pardiés, K and Dubey A, Cell & developmental Biology," Akhand publishing house, New Delhi.
14. <https://www.academic.oup.com>
15. <https://www.medlineplus.gov>
16. <https://www.ncbi.nlm.nih.gov>
17. <https://www.zoologylearningpoint.wordpress.com>
18. <https://zoologyresources.com>

Suggested equivalent online courses:

16. Sway am online courses
<https://storage.googleapis.com/uniquecourses/onlinehtml>
17. National Digital Library <https://ndl.iitkgp.ac.in>
18. E- PG Pataskala (MHRD) PORTAL, (<HTTPS://EPGP.INFLIBNET.AC.IN>)
19. Science Direct Open Access Content
(<https://www.sciencedirect.com/book/9781843342038/openaccess>)

B

Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

<u>Maximum Marks:</u>	100
<u>Continuous Comprehensive Evaluation (CCE):</u>	25
<u>University Exam (UE):</u>	75

<u>Internal Assessment</u> <u>Continuous</u> <u>Comprehensive</u> <u>Evaluation(CCE):25</u>	<u>Class Test</u>	15
	<u>Assignment /</u> <u>Presentation</u>	10
	<u>Total</u>	25
<u>External Assessment</u> <u>University Exam</u> <u>Section 25</u> <u>Time: 02.00Hours</u>	<u>Section (A):</u> <u>Three Very Short</u> <u>Questions (50</u> <u>Words Each)</u>	3x3=30

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	<u>Section (B):</u> <u>Four Short</u> <u>Questions</u> <u>(200 Words</u> <u>Each)</u>	<u>4x9=36</u>
	<u>Section (C):</u> <u>Two Long</u> <u>Questions</u> <u>(500 Words</u> <u>Each)</u>	<u>2x15=30</u>
	<u>Total</u>	<u>75</u>

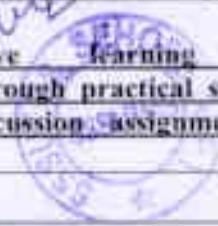
Part A Introduction
PRACTICAL SYLLABUS

<u>Program Certificate</u> <u>Course</u>	<u>Class:</u> <u>B.SC.</u>	<u>Year :</u> <u>FIRST</u> <u>Year</u>	<u>Session</u> <u>:2021-2022</u> <u>onwards</u>
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Subject: ZOOLOGY

<u>1</u>	<u>Course Code</u>	<u>SI-ZOOL2P</u>
<u>2</u>	<u>Course Title</u>	<u>CYTOLOGY, REPRODUCTIVE</u> <u>BIOLOGY & EMBROLOGY (Paper2)</u>
<u>3</u>	<u>Course Type</u>	<u>Core Course</u>
<u>4</u>	<u>Pre- requisite (if</u> <u>any)</u>	<u>To Study this course a student must</u> <u>have had the subject</u>
<u>5</u>	<u>Course Learning</u> <u>outcomes (CLO)</u>	<u>On completion of this course, learners</u> <u>will be able to understand:</u> <ul style="list-style-type: none"> • <u>The different stages of mitotic and meiotic cell</u> <u>division and special types of chromosomes.</u> • <u>Different stages of embryology.</u> • <u>Through squash preparations understand the</u> <u>stage of cell division and structure of polygene</u> <u>chromosomes.</u> • <u>Enhance collaborative learning and</u> <u>communication skills through practical sessions,</u> <u>team work group discussion, assignments &</u> <u>projects.</u>
<u>6</u>	<u>Credit Value</u>	<u>2</u>


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7	<u>Total Marks</u>	<u>Maximum Marks:25+75</u>	<u>Minimum Passing Marks: 33</u>
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Part B – Content of the Course

Total No. of Lectures:30

Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2

<u>Unit</u>	<u>TOPICS</u>	<u>No. of Lab Hours</u>
<u>1.</u>	<u>Spotting related to the cytology</u> a. <u>Prokaryotes and Eukaryotes cell</u> b. <u>Stages of mitotic cell division</u> c. <u>Stages of meiotic cell division</u> d. <u>Lamp brush chromosomes.</u>	<u>13</u>
<u>2.</u>	<u>Spotting related to Reproductive biology & Embryology</u> a. <u>T.S. Testis of Mammal</u> b. <u>T.S. Ovary of Mammal</u> c. <u>Development stages of Frog Embryology</u> d. <u>Developmental stages of Chick embryology.</u>	<u>13</u>
<u>3</u>	<u>Squash preparation of onion root tip to understand the stages of Mitosis</u>	<u>8</u>
<u>4.</u>	<u>Squash preparation of Grasshopper testis to understand the stage of Meiosis</u>	<u>9</u>
<u>5.</u>	<u>Try pan Blue exclusion test of cell viability</u>	<u>3</u>
<u>6.</u>	<u>Squash preparation of salivary gland chromosomes from Chironomus larva/Drosophila</u>	<u>9</u>

KEYWORDS: stages of cell division, stages of embryonic development squash preparation.

Part- C Learning Resources

Text Books, References, and other Resources

Books

Suggested reading:

1. Biffa, MM, Knight J. "Experiments in practical developmental biology", first edition Cambridge university press,2011
2. Chai Tanva, KV" Cell & molecular biology: a lab manual", PHI, 2013.
3. KELLER, LR Evans, JH, KELLER TCS "experimental developmental biology", academic press, 1998
4. TIGUNAYAT, MM,"A manual of practical Zoology: biodiversity cell biology, Genetics& development biology" scientific publishers,2019

5. Virtual Labs (<https://www.vlab.co.in>)

Part-D Assessment and evaluation

<u>Internal assessment</u>	<u>Marks</u>	<u>External assessment</u>	<u>Marks</u>
<u>Class interaction Quiz</u>	<u>10</u>	<u>Viva voce on practical</u>	<u>15</u>
<u>Attendance</u>	<u>05</u>	<u>Practical record file</u>	<u>10</u>
<u>Assignment/Charts /Model Seminar /Rural service technology(Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)</u>	<u>10</u>	<u>Table work/Experiments</u>	<u>50</u>
<u>Total</u>	<u>25</u>		<u>75</u>
<u>Any remarks suggestions: Nil</u>			

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Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, Hyperchromic and hypochromic shifts. UV spectra of conjugated polyenes and enones.

Infra-red (IR) absorption spectroscopy-

Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands. Measurement of IR spectrum, finger print region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

Keywords/Tags: *Hypsochromic, Hypochromic, Absorption, Spectrum*

Part C- Learning resources

Text Books, Reference Books, Other Resources


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Text Books

1. Gaur, S., Computer for Chemists, Neel Kamal Prakashan, 2017.
2. Khopkar, S.M. Basic Concepts of Analytical Chemistry, New Age, International Publisher, 2009.
3. Kaur H, Analytical Chemistry, Pragati Prakashan (2008).
4. Gupta, Alka L., Analytical Chemistry, Pragati Prakashan (2020).
5. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.
6. Kaur H, Instrumental Methods of Chemical Analysis, Pragati Prakashan, 2018.
7. Sharma B.K., Chromatography, Krishna Prakashan, 2019.
8. Sharma Y.R., Elementary Organic Spectroscopy, S Chand, 2013.
9. Singh, DR Saxena, G., Singh, B., Inorganic Chemicals, Shival Aggrawal & Company, Agra.
10. Srivastava, S.S., Gehlot, A.S., Chemistry, Ratan Prakashan Temple, Indore.


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11. Soni, P.L, Organic Chemistry, Sultan Chand and Sons, Delhi.
12. Singh, R.K.P., Modern Chemistry, Sahitya Bhavan, Agra.
13. Agnihotri, PK, Sahu, D
14. P., Pillai, A., Sahu, M., Yugbodh Chemistry, Yugbodh Publications, Raipur.

Reference Books:

1. Mitra Surbhi, Handbook of Computer Science & IT, Arihant, 2018.
2. Harris, D.C. Quantitative Chemical Analysis, 6th Ed., Freeman (2007).
3. Christian, Gary D; Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
4. Barrow, G.M. Physical Chemistry, Tata McGraw-Hill (2007)
5. Atkins' Physical Chemistry, 10th Edition, Oxford University Press 2014.
6. Guru J.N. Gurtu A. Advanced Physical Chemistry, Pragati Prakashan, Meerut, ISBN:9789386633347. 9386633345; Edition: IV, 2017.
7. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2016.
8. Finar, I.L. Organic Chemistry (Vol. I & II), E.L.B.S.
9. Morrison. R.T. & Boyd, R.N. Organic Chemistry, Pearson, 2010.
10. Banwell. Molecular Spectroscopy. 2017.
11. Silverstein Robert, Spectrometric Identification of Organic Compounds, Wiley, 2014.
12. Dyer J.R., Applications of Absorption Spectroscopy of Organic Compounds, 2009.

Suggested equivalent online courses:

MOOC: <https://www.edx.org/course/basic-analytical-chemistry>

NPTEL: <https://nptel.as.in/courses/104/105/104105084/>



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Web sources

1. <https://www.freebookcentre.net/Chemistry/Analytical-Chemistry-Books.html>
2. <https://nptel.springer.com/journal/216>

Part D- Assessment and Evaluation


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Suggested Continuous Evaluation Methods: Continuous Internal Evaluation Shall be Based on Allotted Assignment and class Tests. The marks shall be as follows:	Marks
Assessment and presentation of assignment	04
Class Test-I (Objective Questions)	04
Class Test-II (Descriptive Questions)	04
Class Test-I (Objective Questions)	04
Class Test-II (Descriptive Questions)	04
Overall performance throughout the year (includes Attendance Behavior Discipline Participation in Different Activities)	05
Total	25
Elaboration: Assessment Theory	
External Assessment	
Theory Paper	75
Grand Total	100


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PRACTICAL

Program- CERTIFICATE	Class- B.Sc.	Year- First	Session: 2021-2022
Subject – Chemistry			
1	Course Code	SI-CHEM2P	
	Course Title	Analytical Processes and Techniques	


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2	Course Type	Minor	
3	Course Learning Outcomes (CLO)	<p>By the end of this course students will learn the following aspects of Laboratory exercises in Chemistry:</p> <ol style="list-style-type: none"> 1. Concepts and analytical methods in Chemistry. 2. Preparation of solutions of different concentrations. 3. Standardization of the solution. 4. Identification of Organic compounds by chromatographic techniques. 5. Analysis by Spectral Techniques. 	
4	Credit Value	2	
	Total Marks	Maximum Marks: University Exam (UE)-75, CCE-25	Minimum Passing Marks: 33

External Assessment		Marks
	Experiments to be performed in laboratory	50
1	<p>Basic analytical exercises</p> <ul style="list-style-type: none"> • Calibration of different weights and glass apparatus (measuring cylinder, burette, pipette, volumetric flasks). • Preparation of solutions of different molarity/normality by weighing and dilution. 	10


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2

Quantitative Analysis

20

● **Titrimetric Analysis**

- Standardization of NaOH with Oxalic acid.
- Determination of carbonate and hydroxide present in mixture.
- Determination of carbonate and bicarbonate present in a mixture.
- Determination of free alkali present in different soaps/detergents.


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3	<p>Quantitative Analysis by Colorimetry</p> <ul style="list-style-type: none">• Verification of Lambert-Beer Law• Determination of concentration of coloured compounds (e.g., CuSO_4, KMnO_4)	10
4	<p>Qualitative Analysis</p> <ul style="list-style-type: none">• Systematic identification of organic compound by qualitative analysis.• Chromatography; Identification by determination of the R_f values of the given organic/ inorganic compounds by paper/thin layer chromatography. <p><i>Keywords/Tags: Analytical, Authentication, Molarity/ Normality, Standardization, Colorimetry, Qualitative Analysis</i></p>	10


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Part C- Learning resources

Text Books, References Books, Other Resources


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References:

1. Skoog, D.A. and Leary, J.J.: Instrumental Methods of Analysis, Saunders College Publications, New York, 1992.
2. Vogel's textbook of quantitative chemical analysis, 7th edition.
3. Goswami A.K., Mehta Anita, Khanam Rehana, ORS., UGC Practical Chemistry VOL. I, Pragati Prakashan, 2015.
4. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
5. Tandon, M.N., unified Rasayan Vigyan, Shival Agarwal & Company, 2018.

Suggestive digital platforms web links:

1. <https://www.youtube.com/watch?v=QAImRDzuTh8>
2. <http://amrita.olabs.edu.in/?sub=73&brch=8&sim=133&cot=1>
3. <http://chemcollective.org/vlabs>
4. <http://mas-iiith.vlabs.ac.in/exp6/Quiz.html>
5. [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_9_Experiments/02%3A_Paper_Chromatography_of_Gel_Ink_Pens-\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_9_Experiments/02%3A_Paper_Chromatography_of_Gel_Ink_Pens-(Experiment))
6. <https://edu.rsc.org/experiment/leaf-chromatography/389/article>
7. <https://edu.rsc.org/experiments/chromatography-of-sweets/455/article>
8. http://swe.mit.edu/outreach/virtual_resources/paper_chromatography.pdf
9. <http://www.chem.latech.edu/~deddy/chem104/104Standard.htm>
10. https://www.chem.purdue.edu/course/chem224/Miscellaneous/Mod_el_repor_Exp12-revised_2009.pdf


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11. <https://www.webpages.uidaho.edu/jfcheng/Chem%20253/labsExperiments%203.pdf>
12. <http://faculty.ccbcmd.edu/c-cyau/122%2007%20Acid-base%20titration%20AUG%2013.pdf>
13. <https://labbalances.net/blog/guide-to-calibration-weights>
14. https://cdn2.hubspot.net/hubfs/2203666/Beamex_White_Papers/Beamex%20White%20Paper%20-%20Weighing%20scale%20calibration%20ENG.pdf?_hsac=107807261.6.1518193235316&_hsfp=2102249448&hsCtaTracking=8918cffa-b755-4f72-b4b1-24c1fa8d_1a6d%7C12eb2e3f-4b62-43eb-bafd-2da2a5d102b6

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction on- <ul style="list-style-type: none"> • Common glassware and lab wares for solution preparation and analysis. • Numerical problems related to solution preparation. • Any other discussion. <p><i>Note: description to be written in practical record.</i></p>	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10

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Assignment (Charts/Model Seminar/Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Survey/Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75


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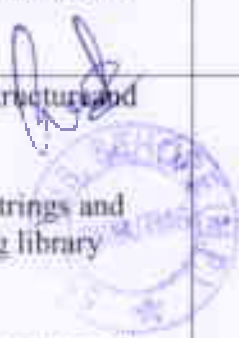
PART A : Introduction			
Program : Certificate		Class: B.Sc.	Year : I Year
Session: 2021-2022			
Subject : Computer Science			
1.	Course Code	SI-COSC21	
2.	Course Title	Programming Methodology & Data Structure	
3.	Course Type (Core Course/Elective/ Generic Elective/Vocational)	Minor	
4.	Pre-Requisite (if any)	To study this course ,a students must have had the subject Physics/Maths in 12 th class .	
5.	Course Learning Outcomes(CLO)	<p>On the Completion of this course ,learners will be able to:</p> <ol style="list-style-type: none"> 1. Develop simple algorithm and flow chart to solve the problem with programming using top down design principles . 2. Writing efficient and well structured computer algorithms/programs . 3. Learn to formulate iterative solutions and array processing algorithms for problems . 4. Use the recursive technique ,pointers and searching methods in programming . 5. Will be familiar with fundamental data structure ,their implementation ; become accustomed to the description of algorithm in both functional and procedural styles . 6. Have knowledge of complexity of basic operations like insert ,delete ,search on these data structure . 7. Posses ability to choose a data structure to suitably model any data used in computer applications . 8. Design programs using various data structure including hash table ,Binary and general search Tree ,heaps ,Graphs etc. 9. Asses efficiency tradeoffs among different data structure implementations. 10. Implement and know the applications of algorithms for searching and sorting etc. 11. Know the contributions of Indian in the field of programming data structures. 	
6.	Credit value	Theory-4 Credits	
7.	Total Marks	Max .Marks : 25+75	Min. Passing Marks :33

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Part B: Content Of the Course		
No. of Lectures (in hours per week) : 2 Hours per week		
Total No. of Lectures : 60 HRS.		
M o d u l e	Topics	No. of Lectur es
I	<p>Introduction to Programming : Program concepts ,Characteristics of programming, Stages in program Development, Algorithms, Notations ,Design ,Flow chart, Types of programming Methodologies .</p> <p>Introduction to C++ Programming :Basic Program Structure in the C++,Data types,Variable,Constatnts ,Opearators and basic I/O .</p> <p>Variable:Declaring ,defining and initializing variables, scope of variables ,using named constants ,Keywords,Casting of data types ,Opearators(Arithmetic,Logical and Bitwise),Using comments in programs,Character I/O (getc,getchr,putc,putchr etc.),Formatted and console I/O(printf(),scanf(),cin,cout),using basic header files (stdio.h,iostream.h,conio.h etc.).</p> <p>Simple Expressions in C++ : (Including unary operator Epressions,Binary operator expressions), understanding operator precedence in expressions .</p>	8
II	<p>Iterativestatemnts :while ,do-while and for loops,use break and continue loops,Using nested Statements (Conditional as well as Iterative).</p> <p>Functions:Top-Down design,Pre-defined functions, Programmer defined functions,local variable and global variables,Functionas with default Arguments ,Call by Value and Call by References, Parameters, Recursions:</p> <p>Introduction to Arrays: Declaration and Referring Arrays,Arrays in Memory,Initializing Array. Arrays in Functions,Multi-Dimentional Arrays.</p>	10
III	<p>Structures :Member Accessing ,Pointers to Structure ,Structure and Functions ,Array of Structure .</p> <p>Unions :Declaration and Initialization.</p> <p>Strings:Reading and Writing Strings,Arrays of Strings,Strings and Structures, Standard String and Structure, Standard String library Functions.</p> <p>Searching Algorithms:LinearSearch,Binary Search .</p> <p>File Handling:Use of Files for data input and output ,merging and copying files .</p>	8
IV	Data Structure :Basic Concepts, Linear and non linear data structure	12

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	<p>Algorithm Specification – Introduction, recursive algorithms, Data Abstraction, Performance Analysis.</p> <p>Linked List: Singly Linked List, Operations, Concatenating, Circularly linked list, Doubly linked list – Operations.</p> <p>Array: Representation of single, Two Dimensional arrays, sparse matrices-array and linked Representation.</p> <p>Stacks: Operations array and linked implementations, applications infix to postfix conversion, postfix expression evaluation, Recursion Implementation.</p>	
V	<p>Queue – Definition, operation, array and linked implementations . Circular Queue- insertion and deletion operations, Dequeue (Double ended Queue), priority Queue-Implementation.</p> <p>Trees : Binary Tree Representation – Properties of Binary Tree, Binary Tree Representation, -Array and Linked Representation, Binary Tree Traversal, Threaded Binary Tree.</p> <p>Heap: Definition, Insertion, Deletion.</p>	10
VI	<p>Graphs – Graph ADT, Graph Representation Graph Traversals, searching.</p> <p>Hashing - Introduction, Hash tables, Hash functions, Overflow Handling</p> <p>Sorting Methods – Comparison Sorting Methods.</p> <p>Search Tree- Binary Search Tree, Avl Tree – definition and Examples.</p>	10
VII	<p>Indian contribution to the field – Innovation in India, Origin of Julia Programming Language, Indian Engineers who designed new programming Languages, open source languages, Dr. Sanjay Sahni- Computer Scientist- pioneer of Data Structures, other relevant contributors and contributions.</p>	2
<p>Keywords /Tags : Programming, C++, Data Structure, Expressions, Control, File Handling, Arrays, Stack, Queue, Linked List, Tree, Graphs, Structure, Union, Search, Algorithm.</p>		


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PART C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- Lipschutz: Schaum's outline series Data Structure ,Tata McGraw Hill
- Problem Solving and Program Design in C,J.R.Hanly and E.B.Koffman ,Pearson.2015
- E.Balaguruswamy,"C++TMH Publication ISBN 0-07-462038-X.
- HerbertzShick,"C++ the complete References" TMH Publication.
- R.Lafore, 'Object Oriented Programming C++.
- N. Dale and C .Weems ,Programming and Problem solving with C++ :brief edition Jones& Bartlett learnig.
- Adam Drozdek," Data structure and Algorithms in C++",Third edition Cengage Learning.
- SarajSahani, Data Structure ,Algorithms and Applications with C++ ,McGraw Hill.
- Robert L. Kruse," Data Structure and Program Design inC++',Pearson.
- D.S. Malik,Data Structure using C++,Second Edition ,Cengage Learning.
- M.A. Weiss ,Data structure and Algorithms Analysis in C,2nd edition ,Pearson.
- M.A. Weiss,Data structure and Algorithm Analysis in C,2nd edition,Pearson.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=BC1S40yzsA>
2. <https://www.youtube.com/watch?v=vLnPwxZdW4Y&v=en>
3. <https://www.youtube.com/watch?v=Umm1ZQ5itZw>
4. https://www.youtube.com/watch?v=AT141CkUMKk&list=PLdo5W4Nhhv31bbUzrskfMpo_gxyU0LU

Suggested equivalent online course

<http://nptel.ac.in/courses/106/105/106105151/>
<http://nptel.ac.in/courses/106/106/106106133/>


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PART A : Introduction**Part D : Assessment and Evaluation**




Internal Assessment: Continuous Comprehensive Evaluation (CCE): 25 Marks Shall be based on allotted assignment and Class Tests. The marks shall be as follows :		External Assessment: University Exam (UE) : 75 Marks Time : 02.00 Hours	
Assessments and presentation of assignment	10 Marks	Section (A) : Three Very Short Questions (50 Word) OR Nine MCQ Questions	03x03=9 Marks Or 09x01= 9 Marks
Class Test I (Objective Questions)	05 Marks		
Class Test II (Descriptive Questions)	05 Marks	Section (B) : Four Short Questions (200 Word)	04x09=36 Marks
Class Test III (Based on solving circuit design problems)	05 Marks	Section (C) : Two Long Questions (500 Word)	02x15=30 Marks
Total	25 Marks	Total	75 Marks

Any remarks /Suggestions :Focus of the course /teaching should be on developing ability of the student in analyzing a problem, building the logic and efficient code for the problem.

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Program :Certificate		Class: B.Se.	Year : 1 Year	Session: 2021- 2022
Subject : Computer Science				
1.	Course Code	SI-COSC2P		
2.	Course Title	Office Tools & Programming Methodology Lab		
3.	Course Type (Core Course/Elective/Generic Elective/Vocational)	Minor		
4.	Pre-Requisite (if any)	To study a student must have had the subject Physics /Maths in 12th Class		
5.	Course Learning Outcomes(CLO)	<p>On the Completion of this course learners will be able-</p> <ol style="list-style-type: none"> 1. Develop simple algorithms and flow Chart to solve a problem with programming using top down design principles. 2. Writing efficient and well structured computer algorithms/programs. 3. Learn to Formulate iterative solutions and array processing algorithms for problems . 4. Use recursive techniques, pointers and searching methods in programming. 5. Possess ability to choose a data Structure to suitably model any data used in computer applications. 6. Implementation of algorithms for searching and sorting . 		
6.	Credit value	Practical -2 Credits		
7.	Total Marks	Max .Marks : 25+75	Min. Passing Marks :33	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore, Madhya Pradesh</p> </div> <div style="text-align: center;">   </div> </div>				

PART B:Content Of the Course

No. of Lab Practical's(in hours per week):2Hrs. Per week

Total No. of Labs =30 Hours

Suggested list of Practical's

List of Practical

**1. Office Tools ,
Using a Text Editor Tool**

**30
Hours**

1. Create a documents and apply different Editing options .
2. Create Banner for your college .
3. Design a Greeting card using word art for different festivals.
4. Design your Bio Data and use page borders and shading .
5. Create a documents and insert header and footer,apgetitle,date,time ,apply various page formatting feature etc.
6. Implement Mail Merge.
7. Insert a table into a document and try different formatting options for the table .

Using a spreadsheet Tool

1. Design your class Time Table .
2. Prepare a Mark Sheet of your class result .
3. Prepare a salary slip of an employee of an organization.
4. Prepare a bar chart & pie chart for analysis of election result.
5. Prepare a generic Bill of a Super Market.
6. Work on the following exercise on answer book:
 - a. Copy an existing Sheet
 - b. Rename the old Sheet
 - c. Insert a new Sheet into an existing Workbook
 - d. Delete the renamed sheet.
7. Prepare an attendance sheet of 10 students for any 6 subjects of your syllabus.calculate their total attendance,total percentages of attendance of each students and average of attendance.
8. Create a worksheet of students list of any 4 facilities and perform following database function on it.
 - a. Sort data by Name
 - b. Filter data by Class
 - c. Subtotal of students by class

Using a Presentation Tool



1. Design a presentation of your institute using auto content wizard, design template and blank presentation.
2. Design a presentation illustrating insertion of pictures, Word Art and Clipart .
3. Design a presentation, learn how to save it in different formats, copying and opening an existing presentation.
4. Design a presentation illustrating insertion of movie, animation and sound.
5. Illustrate use of custom animation and slide transition (using different effects).
6. Design a presentation using charts and tables of the marks obtained in class.

ii. **Given a problem statements ,students are required to formulate problem,developflowchart/Algoriyhm,write code in C++,execute and test it. Students should be given assignments on following :**

1. A. To learn elementary technique involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators)and control structures.
B.Learn how to use functions and parameter passing in functions ,writing recursive programs.
2. Write a program to swap the contents of two variables.
3. Write a program for finding the roots of a quadratic equation.
4. Write a program to find area of a circle,rectangle,square using switch case.
5. Write a program to check whether a given number is even or odd.
6. Write a program to print table of any number.
7. Write a program to print Fibonacci series.
8. Write a program to find factorial of given number.
9. Write a program to convert decimal (integer) number in to equivalent binary number.
10. Write a program to check given string is palindrome or not.
11. Write a program to perform multiplications of two matrices.
12. Write a program to print digits of entered number in reverse order .
13. Write a program to print sum of two matrices .
14. Write a program to print multiplication of two matrices.
15. Write a program to generate even/odd series from 1 to 100.
16. Write a program whether a given number is prime or not.
17. Write a program for call by value and call by reference.
18. Write a program to generate a series $1+1/1!+2/2!+3/3!+.....+n/n!$.
19. Write a program to create a pyramid structure



Part A Introduction		
Program: Certificate	Class: BSc-I	Year: 2021
		Session: 2021-22
Subject: Botany		
1	Course Code	SI-BOTAZI
2	Course Title	Basic Botany
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Minor
4	Pre-requisite (if any)	To study this course, a student must have had the subject botany in class/12th/ certificate/diploma.
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms. It gives an accounts of plant adaptations from aquatic condition to colonize terrestrial habitat. The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated. The economic importance and significance of plants in nature will be understood. They will be acquainted with locally prevalent microbial diseases of plants and humans
6	Credit Value	4 Credits
7	Total Marks	Max. Marks: 25+75 Min. Passing Marks: 33
Part B- Content of the Course		
Total No. of Lectures- 60 Tutorials- 0 Practical = 0 (theory 4 hours per week): L-T-P:		
Unit	Topics	No. of Lectures
I	1.1 History of Botany and Indian Contributions. 1.2 Morphological Characteristics of lower and higher plants (Angiosperms). 1.3 Types of leaves, Inflorescence, Flowers and Fruits. 1.4 Structure of Plant cell and cell organelles. Prokaryotic and Eukaryotic Cells, types of Cell division. 1.5 Microscope structure and function of light microscope (magnification and resolving power). 1.6 Various types of Microscopes: Bright field, Phase Contrast, SEM and TEM.	12
II	1. Algae 1.1 General characteristics 1.2 Range of thallus organization, reproduction. 1.3 Types of life-cycles in algae 1.4 Role of algae in nature and its economic importance.	12

	<p>2Bryophytes :</p> <p>2.1General characteristics, Ecology.</p> <p>2.2Range of thallus organization, morphology, anatomy(internal and external features) and reproduction of any one Bryophyte.</p> <p>2.3Economic importance of Bryophytes</p>	
III	<p>1Pteridophytes</p> <p>1.1General characteristics and morphology.</p> <p>1.2Stelar organization and reproduction.</p> <p>1.3Heterospory and seed habit.</p> <p>1.4Economic importance</p> <p>2.Gymnosperms</p> <p>2.1 General description and their distribution.</p> <p>2.2Economic importance of Gymnosperms.</p> <p>3.Paleobotany</p> <p>3.1 Indian contribution in Paleobotany.</p> <p>3.2Brief knowledge of Fossils and Geological time scale.</p>	12
IV	<p>1Fungi</p> <p>1.1 General characteristics and cell wall composition.</p> <p>1.2 Mode of nutrition</p> <p>1.3 Types of reproduction</p> <p>1.4 Economic importance</p> <p>1.5Parasexuality and Mycorrhiza</p> <p>2.Lichens: Brief knowledge and their significance.</p>	12
V	<p>1Microbes</p> <p>1.1Brief outline of various types of Microbes</p> <p>1.2Archaeobacteria, Eubacteria, Cyanobacteria, Mycoplasma, Actinomycetes and Virus.</p> <p>1.3 Beneficial and harmful roles.</p>	12

Keywords/Tags: History of Botany, Paleobotany, Prokaryotes, Eukaryotes, Algae, Bryophyta, Pteridophyta, Gymnosperms, Fungi, Mycorrhiza, Lichens, Bacteria, Virus

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Oladele Ogunseitan, Microbial Diversity: Form and Function in Prokaryotes, Wiley Blackwell, 2008.
2. Pelezar, M.J et al., Microbiology, Tata McGraw-Hill Co, New Delhi, 5th edition, 2001.
3. Prescott, L. Harley, J. and Klein, D., Microbiology, Tata McGraw-Hill Co, New Delhi, 6th edn., 2005.
4. Fritsch F.E., The Structure & Reproduction of Algae, Vol. I & Vol. II, Cambridge University Press, Cambridge, U.K., 1945.
5. Smith, G.M., Cryptogams Botany, Vol. I: Algae, Fungi, & Lichens, McGraw-Hill Book Co., New York, 1959.
6. Ian Morris, An Introduction to the Algae, Hutchinson, London, 1967.

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Suggested equivalent online courses:

Part D Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 25marks University Exam (UE) 75 marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation Total	15 10 25
External Assessment : University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) Four Short Questions (200 Words Each) Section (C) Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09 = 36 02 x 15 = 30 Total 75


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Part A Introduction			
Program: Certificate	Class: 1st year	Year: 2021	Session: 2021-22
Subject: Botany Practical			
1	Course Code	SB-BOTA2P	
2	Course Title	Basic Botany Practical	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Minor	
4	Pre-requisite (if any)	To study this course, a student must have had the subject of Biology/ Life science/Agriculture in class 12th.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> • Students will learn to carry out practical work in the laboratory. • Interpreting plant morphology and anatomy of various groups of lower and higher plants. • Students will be able to identify the major groups of microorganisms. 	
6	Credit Value	2	Credits
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33
Part B- Content of the Course			
Total No. of Practical- 30 Hours Tutorials- 00 -Practical (2 hours per week): L-T-P:			
Unit	Topics	No. of Practical	
I to V	<ol style="list-style-type: none"> 1. Study of various types of leaves , inflorescence, Flowers and fruits. 2. Understanding various parts of Microscope(simple and compound microscope) 3. Study of plant cells (e.g. Onion etc.) 4. Study of permanent slides of Mitosis and meiosis 5. Study of Electron Micrographs of Cell and organelles from Internet, You -Tube. 6. Identification of various algae from specimens, slides and temporary mounts of water from nearby areas like, <i>Nostoc</i>, <i>Oscillatoria</i>, <i>Volvox</i>, <i>Spirulina</i>, <i>Dedogonium</i>, <i>Chara</i> and specimens and pictographs of marine algae like <i>Ectocarpus</i>, <i>Sargassum</i>, <i>Polysiphonia</i>. 7. Study and identification of some Bryophytes like <i>Riccia</i>, <i>Marchantia</i>, <i>Anthoceros</i>, <i>Fucus</i> and Field visit. 8. Study of some fossils (specimens and slides) 9. Study of some Pteridophytes like <i>Lycopodium</i>, <i>Selaginella</i>, <i>Equisetum</i>, <i>Marselia</i> and study of any one fern 	30	


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10. Section cutting of Pteridophytes and Gymnosperms: Stem, root and leaves
11. Specimen study of Pteridophytes and Gymnosperms Cones
12. Study of fungal structures and preparation of temporary mounts of *Mucor*, *Rhizopus*, *Asperigillus*, *Yeast*, *Pencillium*, *Alternaria*, *Athysa*, *Helimentosporium*.
13. Permanent slides of Puccinia on host.
14. Study of various fungal plant diseases
15. Observation of symptoms of virus and bacteria on plants.
16. Gram staining techniques

Keywords/Tags: Microscope, Algae, Bryophyta, Pteridophyta, Gymnosperm Fungi

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Bendre Ashok and Ashok Kumar , A Textbook of Practical Botany, vol. 1, Rastogi Pub., Meerut, 1984.
2. Pandey B.P Modern Practical Botany,., vol. i, S. Chand and Co. Ltd., N. Delhi, 17th edn., 1999.
3. Singh M.P., Chaudhary S.B. and Sahu H. BA Textbook of Practical Botany, Daya Pub. House, N. Delhi, 2005.
4. Shahezad, Aki I Mohd., Practical Botany, Shanil Prakashan, Gwalior, 2016.
5. Elizabeth Margeret and Angela G Practical manual of Botany, vol.1, New Age (Pub.) Ltd., Delhi, 2007.

Suggestive digital platforms web links --

Suggested equivalent online courses: ---

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction (Quiz)	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of / Lab Visits/ Survey / Industrial visit)	10	Table work / Experiments	50
TOTAL	25		75

Any remarks/ suggestions: Practical may be adjusted accordingly by the teachers.

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Program- CERTIFICATE	Class- B.Sc.	Year- First	Session- 2021-2022
Subject – Chemistry			
Course Code	SI-CHEM2T		
Course Title	Analytical Chemistry		
Course Type	Minor		
Pre-requisite (if any)	To study this course students must have had the subject Chemistry in class +2 or equivalent.		
Course Learning Outcomes (CLO)	<p>By the this course students will learn the following aspects of Chemistry:</p> <ol style="list-style-type: none"> 1. Basic concepts of Mathematics for Chemists. 2. Fundamentals of analytical chemistry and steps involved in analysis. 3. Basic Knowledge of Computer for chemists. 4. Basic Concepts of Chemical equilibrium. 5. Principles of Chromatography and chromatographic techniques. 6. Various techniques of Spectroscopic Analysis. 		
Credit Value	4		
Total marks	Maximum Marks: CCE-25, University Exam (UE)-75	Minimum Passing Marks:33	


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Part B – Content of the course

Total No. of Lectures-Tutorials-Practical (In hours per week): L-T-P: 90-0-30

Unit	Topic	No. of Lectures
1	<p>Mathematics for Chemists Straight line equation, Logarithmic relation, curve sketching, linear graphs & calculation of slopes. Differentiation, differentiation of functions like kx, e^x, x^n, $\sin x$, $\log x$, maxima & minima, partial differentiation. Integration of some useful relevant functions. <i>Keywords/Tags: Linear graphs, Logarithmic Relation, Differentiation, Integration.</i></p>	10
2	<p>Basic Analytical Chemistry: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurement. Presentation of experimental data and results, from the point of view of significant figures, statistical terms: mean, mean deviation, median standard deviation, Numerical Problems.</p> <p>Calculations used in Analytical Chemistry Some Important units of measurements- SI Units, distinction between mass and weight, mole, milli mole and Numerical Problems. Solution and their concentrations- Concept of Molarity, molality and normality, Expressing the concentration in parts per million (ppm), parts per billion (ppb), Numerical Problems. Chemical Stoichiometry- Empirical and Molecular Formulas, Stoichiometric Calculations, Numerical Problems. <i>Keywords/Tags: Accuracy, Precision, SI units, Units of Concentration, Chemical stoichiometry.</i></p>	10


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3	Computer for chemists Introduction to computer, Introduction to operating systems like- DOS, Windows, Linux and Ubuntu. Use of computer programs	10
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	<p>Running of standard programs & packages such as MS-word, MS-excel, PowerPoint, Execution of linear regression x-y Plot, Use of software's for drawing structures and molecular formulac.</p> <p><i>Keywords/Tags: Operating systems, MS-word, MS-excel, PowerPoint.</i></p>	
4	<p>Chemical Equilibrium: Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium, Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van's Hoff reaction isotherm, Le-Chatelier's principle and its applications.</p> <p><i>Keywords/Tags: Chemical Equilibrium, Equilibrium constant, Free Energy, Chemical Potential.</i></p>	10
5	<p>Chromatography: Introduction, Principle and Classification. Mechanism of separation: adsorption, partition & ion-exchange. Development of chromatograms: frontal, elution and displacement methods. Paper Chromatography (ascending, descending and circular), Thin layer Chromatography (TLC) and Column Chromatography (CC), Gas Chromatography (GC) and High Pressure Liquid Chromatography (HPLC), types of column and column selection, applications, limitations.</p> <p>Principle and Application of:</p> <ul style="list-style-type: none"> • Flash chromatography, • Ion-exchange chromatography and • Chiral chromatography. <p><i>Keywords/Tags: Chromatography, Ion Exchange, Column Selection, Adsorption.</i></p>	10




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6	<p>Spectrum techniques of analysis</p> <p>Basic of absorption spectroscopy: Electromagnetic radiation, Spectral range, Absorption, Absorptivity, Molar Absorptivity, Fundamental Laws of Absorption, Lambert-Beer Law and its limitations.</p> <p>Constitution & working of photometer, spectrometer, colorimeter.</p> <p>Ultraviolet (UV) absorption spectroscopy-</p>	10
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	<p align="center">* ** *** ****</p> <p>20. Write a program to create a pyramid structure 1 12 123 1234</p> <p>21. Write a program to check entered number is Armstrong or not.</p> <p>22. Write program for traversing an Array.</p> <p>23. Write a program to input N numbers, add them and find average.</p> <p>24. Write a program to find largest element from an array.</p> <p>25. Write a program for linear search.</p> <p>26. Write a program for binary search.</p> <p>27. Write a program for bubble sort.</p> <p>28. Write a program for selection sort.</p>	
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Keyword /Tags: Digital Electronics ,Logic gates ,AND ,OR,NOT ,IC 7486,IC 7400,NAND ,NOR,IC 7483, Circuit , Flip Flop , Demorgan's Theorem

Part C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- M.Morris Mano, "Computer System Architecture " PHI
- Heuring Jordan , "Computer System Design & Architecture" (A.W.L.)
- William Stalling , " Computer Organization & Architecture " , Pearson Education Asia.
- V.CarlHamacher , " Computer Organization " TMH
- Tannenbaun , "Structured Computer Organization " PHI.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=4TzMyXmzIL8M>
2. <https://nptel.ac.in/course/106/106/106106166/>
3. <https://nptel.ac.in/course/106/106/106106134/>

Suggested Equivalent online course

<http://nptel.ac.in/course/106/105/106105163>

Part D : Assessment and Evaluation (theory)

Internal Assessments : Continuous
Compressive

External Assessments : University
Exam(UE):75 Marks

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Evaluation (CCE) :25 Marks		Time :02.00 Hours	
Internal Assessment	Marks	External Assessment	Marks
Hands -on Lab Practice	5 Marks	Practical Record File	10 Marks
Lab Test Practical list & Internal Viva	12 Marks	Viva Voce on Practical	15 Marks
Assignments(Charts/Seminar/Rural Service/Technology Dissemination/Report of Excursion/ Lab Visits/Survey/Industrial Visit)	8 Marks	Table Work /Experiments	50 Marks
Total	25	Total	75

Any remarks /Suggestions ;Focus of the course /Teaching should be on developing ability of the students in analyzing a problem, building the logic and efficient code for the problem.


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Part A- Introduction		
Program: Certificate	Class: B.Sc. I Year	Year: 2021 Session: 2021-2022
Subject: Mathematics		
Course Code	SI-MATH2T	
Course Title	Calculus and Differential Equations	
Course Type (Core/Elective/ General Elective/Vocational/...)	Minor	
Pre-requisite (if any)	To study this course, a student must have had the subject Mathematics in 12 class.	
Course Learning Outcomes (CLO)	The course will enable the students to: <ol style="list-style-type: none"> 1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference. 2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc. 3. Formulate the Differential equations for various Mathematical models. 4. Using techniques to solve and analyze various Mathematical models. 	
Credit Value	6	
Total Marks	Max. Marks: 25+75	Min. Marks: 33

Part B- Content of the Course		
Total numbers of Lectures(in hours per week): 3 hours per week		
Total Lectures: 90 hours		
Unit	Topics	Numbers of Lectures
1	1.1 Historical background: <ul style="list-style-type: none"> 1.1.1 Development of Indian Mathematics ancient and early classical period (Till 500 Cen.) 1.1.2 A brief biography of Bhaskaracharya (with special reference to Lilavati and Madhava) 1.2 Successive Differentiation <ul style="list-style-type: none"> 1.2.1 Leibniz Theorem 1.2.2 Maclaurin's series Expansion 1.2.3 Taylor's series Expansion 	18
	1.3 Partial Differentiation <ul style="list-style-type: none"> 1.3.1 Partial Derivatives of higher order 1.3.2 Euler's theorem on homogeneous functions 1.4 Asymptotes 	



	<p>1.4.1 Asymptotes of algebraic curves 1.4.2 Condition for Existence of Asymptotes 1.4.3 Parallel Asymptotes 1.4.4 Asymptotes of polar curves</p>	
2	<p>2.1 Curvature 2.1.1 Formula for radius of Curvature 2.1.2 Curvature at origin 2.1.3 Centre of Curvature 2.2 Concavity and Convexity 2.2.1 Concavity and Convexity of curves 2.2.2 Point of inflexion 2.2.3 Singular point 2.2.4 Multiple points 2.3 Tracing of curves 2.3.1 Curves represented by Cartesian equation 2.3.2 Curves represented by Polar equation</p>	18
3	<p>3.1 Integration of Transcendental Functions 3.2 Introduction to Double and Triple Integral 3.3 Reduction formulae 3.4 Quadrature 3.4.1 For Cartesian coordinates 3.4.2 For Polar coordinates 3.5 Rectification 3.5.1 For Cartesian coordinates 3.5.2 For Polar coordinates</p>	18
4	<p>4.1 Linear Differential Equations 4.1.1 Linear equation 4.1.2 Equations reducible to the linear form 4.1.3 Change of variables 4.2 Exact Differential equations 4.3 First order and higher degree Differential equations 4.3.1 Equations solvable for x, y and p 4.3.2 Equations homogenous in x and y 4.3.3 Clairaut's equation 4.3.4 Singular solutions 4.3.5 Geometrical meaning of Differential equations 4.3.6 Orthogonal trajectories</p>	18
5	<p>5.1 Linear Differential equation with constant coefficients 5.2 Homogeneous linear ordinary Differential equations 5.3 Linear Differential equations of second order 5.4 Transformation of equations by changing the Dependent/Independent variables 5.5 Method of Variation of parameters</p>	18
<p>Keywords/Tags: Indian Mathematics, Successive Differentiation, Partial Differentiation, Asymptotes, Curvature, Tracing of Curves, Quadrature, Rectification, Linear Differential Equations, Method of Variation of Parameters.</p>		

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Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Text Books:

1. Gorakh Prasad: Differential Calculus. Pothishala Pvt. Ltd, Allahabad, 2016.
2. Gorakh Prasad: Integral Calculus, Pothishala Private Ltd., Allahabad, 2015.
3. M. D. Raisinghanis: Ordinary and Partial Differential equations. S Chand & Co Ltd., 2017.
4. Gerard G. Emch, R.Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, vol. 3, 2005.
5. Madhya Pradesh hindi granth academy books.

Reference Books:

1. N. Piskunov: Differential and Integral Calculus, CBS Publishers,1996.
2. G. F. Simmons: Differential Equations, Tata McGraw Hill, 1972.
3. E. A. Codington: An introduction to ordinary differential Equation, Prentice Hall of India, 1961.
4. D. A. Murray: Introductory Course in Differential Equations, Orient Longman (india), 1967.
5. H. T. H Piaggio: Elementary Treatise on Differential Equations and their Application, C. B.S. Publisher & Distributors Delhi, 1985.
6. Bibhuti bhushan Das and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House,1962.

Suggested Digital Platforms Web links:

<https://eppg.inflibnet.ac.in>

<https://freevidelectures.com/university/it-roorkee>

<https://www.highereducation.mp.gov.in/?page=zhzIQmpZwkyIQo2b%2Fy5G7w%1D%1D>

<https://www.bhojvirtualuniversity.com>

Suggested Equivalent online courses:

<https://nptel.ac.in/courses/111105122/>

<https://nptel.ac.in/courses/111107112/>

<https://nptel.ac.in/courses/111101/111101080/>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 marks

Continuous Comprehensive Evaluation (CCE): 25 marks



University Exam (UE): 75 marks



Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	15 10 Total: 25 marks
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section (A) : Three Very Short Questions (50 Words Each) Section (B) : Four Short Questions (200 Words Each) Section (C) : Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30 Total = 75


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Part A Introduction			
Program Certificate Course		Class: B.SC.	Year : FIRST Year Session : 2021-2022 onwards
Subject : Microbiology			
1	Course Code		SI-MBI02T
2	Course Title		Microbial Techniques
3	Course Type		Minor
4	Pre- requisite (if any)		To Study this course a student must have had the subject
5	Course Learning outcomes (CLO)		After completing this course in Microbiology a student shall have understanding of- <ul style="list-style-type: none"> • Recall the basic lab glassware to be used in the laboratory. • Summarize different methods of sterilization and isolation of pure cultures. • Understand the working of different kinds of instruments and microscopes. • Apply serial dilution technique to isolate the bacteria. • Practice different methods to culture bacteria in the laboratory • Illustrate a method to differentiate between gram positive and gram negative bacteria.
6	Credit Value		4
7	Total Marks	Maximum Marks: 25+75	Minimum Passing Marks: 33
Part B- Content of the Course			
Total no of Lectures -60			
Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0			
Total No. of Lectures: 15			
Unit	Topics		No. of Lectures
1	MICROSCOPY AND STAINING 1.1 MICROSCOPY- PRINCIPLES AND APPLICATION OF SIMPLE AND COMPOUND Bright- field microscopy, phase- contrast microscopy, transmission electron microscopy and scanning electron microscopy. 1.2 Preparation for light microscope Examination- wet mount and hanging – drop techniques preparation for simmer and fixation 1.3 Staining- principles of staining, negative staining, simple staining, differential staining (Gram and acid fast staining), flagella staining capsule and endospore staining.	 	15

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	mount, Hanging drop method, Bacterial staining.		
II	<p>Instruments Electronic Balance, autoclave, centrifuge ,colony counter, deep freezer, homogenizer, hot air oven,incubator.laminar air flow, magnetic stirrer, P h meter, spectrophotometer, vortex mixture, water bath, water distiller chromatography chamber anaerobic chamber and electrophoresis apparatus.</p>		15
III	<p>Sterilization and culture medium</p> <p>3.1 Physical methods of sterilization: Dry heat, moist heat, radiation, filtration, and incineration. 3.2 Chemical methods of sterilization- Phenol and phenolic compounds, Alcohol, Halogens, and detergents. 3.3 Types of culture media- Natural, synthetic, complex, enriched, and selective. Anaerobic (Trio glycol ate broth, Robertson's media,) broth culture of aerobic bacteria.</p> <p>Keywords: Physical sterilization, Chemical sterilization, microbial culture media.</p>		
IV	<p>Isolation, Cultivation and preservation</p> <p>4.1 Natural microbial population- Pure culture 4.2 Isolation of microbial population- From air, water, and soil. 4.3 Methods for isolation: Streak plate, pour plate and spread plate. Serial dilution and micromanipulator methods. Cultivation on liquid and solid media. Isolation of micro organisms on potato slice and bread. 4.4 Maintenance and preservation for short term and long term. 4.5 Cultivation OF Anaerobic bacteria, and accessing non-cultivable microorganisms.</p> <p>Key words: Pure culture, isolation of microbes, preservation of culture.</p>		
Part C-Learning Resources			
Text books, Reference Books, Other resources			
Suggested Reading:			
F. Felzer, M.J., , E.C.S and Krieg, N.R. "Microbiology" Tata McGraw- Hill, New			

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DELHI(2001)

2. Tortuga G.J. Finke Br. Case "Microbiology". An Introduction, 9th edition Pearson Education (2008)
3. Willey J.M., Sherwood L.M., Wool verton C.J., "PRESCOTT'S Microbiology", 9th edition (2013)
4. Madigan. M.T., Marino. J.M., Dunlap. P.V. AND Clark D.P., "Bruck Biology of Microorganisms, 12th edition. Pearson Benjamin Cummings, San Francisco (2009).
5. Sum Bali, Gacta and Mathura, R.S., "Principles of Microbiology" M.C. Grew Hill edition.(2017)
6. Agatha Narayan, R. and Picnicker, C.K.S., "Text book of microbiology", 6th edition Oriental Longman Publication. U.S.A (2000).
7. Dubiety, R.C., And Maheshwari, D.K., "Text book of microbiology". S. Chand & Company Ltd., New Delhi.(2008).
8. Sharma, P.D., "Microbiology". Kasogi Publications, Meerut. (2014).
9. Singh, R.P., "Applied Microbiology". Kalia Publishers, New Delhi. (2007)
- 10 Shimmy, Q.J., "Microbiology"-I", Kaila Sadden, Bhopal.

Suggested equivalent online courses:

1. <https://www.com.mooc-list.com/course/small-and-mighty-introduction-microbiology-futurelearn>
2. <https://www.mooc-list.com/course/microbiology-saylororg>
3. <https://www.mooc-list.com/course/bacteria-and-chronic-infections-coursera>
4. <https://www.coursera.org/lecture/bacterial-infections/1-1-introduction-to-bacteria-by-bioinformaticscian-phd-neder-worning-HZ64m>
5. <https://www.openstax.org/books/microbiology/pages/1-1-types-of-microorganisms>
6. <https://openstax.org/books/microbiology/pages/4-1-prokaryotic-habitats-relationships-and-microbiomes>
7. <https://swayam.gov.in/explorer?searchText=microbiology>

Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100
Continuous Comprehensive Evaluation (CCE):	25
University Exam (UE):	75

Internal Assessment Continuous Comprehensive Evaluation(CCE):25	Class Test	15
	Assignment / Presentation	10
	Total	25
External Assessment University Exam Section:25 Time: 02.00Hours	Section (A): Three Very Short Questions (50 Words Each)	3x3=30
	Section (B): Four Short Questions (200 Words Each)	4x9=36
	Section (C): Two Long Questions (500 Words Each)	2x15=30
	Total	75

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Part A Introduction			
Program Certificate Course	Class: B.SC.	Year : FIRST Year	Session :2021-2022 onwards
Subject : Microbiology			
1	Course Code	SI-MBIO2P	
2	Course Title	Microbial Tools and Techniques Practical	
3	Course Type	Core Course	
4	Pre-requisite (if any)	To Study this course a student must have had the subject	
5	Course Learning outcomes (CLO)	On completion of this course, learners will be able to understand: <ul style="list-style-type: none"> • Basic Knowledge of glassware, microscopes and different kinds of instruments used in the microbiology laboratory. • Basic media preparation technique, autoclaving, cleaning and sterilization of glassware. • Preparation of liquid and solid culture media. • Isolation of microorganisms by different plating methods. 	
6	Credit Value	2	
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33

Part B – Content of the Course

Total No. of Lectures:10

Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2

S. No.	Name of the Exercise	No. of Lab Hours
1.	Demonstration and briefing about principles and working of basic instruments.	4
2.	Basic media preparation technique, autoclaving, cleaning and sterilization of glass ware.	6
3.	Preparation of liquid culture media- Peptone water, nutrient broth	2
4.	Preparation of solid culture media – Nutrient agar (agar slant/ agar plate)	2
5.	Isolation of microbes from water , soil and air by serial dilution agar plating method.	3
6.	Isolation of fungi from water, soil and air by serial dilution agar plating method.	3
7.	Isolation of microorganisms by pour plate method.	3
8.	Isolation of microorganisms by streak plate method	3
9.	Isolation of microorganisms by spread plate method.	3
10.	Any other experiment may be designed on the basis of theoretical aspects.	1

Keywords: Basic instruments, Culture media, pour plate, streak plate, spread plate.

Part- C Learning Resources

Text Books, References, and other Resources Books

- 1.Cappuccino, David Sherman N., "Microbiology : A Laboratory Manual", 9th edition, Pearson Education Limited. (2010).
- 2.Dubey , R.C and Maheswari, D.K. , "Practical Microbiology" ,S. Chand &Co Ltd, New Delhi

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3.M. Gopool Reddy , M., Reddy m.n. Saigopal , D.V.R. and Mallaiiah K.V., " Laboratory Experiments in Microbiology", Himaliya Publishing House , Mumbai (2007).

4.Ancja , K.R., " Laboratory Manual of Microbiology and Biotechnology.2:Edition", Meditech Scientific International ,(2018).

5.Patel, Rakesh J and Patel Kiran, R., " Experiments: Microbiology Vol. I and Vol. II" , AdityaPrakashan Ahmadabad, (2009).

6. Varghese, Naveen and Joy , V," Microbiology LaboratoryManual " ED.1, Aromatic and Medicinal Plants Research Station, Odakkali, Ernakulam, Kerala. (2014).

7.Shammi, Q.J. " Microbiology-Tools and Techniques", KailashPustaksadan ISBN 978-81-89900-38-0 (In hindi also)

8.Grainger. John , Hurst Janet and Burdass, Daniel , "Basic Practical Microbiology: A Manual".The Society for General Microbiology.(2001).

Suggested Digital Platforms /Web Links:

1. <https://www.mooc-list.com/course/introduction-practical-Microbiology-futurelearn>
2. https://study.com/articles/List_of_Free_Online_Microbiology_Courses_and_Training_Options.html

Part-D Assessment and evaluation

Internal assessment	Marks	External assessment	Marks
Class interaction Quiz	10	Viva voce on practical	15
Attendance	05	Practical record file	10
Assignment(Charts /Model Seminar /Rural service technology(Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)	10	Table work/Experiments	50
Total	25		75

Any remarks suggestions:Nil


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Part A- Introduction			
Program: Certificate	Class: B.Sc.IYear	Year: 2021	Session: 2021-2022
Subject: Physics			
Course Code	SI-PHYS2T		
Course Title	Mechanics and General Properties of Matter		
Course Type (Core/Elective/ Generic Elective/Vocational/...)	Minor		
Pre-requisite (if any)	To study this course, a student must have had the subject Physics in 12 th class.		
Course Learning Outcomes (CLO)	1. The course would empower the students to develop the idea about the behavior of physical bodies. 2. It will provide the basic concepts related to the motion of all the objects around us in daily life. 3. The students would be able to build foundation to various applied field in science and technology especially in the field of mechanical engineering. 4. The students will acquire the knowledge of basic mathematical methods to solve the various problems in physics. 5. The students will be able to understand the relativistic effect and the relation between energy and mass.		
Credit Value	4		
Total Marks	Max. Marks: 25+75	Minimum passing Marks:33	

Part B- Content of the Course		
Total numbers of Lectures(in hours):60		
Unit	Topics	Numbers of Lectures


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I	<p>Historical background and Mathematical Physics</p> <p>1. Historical background: 1.1. A brief historical background of mathematics and mechanics in the context of India and Indian culture. 1.2. A brief biography of Varahamihira and Vikram Sarabhai with their major contribution to science and society.</p> <p>2. Mathematical Physics: 2.1. Scalar and vector fields, Gradient of a scalar field and its physical significance. 2.2. Vector integral: line integral, surface integral and volume integral, Divergence of a vector field and its physical significance, Gauss divergence theorem. 2.3. Curl of a vector field and its physical significance, Stokes and Green's theorem, Numerical problems based on the above topics.</p> <p>Keywords/Tags: Scalar field, Vector field, Vector integral, Gradient, Divergence, Curl.</p>	12
II	<p>Mechanics of Rigid and deformable bodies</p> <p>1. Rigid body mechanics: 1.1. System of particles and concept of rigid body, Torque, centre of mass: position of the centre of mass, Motion of the centre of mass, Conservation of linear & angular momentum with examples. Single stage and multistage rocket. 1.2. Rotatory motion and concept of moment of inertia. Theorems on moment of inertia: theorem of addition, theorem of perpendicular axis, theorem of parallel axis, Calculation of moment of inertia of rectangular lamina, disc, solid cylinder, solid sphere.</p> <p>2. Mechanics of deformable bodies: 2.1. Hook's law, Young's modulus, Bulk modulus, Modulus of rigidity and Poisson's ratio, Relationship between various elastic moduli. 2.2. Possible values of Poisson's ratio. Finding Poisson's ratio of rubber in the laboratory, Torsion of a cylinder, Strain energy of twisted cylinder. 2.3. Finding the modulus of rigidity of the material of a wire by Barton's method, Torsional pendulum and Maxwell's needle, Searl's method to find Y, η and σ of the material of a wire, Bending of beam, Cantilever, Beam supported at its ends and loaded in the middle.</p> <p>Keywords/Tags: Rigid body, Centre of mass, Moment of Inertia, Poisson's ratio.</p>	12


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<p>III</p>	<p>Fluid mechanics</p> <p>1. Surface Tension: 1.1. Inter-molecular forces and potential energy curve, force of cohesion and adhesion. 1.2. Surface tension, Explanation of surface tension on the basis of intermolecular forces, Surface energy, Effect of temperature and Impurities on surface tension, Dally life application of surface tension. 1.3. Angle of contact, The pressure difference between the two sided of a curved liquid surface, Excess pressure inside a soap bubble, Capillarity, determination of surface tension of a liquid capillary rise method, Jaeger's method.</p> <p>2. Viscosity: 2.1. Ideal and viscous fluid, Streamline and turbulent flow, Equation of continuity, Rotational and Irrational flow, Energy of a flowing fluid, Euler's equation of motion of a non-viscous fluid and its physical significance. 2.2. Bernoulli's theorem and its applications (Velocity of efflux, shapes of wings of airplane, Magnus effect, Filter pump, Bunsen's burner) 2.3. Viscous flow of a fluid, Flow of liquid through a capillary tube, Derivation of Poiseuille's formula and limitations, Stocks formula. Motion of a spherical body falling In a viscous fluid.</p> <p>Keywords/Tags: Inter-molecular force, Surface tension, Angle of contact, Capillarity, Viscosity, Euler's equation, Poiseuille's formula</p>	<p>12</p>
<p>IV</p>	<p>Gravitational potential and central forces</p> <p>1. Gravitational potential: 1.1. Conservative and non-conservative force field, Conservation of energy in motion under the conservative and non-conservative forces, Potential energy. 1.2. Conservative force, Conservation of energy, Gravitational potential and gravitational potential energy, Gravitational potential and intensity of gravitational field due to uniform spherical shell and a uniform solid sphere. 1.3. Gravitational self-energy, Gravitational self-energy of a uniform spherical shell and a uniform solid sphere.</p> <p>2 Central forces: 2.1. Motion under Central forces, Conservative ve characteristics of central forces. 2.2. The motion of a two particles system in Central force, Concept of reduced mass, Reduced mass of positronium and hydrogen. 2.3. Motion of particles in an inverse-square central force, Motion of celestial bodies and derivation of Kepler's laws, Elastic and inelastic scattering (elementary idea).</p> <p>Keywords/Tags: Conservative force field, Gravitational potential, Gravitational self-energy, Central force, reduced mass, Scattering.</p>	<p>12</p>

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v	<p>Relativistic Mechanics and Astrophysics</p> <p>1. Relativistic Mechanics: 1.1. Frame of references, Galilean transformation, and Michelson Morley experiment. 1.2. Postulates of special theory of relativity, Lorentz Transformation, Simultaneity and order of events, Length contraction, Time dilation, Relativistic transformation of velocities, Variation of mass with velocity. 1.3. Mass-energy. Equivalence and its experimental verification.</p> <p>2. Astrophysics: 2.1. Introduction to the Universe, Properties of the Sun, Concept of Astronomical Distance. 2.2. Life cycle of stars, Chandrasekhar Limit, H-R diagram, Red giant star, White dwarf star, Neutron star, Black hole, 2.3. Big Bang Theory (elementary idea).</p> <p>Keywords/Tags: Transformation, Mass-energy equivalence, Astronomical distance, Chandrasekhar limit, Black hole.</p>	12

Part C-Learning Resources	
Text Books, Reference Books, Other resources	
Suggested Readings:	<ol style="list-style-type: none"> 1. Spiegel M. R., "Vector Analysis: Schaum Outline Series", McGraw Hill Education, 2017. 2. Mathur D. S., "Mechanics", S. Chand, 2012. 3. Ghatak A. K., Goyni I.C. and Chua S.J., "Mathematical Physics", Laxmi Publications Private Limited, 2017 4. Mathur D. S., "Properties of Matter", Shyam Lal Charitable Trust, New Delhi 5. Sears and Zeemansky, "University Physics", Pearson Education.

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Suggested equivalent online courses:

1. <https://nptel.ac.in/courses/115/103/115103036/> Mathematical Physics by Dr. Saurabh Basu, Department of Physics, Indian Institute of Technology Guwahati
2. <https://nptel.ac.in/courses/115/106/115106090/> Mechanics, Heat, Oscillations and Waves by Prof. V. Balakrishnan, Department of Physics, Indian Institute of Technology, Madras

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 10
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section (A) : Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09 = 36 02 x 15 = 30 Total 75

Any remarks/ suggestions:

Part A- Introduction

Program: Certificate	Class: B.Sc. I Year	Year: 2021	Session: 2021
Subject: Physics			
Course Code	SI-PHYS2P		
Course Title	Mechanics and General Properties of Matter Lab		
Course Type Core/Elective/ Generic Elective/Vocational/...	Minor		
Prerequisite (if any)	To study this course, a student must have passed the subject Physics in 12 th class.		
Course Learning	1. The students would acquire basic		

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Outcomes (CLO)	practical knowledge related to mechanics through the experiments. 2. Students will be familiar with various measurement devices by which they can measure various physical quantities with accuracy. 3. The students will develop the concept related to the mechanics and properties of matter.	
Credit Value	2	
Total Marks	Max. Marks: 25+75	Min passing Marks :33

Part B- Content of the Course

Total numbers of Lectures(in hours):60

Sr.No	List of experiments	Number of Practical (in hours)
1	Determination of Young's modulus, modulus of rigidity and Poisson's ratio of material of a wire using Searle's method.	30
2	Determination of Young's modulus of material of a metallic bar by bending of beam method.	
3	Determination of acceleration due to gravity (g) using Bar pendulum.	
4	Determination of acceleration due to gravity (g) using Kater's reversible pendulum.	
5	Determination of modulus of rigidity of a rod with the help of Barton's apparatus.	
6	Determination of coefficient of viscosity of liquid using Poiseuille's method.	
7	Determination of the moment of inertia of a flywheel about its axis of rotation	
8	Determination of the moment of inertia of a given body (irregular body) with the help of inertia table.	
9	Verification of laws of the parallel/perpendicular axes of moment of inertia.	
10	Determination of modulus of rigidity of material of a wire with the help of Maxwell's needle.	
11	Determination of Young's Modulus of a material of a rod using cantilever method.	



12	Determination of modulus of rigidity of material of a wire with the help of torsional pendulum.	
13	Determination of force constant of a spring.	
14	Determination of Poisson's ratio of rubber.	
15	Determination of surface tension of a liquid by Jaeger's method.	

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Prakash I. & Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 2011, 11/e.
2. Squires G. L. "Practical Physics", Cambridge University Press, 2015, 4/e.
3. Flint B. L. and Workshop H. T., "Advanced Practical Physics for 2015, students", 4/e Asia Publishing House, 197.
4. Chattopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics", New Central Book Agency.

Suggestive digital platforms web links

1. <https://www.vlab.co.in/broad-area-physical-sciences>
2. https://storage.googleapis.com/unique_courses/online.html

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:


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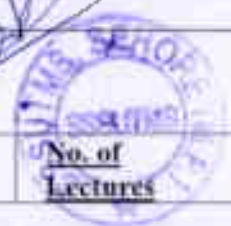
Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar/ Rural Service Technology Dissemination/ Report of Excursion/ Lab Visits/Survey / Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75
Any remarks/ suggestions:			



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<u>Part A Introduction</u>			
<u>Program Certificate Course</u>	<u>Class:</u> <u>B.SC.</u>	<u>Year : FIRST Year</u>	<u>Session :2021-2022 onwards</u>
<u>Subject : ZOOLOGY</u>			
<u>1</u>	<u>Course Code</u>	SI-ZOO1.2T	
<u>2</u>	<u>Course Title</u>	<u>Cell biology, reproductive biology and developmental biology</u>	
<u>3</u>	<u>Course Type</u>	Minor	
<u>4</u>	<u>Pre- requisite (if any)</u>	To study this course a student must have had the subject Biology in class 12 th .	
<u>5</u>	<u>Course Learning outcomes (CLO)</u>	<p>After completing this course in ZOOLOGY, a student shall have understanding of,</p> <ul style="list-style-type: none"> • Develop deeper understanding of what life is and how it functions at cellular level. • Understand the nature and basic concepts of cell biology, Reproductive and Developmental biology. • Understand structure and functions of cell membrane, and cellular organelles. • Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare. • Understand the general patterns and sequential developmental stages during embryogenesis.& understand how the developmental processes lead to establishment of body plan of multicellular organisms. • Understand the the evolutionary development of various animals. 	
<u>6</u>	<u>Credit Value</u>	4	
<u>7</u>	<u>Total Marks</u>	<u>Maximum Marks:25+75</u>	<u>Minimum Passing Marks: 33</u>
<u>Part B- Content of the Course</u>			
<u>Total no of Lectures –60 organisms</u>			
<u>Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0</u>			
<u>Unit</u>	<u>Topics</u>	<u>No. of Lectures</u>	

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I	<p><u>Cell biology:</u> 1.1 <u>Concept of prokaryotic and eukaryotic cell, difference between prokaryotic and eukaryotic cells.</u> 1.2 <u>Structure and functions of plasma membrane</u> 1.3 <u>Structure and functions of Golgi body, Mitochondria, Endoplasmic reticulum, ribosomes and lysosomes.</u> 1.4 <u>Structure and functions of Nucleus.</u> 1.5 <u>Structure and functions of Chromosomes and special types of chromosomes- Lamp brush and Polygenes chromosomes.</u> 1.6 <u>Cell cycle, Mitotic & Meiotic cell division and their significance.</u></p> <p>Keywords: <u>Prokaryote, Eukaryote, cell organelles, chromosomes, cell cycle.</u></p>	13
II	<p><u>2. Reproductive Biology:</u> 1.1 <u>Structure of Male reproductive system of Lupus.</u> 1.2 <u>Structure of Female reproductive system of Lupus.</u> 1.3 <u>Histology of testis, and Ovary of Lupus.</u> 1.4 <u>Gametogenesis- Spermatogenesis and oogenesis, difference between spermatogenesis and oogenesis.</u> 1.5 <u>Types of Eggs- based on amount and distribution of yolk with examples.</u></p> <p>Keywords: <u>Reproductive system, Gametogenesis, sperms, eggs.</u></p>	13
III	<p><u>Recent assisted Reproductive Techniques (ART):</u> 3.1 <u>Stem cell- Types and their uses.</u> 3.2 <u>Gene bank, sperm bank, superovulation, cryopreservation.</u> 3.3 <u>In Vitro Fertilization (IVF) and Embryo Transfer (ET), Zygote.</u> 3.4 <u>Placentation- Types, examples and functions.</u> 3.5 <u>Placenta Banking- placenta preservation benefits.</u> Key words: <u>Gene bank, sperm bank, superovulation, IVF, ET.</u></p>	15
IV	<p><u>4. Developmental Biology:</u> 4.1 <u>Fertilization</u> 4.2 <u>Embryonic development of frog up to the formation of three layers</u> 4.3 <u>Fate map construction in frog.</u> 4.4 <u>Metamorphosis of Tale pole Larva.</u> 4.5 <u>Partheno genesis.</u></p> <p>Keywords: <u>Fertilization, frog embryology, tadpole, metamorphosis, parthenogenesis.</u></p>	11
V	<p><u>Embryonic Development of Chick:</u> 5.1 <u>Structure of hen's egg.</u> 5.2 <u>Embryonic development of chick embryo upto the formation primitive streak.</u> 5.3 <u>Fate map construction in chick.</u> 5.4 <u>Extra Embryonic membranes of chick, formation and functions.</u> Keywords/tags: <u>Hens egg, chick embryology, fate map, chick embryo membranes.</u></p>	<p><i>Rad</i></p> 

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Part C-Learning Resources

Text books, Reference Books, Other resources

Suggested Reading:

1. Arm gam, "A TEXT BOOK OF EMBRYOLOGY", Sara's publications 2005.
2. Babinski, BI, "an Introduction to Embryology." CEng age learning 2012.
3. De Roberti's, EDP De Roberti's, EMF, "Cell and molecular biology," 8th edition, Williams & Wilkins, Philadelphia, 2006.
4. Gupta, PK, "CELL BIOLOGY, Genetics and evolution", Rastogi publications 2013
5. Heffner, L, "Human reproduction at a glance," BWL Publications, 2013.
6. Larsen, Human Embryology," Churchill livingstone, 2001.
7. Powar, CB, "CELL BIOLOGY" Himalya publishing House, 2010.
8. Rastogi, VB, "Animal Distribution and developmental biology ." KNRN Publication, 2020.
9. Rastogi, VB, " Introduction to Cytology," KNRN Publications, 1988.
10. Sastry, KV, "ENDOCRINOLOGY and Reproductive Biology", rastogi publication 2018
11. VERMA and AGRAWAL, " A text Book of cytology," S Chand & co. 1999
12. VERMA, PS, AGARWAL, VK "Chordate Embryology," S. Chand & co. 2000.
13. Pardesi, K and Dubey A, Cell & developmental Biology," Akhand publishing house, New Delhi,
14. <https://www.academic.oup.com>
15. <https://www.mediclineplus.gov>
16. <https://www.ncbi.nlm.nih.gov>
17. <https://www.zoologylearningpoint.wordpress.com>
18. <https://zoologyresources.com>

Suggested equivalent online courses:

8. Sway am online courses
<https://storage.googleapis.com/uniquecourses/online.html>
9. National Digital Library <https://ndl.iitkgp.ac.in>
10. E- PG Pataskala (MHRD) PORTAL, ([HTTPS://EPGP.INFLIBNET.AC.IN](https://EPGP.INFLIBNET.AC.IN))
11. Science Direct Open Access Content
(<https://www.sciencedirect.com/book/9781843342038/openaccess>)

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B

Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100
Continuous Comprehensive Evaluation (CCE):	25
University Exam (UE):	75

Internal Assessment
Continuous Comprehensive Evaluation (CCE): 25

Class Test	15
Assignment / Presentation	10
Total	25

External Assessment

Section (A): Three

3x3=30

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<u>University Exam</u> <u>Section: 25</u> <u>Time: 02.00 Hours</u>	<u>Very Short Questions (50 Words Each)</u>		
	<u>Section (B): Four Short Questions (200 Words Each)</u>		<u>4x9=36</u>
	<u>Section (C): Two Long Questions (500 Words Each)</u>		<u>2x15=30</u>
	<u>Total</u>		<u>75</u>

Part A Introduction
PRACTICAL SYLLABUS

<u>Program Certificate Course</u>	<u>Class: B.SC,</u>	<u>Year : FIRST Year</u>	<u>Session :2021-2022 onwards</u>
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Subject: ZOOLOGY

<u>1</u>	<u>Course Code</u>	SI-ZOO12P
<u>2</u>	<u>Course Title</u>	<u>CYTOLOGY, REPRODUCTIVE BIOLOGY & EMBRYOLOGY (Paper 2)</u>
<u>3</u>	<u>Course Type</u>	Minor
<u>4</u>	<u>Pre- requisite (if any)</u>	To Study this course a student must have had the subject
<u>5</u>	<u>Course Learning outcomes (CLO)</u>	<p><u>On completion of this course, learners will be able to understand:</u></p> <ul style="list-style-type: none"> The different stages of mitotic and meiotic cell division and special types of chromosomes. Different stages of embryology. Through squash preparations understand the stage of cell division and structure of polygene chromosomes. Enhance collaborative learning and communication skills through practical sessions, team work group discussion assignments & projects.
<u>6</u>	<u>Credit Value</u>	<u>2</u>
<u>7</u>	<u>Total Marks</u>	<u>Maximum Marks: 25+75</u> <u>Minimum Passing Marks:</u>

Part B – Content of the Course

Total No. of Lectures: 30

Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2

<u>Unit</u>	<u>TOPICS</u>	<u>No. of Lab Hours</u>
<u>1.</u>	<u>Spotting related to cytology</u> a. Prokaryotes and Eukaryotes cell b. Stages of mitotic cell division c. Stages of meiotic cell division d. Lamp brush chromosomes.	<u>13</u>



2.	Spotting related to Reproductive biology & Embryology a. T.S. Testis of Mammal b. T.S. Ovary of Mammal c. Development stages of frog Embryology d. Developmental stages of Chick embryology.	13
3.	Squash preparation of onion root tip to understand the stages of Mitosis	8
4.	Squash preparation of Grasshopper testis to understand the stage of Meiosis	9
5.	Try pan Blue exclusion test of cell viability	3
6.	Squash preparation of salivary gland chromosomes from Chironomus larva/Drosophila	9

KEYWORDS: stages of cell division, stages of embryonic development squash preparation.

Part-C Learning Resources

Text Books, References, and other Resources Books

Suggested reading:

1. Biffa, MM, Knight J. "Experiments in practical development biology", first edition Cambridge university press, 2011
2. Chai Tanya, KV "Cell & molecular biology: a lab manual", PHI, 2013.
3. KELLER, LR Evans, JH, KELLER TCS "experimental developmental biology", academic press, 1998
4. TIGUNAYAT, MM, "A manual of practical Zoology; biodiversity cell biology, Genetics & development biology", scientific publishers, 2019
5. Virtual Labs (<https://www.vlab.co.in>)

Part-D Assessment and evaluation

<u>Internal assessment</u>	<u>Marks</u>	<u>External assessment</u>	<u>Marks</u>
<u>Class interaction Quiz</u>	<u>10</u>	<u>Viva voce on practical</u>	<u>15</u>
<u>Attendance</u>	<u>05</u>	<u>Practical record file</u>	<u>10</u>
<u>Assignment(Charts /Model Seminar /Rural service technology(Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)</u>	<u>10</u>	<u>Table work/Experiments</u>	<u>50</u>
Total	25		75

Any remarks suggestions: Nil


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Part A Introduction			
Program: Certificate		Class: BSc-I	Year: 2021
		Session: 2021-22	
Subject: Botany			
1	Course Code	SI-001A21	
2	Course Title	Basic Botany	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Elective	
4	Pre-requisite (if any)	To study this course, a student must have had the subject botany in class/12th/ certificate/diploma.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms. It gives an accounts of plant adaptations from aquatic condition to colonize terrestrial habitat. The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated. The economic importance and significance of plants in nature will be understood. They will be acquainted with locally prevalent microbial diseases of plants and humans 	
6	Credit Value	4 Credits	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks: 33
Part B- Content of the Course			
Total No. of Lectures- 60 Tutorials- 0 Practical = 0 (theory 4 hours per week); L-T-P:			
Unit	Topics	No. of Lectures	
I	1.1 History of Botany and Indian Contributions. 1.2 Morphological Characteristics of lower and higher plants (Angiosperms). 1.3 Types of leaves, Inflorescence, Flowers and Fruits. 1.4 Structure of Plant cell and cell organelles, Prokaryotic and Eukaryotic Cells, types of Cell division. 1.5 Microscope structure and function of light microscope (magnification and resolving power). 1.6 Various types of Microscopes: Bright field, Phase Contrast, SEM and TEM.	12	
II	1. Algae 1.1 General characteristics 1.2 Range of thallus organization, reproduction. 1.3 Types of life-cycles in algae 1.4 Role of algae in nature and its economic importance.	12	

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	<p>2Bryophytes :</p> <p>2.1General characteristics, Ecology.</p> <p>2.2Range of thallus organization, morphology, anatomy(internal and external features) and reproduction of any one Bryophyte.</p> <p>2.3Economic importance of Bryophytes</p>	
III	<p>1Pteridophytes</p> <p>1.1General characteristics and morphology.</p> <p>1.2Stelar organization and reproduction.</p> <p>1.3Heterospory and seed habit.</p> <p>1.4Economic importance</p> <p>2.Gymnosperms</p> <p>2.1General description and their distribution.</p> <p>2.2Economic importance of Gymnosperms.</p> <p>3.Paleobotany</p> <p>3.1Indian contribution in Paleobotany.</p> <p>3.2Brief knowledge of Fossils and Geological time scale.</p>	12
IV	<p>1Fungi</p> <p>1.1 General characteristics and cell wall composition.</p> <p>1.2 Mode of nutrition</p> <p>1.3 Types of reproduction</p> <p>1.4 Economic importance</p> <p>1.5Parasexuality and Mycorrhiza</p> <p>2.Lichens: Brief knowledge and their significance.</p>	12
V	<p>1Microbes</p> <p>1.1Brief outline of various types of Microbes</p> <p>1.2Archaeobacteria, Eubacteria, Cyanobacteria, Mycoplasma, Actinomycetes and Virus.</p> <p>1.3 Beneficial and harmful roles.</p>	12

Keywords/Tags: History of Botany, Paleobotany, Prokaryotes, Eukaryotes, Algae, Bryophyta, Pteridophyta, Gymnosperms, Fungi, Mycorrhiza, Lichens, Bacteria, Virus

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Oladele Ogunseitan, Microbial Diversity: Form and Function in Prokaryotes, Wiley Blackwell, 2008.
2. Pelczar, M.J et al., Microbiology, Tata McGraw-Hill Co, New Delhi, 5th edition, 2001.
3. Prescott, L., Harley, J. and Klein, D., Microbiology, Tata McGraw- Hill Co. New Delhi, 6th edn., 2005.
4. Fritsch F.E., The Structure & Reproduction of Algae, Vol. I & Vol. II, Cambridge University Press, Cambridge, U.K. 1945.
5. Smith, G.M., Cryptogamic Botany, Vol. I: Algae, Fungi, & Lichens, McGraw-Hill Book Co., New York, 1955.
6. Ian Morris, An Introduction to the Algae, Hutchinson, London, 1967.

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Suggested equivalent online courses:

Part D Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 25marks University Exam (UE) 75 marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation Total	15 10 25
External Assessment : University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) Four Short Questions (200 Words Each) Section (C) Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09 = 36 02 x 15 = 30 Total 75


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Part A Introduction			
Program: Certificate	Class: 1st year	Year: 2021	Session: 2021-22
Subject : Botany Practical			
1	Course Code	SI-DOTA2P	
2	Course Title	Basic Botany Practical	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Elective	
4	Pre-requisite (if any)	To study this course, a student must have had the subject of Biology/ Life science/Agriculture in class 12th.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> • Students will learn to carry out practical work in the laboratory, • Interpreting plant morphology and anatomy of various groups of lower and higher plants. • Students will be able to identify the major groups of microorganisms. 	
6	Credit Value	2	Credits
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33
Part B- Content of the Course			
OTotal No. of Practical- 30 HoursTutorials- 00 -Practical (2 hours per week): L-T-P:			
Unit	Topics	No. of Practical	
I to V	<ol style="list-style-type: none"> 1. Study of various types of leaves , inflorescence, Flowers and fruits. 2. Understanding various parts of Microscope(simple and compound microscope) 3. Study of plant cells (e.g. Onion etc.) 4. Study of permanent slides of Mitosis and meiosis 5. Study of Electron Micrographs of Cell and organelles from Internet, You -Tube. 6. Identification of various algae from specimens, slides and temporary mounts of water from nearby areas like, <i>Nostoc</i>, <i>Oscillatoria</i>, <i>Volvox</i>, <i>Spirulina</i>, <i>Oedogonium</i>, <i>Chara</i> and specimens and pictographs of marine algae like <i>Ectococcus</i>, <i>Sargassum</i>, <i>Polysiphonia</i>. 7. Study and identification of some Bryophytes like <i>Riccia</i>, <i>Marchantia</i>, <i>Anthoceros</i>, <i>Fucus</i> and Field visit. 8. Study of some fossils (specimens and slides) 9. Study of some Pteridophytes like <i>Lyopodium</i>, <i>Sellaginella</i>, <i>Equisetum</i>, <i>Marselia</i> and study of any one fern 	30	


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10. Section cutting of Pteridophytes and Gymnosperms: Stem, root and leaves
11. Specimen study of Pteridophytes and Gymnosperms Cones
12. Study of fungal structures and preparation of temporary mounts of *Mucor*, *Rhizopus*, *Asperigillus*, *Yeast*, *Pencilium*, *Alternaria*, *Albugo*, *Helimentosporium*.
13. Permanent slides of Puccinia on host.
14. Study of various fungal plant diseases
15. Observation of symptoms of virus and bacteria on plants.
16. Gram staining techniques

Keywords/Tags: Microscope, Algae, Bryophyta, Pteridophyta, Gymnosperm Fungi

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Bendre Ashok and Ashok Kumer , A Textbook of Practical Botany, vol. 1, Rastogi Pub., Meerut, 1984.
2. Pandey B.P Modern Practical Botany,., vol. I, S. Chand and Co. Ltd., N. Delhi, 17th edn., 1999.
3. Singh M.P., Chaudhary S.B. and Sahu H, BA Textbook of Practical Botany, Days Pub. House, N. Delhi, 2005.
4. Shaheezad, Ak I Mohd., Practical Botany, Shanti Prakashan, Gwalior, 2016.
5. Elizabeth Margeret and Angela G Practical manual of Botany, vol.1, New Age (Pub.) Ltd., Delhi, 2007.

Suggestive digital platforms web links --

Suggested equivalent online courses: ---

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of / Lab Visits/ Survey / Industrial visit)	10	Table work / Experiments	50
TOTAL	25		75

Any remarks/ suggestions: Practical may be adjusted accordingly by the teachers.

Part A Introduction			
Program- CERTIFICATE	Class- II,Se.	Year- First	Session- 2021-2022
Subject – Chemistry			
	Course Code	SI-CHEM2T	
	Course Title	Analytical Chemistry	
	Course Type	Elective	
	Pre-requisite (if any)	To study this course students must have had the subject Chemistry in class +2 or equivalent.	
	Course Learning Outcomes (CLO)	By the this course students will learn the following aspects of Chemistry. <ol style="list-style-type: none"> 1. Basic concepts of Mathematics for Chemists. 2. Fundamentals of analytical chemistry and steps involved in analysis. 3. Basic Knowledge of Computer for chemists. 4. Basic Concepts of Chemical equilibrium. 5. Principles of Chromatography and chromatographic techniques. 6. Various techniques of Spectroscopic Analysis. 	
	Credit Value	4	
	Total marks	Maximum Marks: CCE-25, University Exam (UE)-75	Minimum Passing Marks:33


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Part B – Content of the course

Total No. of Lectures-Tutorials-Practical (In hours per week): L-T-P: 90-4-30

Unit	Topic	No. of Lectures
1	<p>Mathematics for Chemists Straight line equation, Logarithmic relation, curve sketching, linear graphs & calculation of slopes. Differentiation, differentiation of functions like k_1, e^x, x^n, $\sin x$, $\log x$, maxima & minima, partial differentiation. Integration of some useful relevant functions. <i>Keywords/Tags: Linear graphs, Logarithmic Relation, Differentiation, Integration.</i></p>	10
2	<p>Basic Analytical Chemistry: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurement. Presentation of experimental data and results, from the point of view of significant figures, statistical terms: mean, mean deviation, median standard deviation, Numerical Problems.</p> <p>Calculations used in Analytical Chemistry Some Important units of measurements- SI Units, distinction between mass and weight, mole, milli mole and Numerical Problems. Solution and their concentrations- Concept of Molarity, molality and normality, Expressing the concentration in parts per million (ppm), parts per billion (ppb), Numerical Problems. Chemical Stoichiometry- Empirical and Molecular Formulas, Stoichiometric Calculations, Numerical Problems. <i>Keywords/Tags: Accuracy, Precision, SI units, Units of Concentration, Chemical stoichiometry.</i></p>	10


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3	Computer for chemists Introduction to computer, Introduction to operating systems like- DOS, Windows, Linux and Ubuntu, Use of computer programs	10
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	<p>Running of standard programs & packages such as MS-word, MS-excel, PowerPoint, Execution of linear regression x-y Plot, Use of software's for drawing structures and molecular formulae.</p> <p><i>Keywords/Tags: Operating systems, MS-word, MS-excel, PowerPoint.</i></p>	
4	<p>Chemical Equilibrium: Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium, Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van's Hoff reaction isotherm. Le-Chatelier's principle and its applications.</p> <p><i>Keywords/Tags: Chemical Equilibrium, Equilibrium constants, Free Energy, Chemical Potential.</i></p>	10
5	<p>Chromatography: Introduction, Principle and Classification, Mechanism of separation: adsorption, partition & ion-exchange. Development of chromatograms: frontal, elution and displacement methods. Paper Chromatography (ascending, descending and circular), Thin layer Chromatography (TLC) and Column Chromatography (CC), Gas Chromatography (GC) and High Pressure Liquid Chromatography (HPLC), types of column and column selection, applications, limitations.</p> <p>Principle and Application of:</p> <ul style="list-style-type: none"> • Flash chromatography, • Ion-exchange chromatography and • Chiral chromatography. <p><i>Keywords/Tags: Chromatography, Ion Exchange, Column Selection, Adsorption.</i></p>	10


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6	<p>Spectrum techniques of analysis Basic of absorption spectroscopy: Electromagnetic radiation, Spectral range, Absorption, Absorptivity, Molar Absorptivity, Fundamental Laws of Absorption, Lambert-Beer Law and its limitations.</p> <p>Constitution & working of photometer, spectrometer, colorimeter.</p> <p>Ultraviolet (UV) absorption spectroscopy-</p>	10
	<p>Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, Hyperchromic and hypochromic shifts. UV spectra of conjugated polyenes and mones.</p> <p>Infra-red (IR) absorption spectroscopy- Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, Measurement of IR spectrum, finger print region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.</p> <p>Keywords/Tags: Hypsochromic, Hypochromic, Absorption, Spectrum</p>	

Part C - Learning resources

Text Books, Reference Books, Other Resources

Text Books

1. Gaur, S., Computer for Chemists, Neel Kamal Prakashan, 2017.
2. Khopkar, S.M, Basic Concept of Analytical Chemistry, New Age, Internations Publisher, 2009.
3. Kaur H, Analytical Chemistry, Pragati Prakashan (2008).
4. Gupta, Alka L., Analytical Chemistry, Pragati Prakashan (2020).
5. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.
6. Kaur H, Instrumental Methods of Chemical Analysis, Pragati Prakashan, 2018.
7. Sharma B.K., Chromatography, Krishna Prakashan, 2019.
8. Sharma Y.R., Elementary Organic Spectroscopy, S Chand, 2013.
9. Singh, DR Saxena, G., Singh, B., Inorganic Chemicals, Shivlal Aggarwal & Company, Agra.
10. Srivastava, S.S., Gehlot, A.S., Chemistry, Ratan Prakashan Temple, Indore.

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11. Soni, P.L, Organic Chemistry, Sultan Chand and Sons, Delhi.
12. Singh, R.K.P., Modern Chemistry, Sahitya Bhavan, Agra.
13. Agnihotri, P.K, Sahu, D
14. P., Pillai, A., Sahu, M., Yugbodh Chemistry, Yugbodh Publications, Raipur.

Reference Books:

1. Mitra Surbhi, Handbook of Computer Science & IT, Arihant, 2018.
2. Harris, D.C. Quantitative Chemical Analysis, 6th Ed., Freeman (2007).
3. Christian, Gary D: Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
4. Barrow, G.M. Physical Chemistry, Tata McGraw-Hill (2007)
5. Atkins' Physical Chemistry, 10th Edition, Oxford University Press 2014.
6. Gurtu J.N, Gurtu A, Advanced Physical Chemistry, Pragati Prakashan, Meerut, ISBN:9789386633347, 9386633345: Edition: IV, 2017.
7. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2016.
8. Finar, I.L. Organic Chemistry (Vol. I & II), E.L.B.S.
9. Morrison, R.T. & Boyd, R.N. Organic Chemistry, Pearson, 2010.
10. Banwell, Molecular Spectroscopy, 2017.
11. Silverstein Robert. Spectrometric Identification of Organic Compounds, Wiley, 2014.
12. Dyer J.R., Applications of Absorption Spectroscopy of Organic Compounds, 2009.

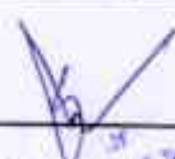
Suggested equivalent online courses:

MOOC: <https://www.edx.org/course/basic-analytical-chemistry>

NPTEL: <https://nptel.as.in/courses/104/105/104105084/>

Web sources

1. <https://www.freebookcentre.net/Chemistry/Analytical-Chemistry-Books.html>
2. <https://nptel.springer.com/journal/216>


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Part D- Assessment and Evaluation		Marks
Suggested Continuous Evaluation Methods: Continuous Internal Evaluation Shall be Based on Allotted Assignment and class Tests. The marks shall be as follows:		
Assessment and presentation of assignment		04
Class Test-I (Objective Questions)		04
Class Test-II (Descriptive Questions)		04
Class Test-I (Objective Questions)		04
Class Test-II (Descriptive Questions)		04
Overall performance throughout the year (includes Attendance Behavior Discipline Participation in Different Activities)		05
Total		25
Elaboration: Assessment Theory		
External Assessment		
Theory Paper		75
Grand Total		100


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PRACTICAL

Program- CERTIFICATE	Class- B.Sc.	Year- First	Session: 2021-2022
Subject – Chemistry			
1	Course Code	SI-CHEM2P	
	Course Title	Analytical Processes and Techniques	
2	Course Type	Elective	
3	Course Learning Outcomes (CLO)	<p>By the end of this course students will learn the following aspects of Laboratory exercises in Chemistry:</p> <ol style="list-style-type: none"> 1. Concepts and analytical methods in Chemistry. 2. Preparation of solutions of different concentrations. 3. Standardization of the solution. 4. Identification of Organic compounds by chromatographic techniques. 5. Analysis by Spectral Techniques. 	
4	Credit Value	2	
	Total Marks	Maximum Marks: University Exam (UE)-75, CCE-25	Minimum Passing Marks: 33


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External Assessment		Marks
Experiments to be performed in laboratory		50
1	<p>Basic analytical exercises</p> <ul style="list-style-type: none"> • Calibration of different weights and glass apparatus (measuring cylinder, burette, pipette, volumetric flasks). • Preparation of solutions of different molarity/normality by weighing and dilution. 	10
2	<p>Quantitative Analysis</p> <ul style="list-style-type: none"> • Titrimetric Analysis <ul style="list-style-type: none"> • Standardization of NaOH with Oxalic acid. • Determination of carbonate and hydroxide present in mixture. • Determination of carbonate and bicarbonate present in a mixture. • Determination of free alkali present in different soaps/detergents. 	20
3	<p>Quantitative Analysis by Colorimetry</p> <ul style="list-style-type: none"> • Verification of Lambert-Beer Law • Determination of concentration of coloured compounds (e.g., CuSO_4, KMnO_4) 	10
4	<p>Qualitative Analysis</p> <ul style="list-style-type: none"> • Systematic identification of organic compound by qualitative analysis. • Chromatography: Identification by determination of the R_f values of the given organic/ inorganic compounds by paper/ thin layer chromatography. <p><i>Keywords/Tags: Analytical, Authentication, Molarity/Normality, Standardization, Colorimetry, Qualitative Analysis</i></p>	10



Part C- Learning resources

Text Books, References Books, Other Resources

References:

1. Skoog, D.A. and Leary, J.J.: Instrumental Methods of Analysis, Saunders College Publications, New York, 1992.
2. Vogel's textbook of quantitative chemical analysis, 7th edition.
3. Goswami A.K., Mehta Anita, Khanam Rehmaa, ORS., UGC Practical Chemistry VOL. I, Pragati Prakashan, 2015.
4. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
5. Tandon, M.N., unified Rasayan Vigyan, Shivalal Agarwal & Company, 2018.

Suggestive digital platforms web links:

1. <https://www.youtube.com/watch?v=OAlmRDzuTh8>
2. <http://amrita.olabs.edu.in/?sub=73&brch=8&sim=133&cnt=1>
3. <http://chemcollective.org/vlabs>
4. <http://mas-iiith.vlabs.ac.in/exp6/Quiz.html>
5. [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_9_Experiments/02%3A_Paper_Chromatography_of_Gel_Ink_Pens-\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_9_Experiments/02%3A_Paper_Chromatography_of_Gel_Ink_Pens-(Experiment))
6. <https://edu.rsc.org/experiment/leaf-chromatography/389/article>
7. <https://edu.rsc.org/experiments/chromatography-of-sweets/455.article>
8. http://swe.mit.edu/outreach/virtual_resources/paper_chromatography.pdf
9. <http://www.chem.latech.edu/~deddy/chem104/104Standard.htm>
10. https://www.chem.purdue.edu/course/chem224/Miscellaneous/Model_report_Expt2-revised_2009.pdf


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<p>11. https://www.webpages.uidaho.edu/ifcheng/Chem%20253/labsExperiments%20J.pdf</p> <p>12. http://faculty.ccbcmd.edu/c-cvau/122%2007%20Acid-base%20titration%20AUG%2013.pdf</p> <p>13. https://labbalances.net/blog/guide-to-calibration-weights</p> <p>14. https://cdn2.hubspot.net/hubfs/2203666/Beames_White_Papers/Beames%20White%20Paper%20-%20Weighing%20scale%20calibration%20ENG.pdf?_hssc=107807261.6.1518193235316&_hsfp=2102249448&hsCtaTracking=8918cffa-b755-4f72-b4b1-24c1fa8d_1a6d%7C12eb2e3f-4b62-43eb-bafd-2da2a5d102b6</p>	
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Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
<p>Class Interaction on-</p> <ul style="list-style-type: none"> • Common glassware and lab wares for solution preparation and analysis. • Numerical problems related to solution preparation. • Any other discussion. <p><i>Note: description to be written in practical record.</i></p>	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignment (Charts/Model Seminar/Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Survey/Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75

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PART A : Introduction

Program : Certificate	Class: B.Sc.	Year : I Year	Session: 2021-2022
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Subject : **Computer Science**

1.	Course Code	SI-COSC21
2.	Course Title	Programming Methodology & Data Structure
3.	Course Type (Core Course/Elective- Generic Elective/Vocational)	Elective
4.	Pre-Requisite (if any)	To study this course ,a students must have had the subject Physics/Maths in 12 th class .
5.	Course Learning Outcomes(CLO)	<p>On the Completion of this course ,learners will be able to:</p> <ol style="list-style-type: none"> 1. Develop simple algorithm and flow chart to solve the problem with programming using top down design principles . 2. Writing efficient and well structured computer algorithms/programs . 3. Learn to formulate iterative solutions and array processing algorithms for problems . 4. Use the recursive technique ,pointers and searching methods in programming . 5. Will be familiar with fundamental data structure ,their implementation ; become accustomed to the description of algorithm in both functional and procedural styles . 6. Have knowledge of complexity of basic operations like insert ,delete ,search on these data structure . 7. Posses ability to choose a data structure to suitably model any data used in computer applications . 8. Design programs using various data structure including hash table ,Binary and general search Tree ,heaps ,Graphs etc. 9. Asses efficiency tradeoffs among different data structure implementations. 10. Implement and know the applications of algorithms for searching and sorting etc. 11. Know the contributions of Indian in the field of programming data structures.
6.	Credit value	Theory-4 Credits
7.	Total Marks	Max. Marks : 25+75 Min. Passing Marks : 33



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Part B: Content Of the Course


No. of Lectures (in hours per week): **2 Hours per week**

Total No. of Lectures: **60 HRS.**

Module

Topics

No. of Lectures


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I	<p>Introduction to Programming :Program concepts ,Characteristics of programming, Stages in program Development, Algorithms, Notations ,Design ,Flow chart, Types of programming Methodologies .</p> <p>Introduction to C++ Programming :Basic Program Structure in the C++,Data types,Variable,Constants ,Opearators and basic I/O .</p> <p>Variable:Declaring ,defining and initializing variables, scope of variables ,using named constants ,Keywords,Casting of data types ,Opearators(Arithmetic,Logical and Bitwise),Using comments in programs,Character I/O (getc,getchr,putc,putchr etc.),Formatted and console I/O(printf(),scanf(),cin,cout),using basic header files (stdio.h,iostream.h,conio.h etc.).</p> <p>Simple Expressions in C++ : (Including unary operator Epressions,Binary operator expressions), understanding operator precedence in expressions .</p>	8
II	<p>Iterative statements :while ,do-while and for loops,use break and continue loops,Using nested Statements (Conditional as well as Iterative).</p> <p>Functions:Top-Down design,Pre-defined functions, Programmer defined functions,local variable and global variables,Functions with default Arguments ,Call by Value and Call by References, Parameters, Recursions.</p> <p>Introduction to Arrays: Declaration and Referring Arrays,Arrays in Memory,Initializing Array, Arrays in Functions,Multi-Dimensional Arrays.</p>	10
III	<p>Structures :Member Accessing ,Pointers to Structure ,Structureand Functions ,Array of Structure .</p> <p>Unions :Declaration and Initialization.</p> <p>Strings:Reading and Writing Strings,Arrays of Strings,Strings and Structures, Standard String and Structure, Standard String library Functions.</p> <p>Searching Algorithms:LinearSearch,Binary Search .</p> <p>File Handling :Use of Files for data input and output ,merging and copying files .</p>	8
IV	<p>Data Structure :Basic Concepts, Linear and non linear data structure</p> <p>Algorithm Specification –Introduction,recursivealgorithms,Data Abstraction, Performance Analysis.</p> <p>Linked List: Singly Linked List, Operations, Concatenating,Circularly linked list ,Doubly linked list –Operations.</p> <p>Array: Representation of single,Two Dimensional arrays, sparse matrices-array and linked Representation.</p> <p>Stacks:Operations array and linked implementations,applications in fix to postfix conversion, postfix expression evaluation, Recursion Implementation.</p>	12
V	<p>Queue :Definition, operation,array and linked implementations .</p> <p>Circular Queue: insertion and deletion operations ,Dequeue (Double ended Queue) ,priority Queue-Implementation.</p>	10

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	<p>Trees : Binary Tree Representation –Properties of Binary Tree ,Binary Tree Representation,-Array and Linked Representation, Binary Tree Traversal, Threaded Binary Tree.</p> <p>Heap: Definition, Insertion, Deletion.</p>	
VI	<p>Graphs – Graph ADT, Graph Representation Graph Traversals, searching.</p> <p>Hashing - Introduction, Hash tables, Hash functions, Overflow Handling</p> <p>Sorting Methods – Comparison Sorting Methods.</p> <p>Search Tree-Binary Search Tree, AVL Tree –definition and Examples.</p>	10
VII	<p>Indian contribution to the field – Innovation in India, Origin of Julia Programming Language, Indian Engineers who designed new programming Languages, open source languages ,Dr. Sanjay Sahni- Computer Scientist- pioneer of Data Structures, other relevant contributors and contributions.</p>	2

Keywords /Tags :Programming, C++, Data Structure, Expressions, Control, File Handling, Arrays, Stack, Queue, Linked List, Tree, Graphs, Structure, Union, Search, Algorithm.

PART C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- Lipschutz: Schaum's outline series Data Structure ,Tata Mcgraw Hill
- Problem Solving and Program Design in C J.R.Hanly and E.B.Koffman ,Pearson,2015
- E.Balaguruswamy,"C++TMH Publication ISBN 0-07-462038-X.
- HerbertzShield,"C++ the complete References" TMH Publication.
- R.Lafore, 'Object Oriented Programming C++.
- N. Dale and C .Weems ,Programming and Problem solving with C++ :brief edition ,Jones& Bartlen learnig.
- Adam Drozdek." Data structure and Algorithms in C++",Third edition Cengage Learning.
- SartajSahani, Data Structure ,Algorithms and Applications with C++ ,McGraw Hill.
- Robert L. Kruse," Data Structure and Program Design inC++',Pearson.
- D.S. Malik,Data Structure using C++,Second Edition ,Cengage Learning.
- M.A. Weiss ,Data structure and Algorithms Analysis in C,2nd edition ,Pearson.
- M.A. Weiss,Data structure and Algorithm Analysis in C,2nd edition,Pearson.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=8C1S40yzsA>
2. <https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en>
3. <https://www.youtube.com/watch?v=Umm1ZQ5lt2w>
4. <https://www.youtube.com/watch?v=AT141CXuMKI&list=PLdo5W4Nhw31bbk7zskTMpo-grxuL18LU>

Suggested equivalent online course

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<http://nptel.ac.in/courses/106/105/106105151/>

<http://nptel.ac.in/courses/106/106/106106133/>

Part D : Assessment and Evaluation

Internal Assessment: Continuous Comprehensive Evaluation (CCE): 25 Marks Shall be based on allotted assignment and Class Tests. The marks shall be as follows :	External Assessment: University Exam (UE) : 75 Marks Time : 02.00 Hours
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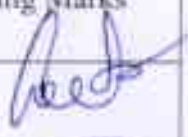

Assessments and presentation of assignment	10 Marks	Section (A) : Three Very Short Questions (50 Word) OR Nine MCQ Questions	03x03=9 Marks Or 09x01= 9 Marks
Class Test I (Objective Questions)	05 Marks		Section (B) : Four Short Questions (200 Word)
Class Test II (Descriptive Questions)	05 Marks	Section (C) : Two Long Questions (500 Word)	02x15=30 Marks
Class Test III (Based on solving circuit design problems)	05 Marks		
Total	25 Marks	Total	75 Marks

Any remarks /Suggestions : Focus of the course /teaching should be on developing ability of the student in analyzing a problem, building the logic and efficient code for the problem .



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PART A : Introduction			
Program : Certificate	Class: B.Sc.	Year : I Year	Session: 2021- 2022
Subject : Computer Science			
1.	Course Code	SI-COSC2P	
2.	Course Title	Office Tools & Programming Methodology Lab	
3.	Course Type (Core Course/Elective/Generic Elective/Vocational)	Elective	
4.	Pre-Requisite (if any)	To study a student must have had the subject Physics /Maths in 12th Class	
5.	Course Learning Outcomes(CLO)	<p>On the Completion of this course learners will be able-</p> <ol style="list-style-type: none"> 1. Develop simple algorithms and flow Chart to solve a problem with programming using top down design principles. 2. Writing efficient and well structured computer algorithms/programs. 3. Learn to Formulate iterative solutions and array processing algorithms for problems . 4. Use recursive techniques, pointers and searching methods in programming. 5. Possess ability to choose a data Structure to suitably model any data used in computer applications. 6. Implementation of algorithms for searching and sorting . 	
6.	Credit value	Practical -2 Credits	
7.	Total Marks	Max .Marks : 25+75	Min. Passing Marks : 33
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PART B:Content Of the Course

No. of Lab Practical's(in hours per week):2Hrs. Per week

Total No. of Labs =30 Hours

Suggested list of Practical's

List of Practical

1. Office Tools ,
Using a Text Editor Tool

30
Hours

1. Create a documents and apply different Editing options .
2. Create Banner for your college .
3. Design a Greeting card using word an for different festivals.
4. Design your Bio Data and use page borders and shading .
5. Create a documents and insert header and footer,page title,date,time ,apply various page formatting feature etc.
6. Implement Mail Merge.
7. Insert a table into a document and try different formatting options for the table .

Using a spreadsheet Tool

1. Design your class Time Table .
2. Prepare a Mark Sheet of your class result .
3. Prepare a salary slip of an employee of an organization.
4. Prepare a bar chart & pie chart for analysis of election result.
5. Prepare a generic Bill of a Super Market.
6. Work on the following exercise on answer book:
 - a. Copy an existing Sheet
 - b. Rename the old Sheet
 - c. Insert a new Sheet into an existing Workbook
 - d. Delete the renamed sheet.
7. Prepare an attendance sheet of 10 students for any 6 subjects of your syllabus.calculate their total attendance,total percentages of attendance of each students and average of attendance.
8. Create a worksheet of students list of any 4 facilities and perform following database function on it.
 - a. Sort data by Name



- b. Filter data by Class
- c. Subtotal of students by class

Using a Presentation Tool

1. Design a presentation of your institute using auto content wizard, design template and blank presentation.
2. Design a presentation illustrating insertion of pictures, Word Art and Clipart .
3. Design a presentation, learn how to save it in different formats, copying and opening an existing presentation.
4. Design a presentation illustrating insertion of movie, animation and sound.
5. Illustrate use of custom animation and slide transition (using different effects).
6. Design a presentation using charts and tables of the marks obtained in class.

II. Given a problem statements ,students are required to formulate problem,developflowchart/Algorlyhm,write code in C++,execute and test it. Students should be given assignments on following :

1. A. To learn elementary technique involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators)and control structures.
B.Learn how to use functions and parameter passing in functions ,writing recursive programs.
2. Write a program to swap the contents of two variables.
3. Write a program for finding the roots of a quadratic equation.
4. Write a program to find area of a circle,rectangle,square using switch case.
5. Write a program to check whether a given number is even or odd.
6. Write a program to print table of any number.
7. Write a program to print Fibonacci series.
8. Write a program to find factorial of given number.
9. Write a program to convert decimal (integer) number in to equivalent binary number.
10. Write a program to check given string is palindrome or not.
11. Write a program to perform multiplications of two matrices.
12. Write a program to print digits of entered number in reverse order .
13. Write a program to print sum of two matrices .
14. Write a program to print multiplication of two matrices.
15. Write a program to generate even/odd series from 1 to 100.
16. Write a program whether a given number is prime or not.
17. Write a program for call by value and call by reference.

REP



18. Write a program to generate a series
 $1+1/1!+2/2!+3/3!.....+n/n!$.
19. Write a program to create a pyramid structure
 *
 **

20. Write a program to create a pyramid structure
 1
 12
 123
 1234
21. Write a program to check entered number is Armstrong or not.
22. Write program for traversing an Array.
23. Write a program to input N numbers, add them and find average.
24. Write a program to find largest element from an array.
25. Write a program for linear search.
26. Write a program for binary search.
27. Write a program for bubble sort.
28. Write a program for selection sort.

Keyword /Tags: Digital Electronics ,Logic gates ,AND ,OR,NOT ,IC 7486,IC 7400,NAND ,NOR,IC 7483, Circuit , Flip Flop , Demorgan's Theorem

Part C: Learning Recourses

Textbooks, References Books, Other Recourses

Suggested Readings :

- M.Morris Mano, "Computer System Architecture " PHI
- Heuring Jordan , "Computer System Design & Architecture" (A.W.L.)
- William Stalling , " Computer Organization & Architecture " , Pearson Education Asia.
- V.CarlHamacher , " Computer Organization " TMH
- Tannenbaum , "Structured Computer Organization " PHI.

Suggested Digital Platforms ,Web links :

1. <https://www.youtube.com/watch?v=4TzMyXmzL8M>
2. <https://nptel.ac.in/course/106/106/106106166/>
3. <https://nptel.ac.in/course/106/106/106106134/>

Suggested Equivalent online course

<http://nptel.ac.in/course/106/105/106105163>



Part D : Assessment and Evaluation (theory)

Internal Assessments : Continuous Compressive Evaluation (CCE) :25 Marks		External Assessments : University Exam(UE):75 Marks Time :02.00 Hours	
Internal Assessment	Marks	External Assessment	Marks
Hands –on Lab Practice	5 Marks	Practical Record File	10 Marks
Lab Test Practical list & Internal Viva	12 Marks	Viva Voce on Practical	15 Marks
Assignments(Charts/Seminar/Rural Service/Technology Dissemination/Report of Excursion/ Lab Visits/Survey/Industrial Visit)	8 Marks	Table Work /Experiments	50 Marks
Total	25	Total	75


Any remarks /Suggestions :Focus of the course /Teaching should be on developing ability of the students in analyzing a problem, building the logic and efficient code for the problem.


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Part A- Introduction			
Program: Certificate	Class: B.Sc. I Year	Year: 2021	Session: 2021-2022
Subject: Mathematics			
Course Code	SI-MATH2T		
Course Title	Calculus and Differential Equations		
Course Type (Core/Elective/ Generic Elective/Vocational/...)	Elective		
Pre-requisite (if any)	To study this course, a student must have had the subject Mathematics in 12 class.		
Course Learning Outcomes (CLO)	The course will enable the students to: <ol style="list-style-type: none"> 1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference. 2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc. 3. Formulate the Differential equations for various Mathematical models. 4. Using techniques to solve and analyze various Mathematical models. 		
Credit Value	6		
Total Marks	Max. Marks: 25+75	Min. Marks: 33	

Part B- Content of the Course		
Total numbers of Lectures(in hours per week): 3 hours per week		
Total Lectures: 90 hours		
Unit	Topics	Numbers of Lectures
1	1.1 Historical background: <ul style="list-style-type: none"> 1.1.1 Development of Indian Mathematics ancient and early classical period (Till 500 Cen.) 1.1.2 A brief biography of Bhaskaracharya (with special reference to Lilavati and Madhava) 1.2 Successive Differentiation <ul style="list-style-type: none"> 1.2.1 Leibnitz Theorem 1.2.2 Maclaurin's series Expansion 1.2.3 Taylor's series Expansion 	18

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	<p>1.4 Asymptotes 1.4.1 Asymptotes of algebraic curves 1.4.2 Condition for Existence of Asymptotes 1.4.3 Parallel Asymptotes 1.4.4 Asymptotes of polar curves</p>	
2	<p>2.1 Curvature 2.1.1 Formula for radius of Curvature 2.1.2 Curvature at origin 2.1.3 Centre of Curvature 2.2 Concavity and Convexity 2.2.1 Concavity and Convexity of curves 2.2.2 Point of inflexion 2.2.3 Singular point 2.2.4 Multiple points 2.3 Tracing of curves 2.3.1 Curves represented by Cartesian equation 2.3.2 Curves represented by Polar equation</p>	18
3	<p>3.1 Integration of Transcendental Functions 3.2 Introduction to Double and Triple Integral 3.3 Reduction formulae 3.4 Quadrature 3.4.1 For Cartesian coordinates 3.4.2 For Polar coordinates 3.5 Rectification 3.5.1 For Cartesian coordinates 3.5.2 For Polar coordinates</p>	18
4	<p>4.1 Linear Differential Equations 4.1.1 Linear equation 4.1.2 Equations reducible to the linear form 4.1.3 Change of variables 4.2 Exact Differential equations 4.3 First order and higher degree Differential equations 4.3.1 Equations solvable for x, y and p 4.3.2 Equations homogenous in x and y 4.3.3 Clairaut's equation 4.3.4 Singular solutions 4.3.5 Geometrical meaning of Differential equations 4.3.6 Orthogonal trajectories</p>	18

SI-MATH2T

5	<p>5.1 Linear Differential equation with constant coefficients 5.2 Homogeneous linear ordinary Differential equations 5.3 Linear Differential equations of second order 5.4 Transformation of equations by changing the Dependent/Independent variables 5.5 Method of Variation of parameters</p>	18
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Keywords/Tags:

Indian Mathematics, Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Differentiation, Partial Differentiation, Asymptotes, Curvature,



Tracing of Curves, Quadrature, Rectification, Linear Differential Equations, Method of Variation of Parameters.

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Text Books:

1. Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd. Allahabad, 2016.
2. Gorakh Prasad: Integral Calculus, Pothishala Private Ltd., Allahabad, 2015.
3. M. D. Raisinghania: Ordinary and Partial Differential equations. S Chand & Co Ltd., 2017.
4. Gerard G. Emch, R.Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, vol. 3, 2005.
5. Madhya Pradesh hindi granth academy books.

Reference Books:

1. N. Piskunov: Differential and Integral Calculus, CBS Publishers, 1996.
2. G. F. Simmons: Differential Equations, Tata McGraw Hill, 1972.
3. E. A. Coddington: An introduction to ordinary differential Equation, Prentice Hall of India, 1961.
4. D. A. Murray: Introductory Course in Differential Equations, Orient Longman (India), 1967.
5. H. T. H Piaggio: Elementary Treatise on Differential Equations and their Application, C. B.S. Publisher & Distributors Delhi, 1985.
6. Bibhutibhusan Dutta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House, 1962.

Suggested Digital Platforms Web links:

<https://epgp.inflibnet.ac.in>

<https://freevideolectures.com/university/iit-roorkee>

<https://www.highereducation.mp.gov.in/?page=shzIQmpZwkyIQo2b%2Fy5G7w%3D%3D>

<https://www.bhojvirtualuniversity.com>

Suggested Equivalent online courses:

<https://nptel.ac.in/courses/111105122/>

<https://nptel.ac.in/courses/111107112/>

<https://nptel.ac.in/courses/111/101/111101080/>

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SI-MATH2T

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 marks

Continuous Comprehensive Evaluation (CCE): 25 marks

University Exam (UE): 75 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	15 10 Total: 25 marks
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	$03 \times 03 = 09$ $04 \times 09 = 36$ $02 \times 15 = 30$ Total = 75

Part A Introduction			
Program Certificate Course		Class: B.SC.	Year : FIRST Year
		Session :2021-2022 onwards	
Subject : Microbiology			
1	Course Code	SI-MBIO2Y	
2	Course Title	Microbial Techniques	
3	Course Type	Elective	
4	Pre- requisite (if any)	To Study this course a student must have had the subject	
5	Course Learning outcomes (CLO)	After completing this course in Microbiology a student shall have understanding of- <ul style="list-style-type: none"> Recall the basic lab glassware to be used in the laboratory. Summarize different methods of sterilization and isolation of pure cultures. Understand the working of different kinds of instruments and microscopes. Apply serial dilution technique to isolate the bacteria. Practice different methods to culture bacteria in the laboratory Illustrate a method to differentiate between gram positive and gram negative bacteria. 	
6	Credit Value	4	
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33
Part B- Content of the Course			
Total no of Lectures -60			
Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0			
Total No. of Lectures: 15			
Unit	Topics	No. of Lectures	
1	MICROSCOPY AND STAINING 1.1 MICROSCOPY- PRINCIPLES AND APPLICATION OF SIMPLE AND COMPOUND Bright- field microscopy, phase- contrast microscopy, transmission electron microscopy and scanning electron microscopy. 1.2 Preparation for light microscope Examination- wet mount and hanging - drop techniques preparation for simmer and fixation Staining- principles of staining, negative staining, simple staining, differential staining (Gram and acid fast staining), flagella staining capsule and endospore staining.	.	15

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	<p>Key word:microscopy, light microscope, wet mount,Hnging drop method, Bacterial staining.</p>		
II	<p>Instruments Electronic Balance, autoclave, centrifuge ,colony counter, deep freezer, homogenizer, hot air oven,incubator,laminar air flow, magnetic stirrer, P h meter, spectrophotometer, vortex mixture, water bath, water distiller chromatography chamber anaerobic chamber and electrophoresis apparatus.</p>		15
III	<p>Sterilization and culture medium</p> <p>3.1 Physical methods of sterilization: Dry heat, moist heat, radiation, filtration, and incineration. 3.2 Chemical methods of sterilization- Phenol and phenolic compounds, Alcohol, Halogens, and detergents. 3.3 Types of culture media- Natural, synthetic, complex, enriched, and selective. Anaerobic (Trio glycol ate broth, Robertson's media,) broth culture of aerobic bacteria.</p> <p>Keywords: Physical sterilization, Chemical sterilization, microbial culture media.</p>		
IV	<p>Isolation, Cultivation and preservation</p> <p>4.1 Natural microbial population- Pure culture 4.2 Isolation of microbial population- From air, water, and soil. 4.3 Methods for isolation: Streak plate, pour plate and spread plate. Serial dilution and micromanipulator methods. Cultivation on liquid and solid media, Isolation of micro organisms on potato slice and bread. 4.4 Maintenance and preservation for short term and long term. 4.5 Cultivation OF Anaerobic bacteria, and accessing non-cultivable microorganisms.</p> <p>Key words: Pure culture, isolation of microbes, preservation of culture.</p>		
Part C-Learning Resources			
Text books, Reference Books, Other resources			
<p>Suggested Reading I. Prescott, M.J., E.C.S and Krieg, N.R. "Microbiology" Tata McGraw- Hill, New</p>			

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- DELHI,(2001)
2. Tortuga G.J, Funke Br. Case "Microbiology". An Introduction, 9th edition Pearson Education (2008)
 3. Willey J.M., Sherwood L.M., Wool verton C.J., "PRESCOTT'S Microbiology", 9th edition (2013)
 4. Madigan, M.T., Marino, J.M., Dunlap, P.V. AND Clark D.P., "Brock Biology of Microorganisms, 12th edition, Pearson Benjamin Cummings, San Francisco (2009).
 5. Sum Bali, Gaeta and Mathura, R.S., "Principles of Microbiology" M.C. Grew Hill edition,(2017)
 6. Agatha Narayan, R. and Picnicker, C.K.S., "Text book of microbiology", 6th edition Oriental Longman Publication, U.S.A (2000).
 7. Dubiety, R.C., And Maheshwari, D.K., "Text book of microbiology". S. Chand & Company Ltd., New Delhi.(2008).
 8. Sharma, P.D., "Microbiology". Kasogi Publications, Meerut. (2014).
 9. Singh, R.P., "Applied Microbiology", Kalyan Publishers, New Delhi. (2007)
 - 10 Shimmy, Q.J., "Microbiology"-I". Kailās Saddin, Bhopal.

Suggested equivalent online courses:

1. <https://www.com.mooc-list.com/course/small-and-mighty-introduction-microbiology-futurelearn>
2. <https://www.mooc-list.com/course/microbiology-saylororg>
3. <https://www.mooc-list.com/course/bacteria-and-chronic-infections-coursera>
4. <https://www.coursera.org/lecture/bacterial/-infections/1-1-introduction-to-bacteria-by-bioinformaticstician-phd-peder-worning-HZ64m>
5. <https://www.openstax.org/books/microbiology/pages/1-3-types-of-microorganisms>
6. <https://openstax.org/books/microbiology/pages/4-1-prokaryotic-habitats-relationships-and-microbiomes>
7. <https://swayam.gov.in/explorer?searchText=microbiology>

Part-D Assessment and evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100
Continuous Comprehensive Evaluation (CCE):	25
University Exam (UE):	75

Internal Assessment
Continuous Comprehensive
Evaluation(CCE):25

Class Test

Assignment / Presentation

Total

15

10

25

External Assessment
University Exam
Section:25
Time: 02.00Hours

Section (A): Three Very
Short Questions (50 Words Each)

3x3=30

Section (B): Four Short
Questions
(200 Words Each)

4x9=36

Section (C): Two Long
Questions
(500 Words Each)

2x15=30

Total

75

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Part A Introduction			
Program Certificate Course	Class: B.SC.	Year : FIRST Year	Session :2021-2022 onwards
Subject : Microbiology			
1	Course Code	SI-MIB02P	
2	Course Title	Microbial Tools and Techniques Practical	
3	Course Type	Elective	
4	Pre-requisite (if any)	To Study this course a student must have had the subject	
5	Course Learning outcomes (CLO)	On completion of this course, learners will be able to understand: <ul style="list-style-type: none"> • Basic Knowledge of glassware, microscopes and different kinds of instruments used in the microbiology laboratory. • Basic media preparation technique, autoclaving, cleaning and sterilization of glassware. • Preparation of liquid and solid culture media. • Isolation of microorganisms by different plating methods. 	
6	Credit Value	2	
7	Total Marks	Maximum Marks:25+75	Minimum Passing Marks: 33
Part B – Content of the Course			
Total No. of Lectures:30			
Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2			
S. No.	Name of the Exercise	No. of Lab Hours	
1.	Demonstration and briefing about principles and working of basic instruments.	4	
2.	Basic media preparation technique, autoclaving, cleaning and sterilization of glass ware.	6	
3.	Preparation of liquid culture media- Peptone water, nutrient broth	2	
4.	Preparation of solid culture media – Nutrient agar (agar slant/ agar plate)	2	
5.	Isolation of microbes from water , soil and air by serial dilution agar plating method.	3	
6.	Isolation of fungi from water, soil and air by serial dilution agar plating method.	3	
7.	Isolation of microorganisms by pour plate method.	3	
8.	Isolation of microorganisms by streak plate method	3	
9.	Isolation of microorganisms by spread plate method.	3	
10.	Any other experiment may be designed on the basis of theoretical aspects	1	
Keywords: Basic instruments, Culture media, pour plate, streak plate, spread plate			
Part- C Learning Resources			
Text Books, References, and other Resources Books			
1.Cappuccino J and Sherman,N., "Microbiology : A Laboratory Manual ", 9 th edition .Pearson Education Limited ,(2010).			
2.Dubey ,R.C and Maheswari, D.K. , "Practical Microbiology" ,S. Chand &Co.Ltd,New Delhi			



- 3.M. Gopal Reddy , M., Reddy m.n. Saigopal , D.V.R. and Malliah K.V., " Laboratory Experiments in Microbiology", Himaliya Publishing House , Mumbai (2007).
- 4.Aneja , K.R., " Laboratory Manual of Microbiology and Biotechnology 2: Edition". Meditech Scientific International (2018).
- 5.Patel, Rakesh J and Patel Kiran, R., " Experiments Microbiology Vol. I and Vol. II" , AdityaPrakashan Ahmadabad. (2009).
6. Varghese, Naveen and Joy , V." Microbiology Laboratory Manual - ED. I, Aromatic and Medicinal Plants Research Station, Odakkali, Ernakulam, Kerala. (2014).
- 7.Shammi, Q.J. " Microbiology-Tools and Techniques", KailashPustakadan ISBN 978-81-89900-38-0 (In hindi also)
- 8.Grainger, John , Hurst Janet and Burdass. Darrel , "Basic Practical Microbiology: A Manual".The Society for General Microbiology.(2001).

Suggested Digital Platform /Web Links:

1. <https://www.mooc-list.com/course/introduction-practical-microbiology-futurelearn>
2. https://study.com/articles/List_of_Free_Online_Microbiology_Courses_and_Training_Options.html

Part-D Assessment and evaluation

Internal assessment	Marks	External assessment	Marks
Class interaction Quiz	10	Viva voce on practical	15
Attendance	05	Practical record file	10
Assignment(Charts /Model Seminar /Rural service technology/Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)	10	Table work/Experiments	50
Total	25		75

Any remarks suggestions:Nil


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Part A- Introduction			
Program: Certificate	Class: B.Sc./Year	Year: 2021	Session: 2021-2022
Subject: Physics			
Course Code	SI-PHYS21		
Course Title	Mechanics and General Properties of Matter		
Course Type (Core/Elective/ Generic Elective/Vocational/...)	Elective		
Pre-requisite (if any)	To study this course, a student must have had the subject Physics in 12 th class.		
Course Learning Outcomes (CLO)	<ol style="list-style-type: none"> 1. The course would empower the students to develop the idea about the behavior of physical bodies. 2. It will provide the basic concepts related to the motion of all the objects around us in daily life. 3. The students would be able to build foundation to various applied field in science and technology especially in the field of mechanical engineering. 4. The students will acquire the knowledge of basic mathematical methods to solve the various problems in physics. 5. The students will be able to understand the relativistic effect and the relation between energy and mass. 		
Credit Value	4		
Total Marks	Max. Marks: 25+75	Minimum passing Marks: 33	

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Part B- Content of the Course		
Total numbers of Lectures(in hours):60		
Unit	Topics	Numbers of Lectures
I	<p>Historical background and Mathematical Physics</p> <p>1. Historical background: 1.1. A brief historical background of mathematics and mechanics in the context of India and Indian culture. 1.2. A brief biography of Varahamihira and Vikram Sarabhai with their major contribution to science and society.</p> <p>2. Mathematical Physics: 2.1. Scalar and vector fields, Gradient of a scalar field and its physical significance. 2.2. Vector integral: line integral, surface integral and volume integral, Divergence of a vector field and its physical significance, Gauss divergence theorem. 2.3. Curl of a vector field and its physical significance, Stokes and Green's theorem, Numerical problems based on the above topics.</p> <p>Keywords/Tags: Scalar field, Vector field, Vector integral, Gradient, Divergence, Curl.</p>	12
II	<p>Mechanics of Rigid and deformable bodies</p> <p>1. Rigid body mechanics: 1.1. System of particles and concept of rigid body, Torque, centre of mass: position of the centre of mass, Motion of the centre of mass, Conservation of linear & angular momentum with examples, Single stage and multistage rocket. 1.2. Rotatory motion and concept of moment of inertia. Theorems on moment of inertia: theorem of addition, theorem of perpendicular axis, theorem of parallel axis, Calculation of moment of inertia of rectangular lamina, disc, solid cylinder, solid sphere.</p> <p>2. Mechanics of deformable bodies: 2.1. Hooks law, Young's modulus, Bulk modulus, Modulus of rigidity and Poisson's ratio, Relationship between various elastic moduli. 2.2. Possible values of Poisson's ratio, Finding Poisson's ratio of rubber in the laboratory, Torsion of a cylinder, Strain energy of twisted cylinder. 2.3. Finding the modulus of rigidity of the material of a wire by Hutton's method, Torsional pendulum and Maxwell's needle, Searl's method to find Y, η and α of the material of a wire, Bending of beam, Cantilever beam</p>	12

	<p>supported at its ends and loaded in the middle.</p> <p>Keywords/Tags: Rigid body, Centre of mass, Moment of Inertia, Poisson's ratio.</p>	
III	<p>Fluid mechanics</p> <p>1. Surface Tension:</p> <p>1.1. Inter-molecular forces and potential energy curve, force of cohesion and adhesion.</p> <p>1.2. Surface tension, Explanation of surface tension on the basis of intermolecular forces, Surface energy, Effect of temperature and Impurities on surface tension, Dally life application of surface tension.</p> <p>1.3. Angle of contact. The pressure difference between the two sided of a curved liquid surface, Excess pressure inside a soap bubble, Capillarity, determination of surface tension of a liquid capillary rise method, Jaeger's method.</p> <p>2. Viscosity:</p> <p>2.1. Ideal and viscous fluid, Streamline and turbulent flow, Equation of continuity, Rotational and Irrational flow, Energy of a flowing fluid, Euler's equation of motion of a non-viscous fluid and its physical significance.</p> <p>2.2. Bernoulli's theorem and its applications (Velocity of efflux, shapes of wings of airplane, Magnus effect, Filter pump, Bunsen's burner)</p> <p>2.3. Viscous flow of a fluid, Flow of liquid through a capillary tube, Derivation of Poiseuille's formula and limitations, Stocks formula, Motion of a spherical body falling in a viscous fluid.</p> <p>Keywords/Tags: Inter-molecular force, Surface tension, Angle of contact, Capillarity, Viscosity, Euler's equation, Poiseuille's formula</p>	12


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<p>IV</p>	<p>Gravitational potential and central forces</p> <p>1. Gravitational potential: 1.1. Conservative and non-conservative force field, Conservation of energy in motion under the conservative and non-conservative forces, Potential energy. 1.2. Conservative force, Conservation of energy, Gravitational potential and gravitational potential energy, Gravitational potential and intensity of gravitational field due to uniform spherical shell and a uniform solid sphere. 1.3. Gravitational self-energy, Gravitational self-energy of a uniform spherical shell and a uniform solid sphere.</p> <p>2 Central forces: 2.1. Motion under Central forces, Conservative ve characteristics of central forces. 2.2. The motion of a two particles system in Central force, Concept of reduced mass, Reduced mass of positronium and hydrogen. 2.3. Motion of particles in an inverse-square central force, Motion of celestial bodies and derivation of Kepler's laws. 2.4. Elastic and inelastic scattering (elementary idea).</p> <p>Keywords/Tags:Conservative force field, Gravitational potential, Gravitational self-energy, Central force, reduced mass, Scattering.</p>	<p>12</p>
<p>v</p>	<p>Relativistic Mechanics and Astrophysics</p> <p>1. Relativistic Mechanics: 1.1. Frame of references, Galilean transformation, and Michelson Morley experiment. 1.2. Postulates of special theory of relativity, Lorentz Transformation, Simultaneity and order of events, Length contraction, Time dilation, Relativistic transformation of velocities, Variation of mass with velocity. 1.3. Mass-energy, Equivalence and its experimental verification.</p> <p>2. Astrophysics: 2.1. Introduction to the Universe. Properties of the Sun, Concept of Astronomical Distance. 2.2. Life cycle of stars, Chandrasekhar Limit, H-R diagram, Red giant star, White dwarf star, Neutron star, Black hole. 2.3. Big Bang Theory (elementary Idea).</p> <p>Keywords/Tags: Transformation, Mass-energy equivalence, Astronomical distance, Chandrasekhar limit, Black hole.</p>	<p>12</p>

Part C-Learning Resources	
Text Books, Reference Books, Other resources	
Suggested Readings:	

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1. Spiegel M. R., "Vector Analysis; Schaum Outline Series". McGraw Hill Education, 2017.
- 2 Mathur D. S., "Mechanics". S. Chand. 2012.
3. Ghatak A. K., Goyal I.C. and Chua S.J., "Mathematical Physics". Laxmi Publications Private Limited, 2017
4. Mathur D. S., "Properties of Matter", Shyamal Charitable Trust, New Delhi.
5. Sears and Zeemansky, "University Physics", Pearson Education.

Suggested equivalent online courses:

1. <https://nptel.ac.in/courses/115/103/115103036/> Mathematical Physics by Dr. Saurabh Basu, Department of Physics, Indian Institute of Technology Guwahati
2. <https://nptel.ac.in/courses/115/106/115106090/> Mechanics, Heat, Oscillations and Waves by Prof. V. Balakrishnan, Department of Physics, Indian Institute of Technology, Madras

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 10
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) : Four Short Questions (200 Words Each) Section (C) : Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09= 36 02 x 15 = 30 Total 75

Any remarks/ suggestions:


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Part A- Introduction			
Program: Certificate	Class: B.Sc. I Year	Year: 2021	Session: 2021
Subject: Physics			
Course Code	SI-PRYS2P		
Course Title	Mechanics and General Properties of Matter Lab		
Course Type Core/Elective/ Generic Elective/Vocational/...	Elective		
Pre-requisite (if any)	To study this course, a student must have had the subject Physics in 12 th class.		
Course Learning Outcomes (CLO)	1. The students would acquire basic practical knowledge related to mechanics through the experiments. 2. Students will be familiar with various measurement devices by which they can measure various physical quantities with accuracy. 3. The students will develop the concept related to the mechanics and properties of matter.		
Credit Value	2		
Total Marks	Max. Marks: 25+75	Min passing Marks :33	

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Part B- Content of the Course		
Total numbers of Lectures(in hours):60		
Sr.No	List of experiments	Number of Practical (in hours)
1	Determination of Young's modulus, modulus of rigidity and Poisson's ratio of material of a wire using Scarle's method.	30
2	Determination of Young's modulus of material of a metallic bar by bending of beam method.	
3	Determination of acceleration due to gravity (g) using Bar pendulum.	
4	Determination of acceleration due to gravity (g) using Kater's reversible pendulum.	
5	Determination of modulus of rigidity of a rod with the help of Barton's apparatus.	
6	Determination of coefficient of viscosity of liquid using Poiseuille's method.	
7	Determination of the moment of inertia of a flywheel about its axis of rotation.	
8	Determination of the moment of inertia of a given body (irregular body) with the help of inertia table.	
9	Verification of laws of the parallel/perpendicular axes of moment of inertia.	
10	Determination of modulus of rigidity of material of a wire with the help of Maxwell's needle.	
11	Determination of Young's Modulus of a material of a rod using Cantilever method.	
12	Determination of modulus of rigidity of material of a wire with the help of torsional pendulum.	
13	Determination of force constant of a spring.	
14	Determination of Poisson's ratio of rubber.	
15	Determination of surface tension of a liquid by Jaeger's method.	


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Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Prakashl. & Ramakrishna, "A Text Book of Practical Physics", KitabMahal, 2011, 11/e.
2. Squires G. L, "Practical Physics", Cambridge University Press, 2015, 4/e.
3. Flim B. L, and Workshop H. T., "Advanced Practical Physics for 2015, students", 4/e Asia Publishing House, 197.
4. Charopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics". New Central Book Agency.

Suggestive digital platforms web links

1. <https://www.vlab.co.in/broad-area-physical-sciences>
2. https://storage.googleapis.com/unique_courses/online.html

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar/ Rural Service Technology Dissemination/ Report of Excursion/ Lab Visits/Survey / Industrial visit)	10	Table work/Experiments	50
TOTAL	25		75

Any remarks/suggestions:

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<u>Part A Introduction</u>			
<u>Program Certificate Course</u>		<u>Class:</u> B.SC.	<u>Year : FIRST Year</u>
		<u>Session :2021-2022 onwards</u>	
<u>Subject : ZOOLOGY</u>			
<u>1</u>	<u>Course Code</u>	SI-ZOO121	
<u>2</u>	<u>Course Title</u>	<u>Cell biology, reproductive biology and developmental biology</u>	
<u>3</u>	<u>Course Type</u>	ELECTIVE	
<u>4</u>	<u>Pre- requisite (if any)</u>	To study this course a student must have had the subject Biology in class 12 th .	
<u>5</u>	<u>Course Learning outcomes (CLO)</u>	<p>After completing this course in ZOOLOGY, a student shall have understanding of,</p> <ul style="list-style-type: none"> • Develop deeper understanding of what life is and how it functions at cellular level. • Understand the nature and basic concepts of cell biology, Reproductive and Developmental biology. • Understand structure and functions of cell membrane, and cellular organelles. • Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare. • Understand the general patterns and sequential developmental stages during embryogenesis; & understand how the developmental processes lead to establishment of body plan of multicellular organisms. • Understand the evolutionary development of various animals. 	
<u>6</u>	<u>Credit Value</u>	4	
<u>7</u>	<u>Total Marks</u>	<u>Maximum Marks:25+75</u>	<u>Minimum Passing Marks: 33</u>
<u>Part B- Content of the Course</u>			
<u>Total no of Lectures –60 organisms</u>			
<u>Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0</u>			
<u>Unit</u>	<u>Topics</u>		<u>No. of Lectures</u>

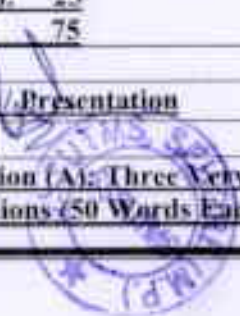

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I	<p><u>Cell biology:</u> <u>1.1 Concept of prokaryotic and eukaryotic cell, difference between prokaryotic and eukaryotic cells.</u> <u>1.2 Structure and functions of plasma membrane</u> <u>1.3 Structure and functions of Golgi body, Mitochondria, Endoplasmic reticulum, ribosomes and lysosomes.</u> <u>1.4 Structure and functions of Nucleus.</u> <u>1.5 Structure and functions of Chromosomes and special types of chromosomes- Lamp brush and Polygenes chromosomes,</u> <u>1.6 Cell cycle, Mitotic & Meiotic cell division and their significance.</u></p> <p>Keywords: Prokaryote, Eukaryote, cell organelles, chromosomes, cell cycle.</p>	13
II	<p><u>2. Reproductive Biology:</u> <u>1.1 Structure of Male reproductive system of Lupus.</u> <u>1.2 Structure of Female reproductive system of Lupus.</u> <u>1.3 Histology of testis, and Ovary of Lupus.</u> <u>1.4 Gametogenesis- Spermatogenesis and oogenesis, difference between spermatogenesis and oogenesis.</u> <u>1.5 Types of Eggs- based on amount and distribution of yolk with examples.</u></p> <p>Keywords: Reproductive system, Gametogenesis, sperms, eggs.</p>	13
III	<p><u>Recent assisted Reproductive Techniques (ART):</u> <u>3.1 Stem cell- Types and their uses.</u> <u>3.2 Gene bank, sperm bank, superovulation, cryopreservation.</u> <u>3.3 In Vitro Fertilization (IVF) and Embryo Transfer (ET), Zygote.</u> <u>3.4 Placentation- Types, examples and functions.</u> <u>3.5 Placenta Banking- placenta preservation benefits.</u> Key words: Gene bank, sperm bank, superovulation, IVF, ET.</p>	15
IV	<p><u>4. Developmental Biology:</u> <u>4.1 Fertilization</u> <u>4.2 Embryonic development of frog up to the formation of three layers</u> <u>4.3 Fate map construction in frog.</u> <u>4.4 Metamorphosis of Tale pole Larva.</u> <u>4.5 Parthenogenesis.</u></p> <p>Keywords: Fertilization, frog embryology, tadpole, metamorphosis, parthenogenesis.</p>	11
V	<p><u>Embryonic Development of Chick:</u> <u>5.1 Structure of hen's egg.</u> <u>5.2 Embryonic development of chick embryo upto the formation primitive streak.</u> <u>5.3 Fate map construction in chick.</u> <u>5.4 Extra embryonic membranes of chick, formation and functions.</u> Keywords/tags: Hens egg, chick embryology, fate map, chick embryo membranes.</p>	



	Part C-Learning Resources							
	Text books, Reference Books, Other resources							
	<p>Suggested Reading:</p> <ol style="list-style-type: none"> 1. <u>Arm gam, "A TEXT BOOK OF EMBRYOLOGY"</u>, Sara's publications 2005. 2. <u>Babinski, BI, "an Introduction to Embryology."</u> CEng age learning 2012. 3. <u>De Roberti's, EDP De Roberti's, EMF, "Cell and molecular biology,"8th edition, Williams &Wilkins, Philadelphia, 2006.</u> 4. <u>Gupta, PK, "CELL BIOLOGY, Genetics and evolution"</u>, Rastogi publications 2013 5. <u>Heffner, L, "Human reproduction at a glance,"</u> BWL Publications, 2013. 6. <u>Larsen, Human Embryology,"</u> Churchill Ivingstone, 2001. 7. <u>Power, CB, "CELL BIOLOGY"</u> Himalya publishing House,2010. 8. <u>Rastogi, VB, "Animal Distribution and developmental biology."</u> KNRNPublication, 2020. 9. <u>Rastogi, VB, " Introduction to Cytology,"</u> KNRN Publications, 1988. 10. <u>Sastry, KV, "ENDOCRINOLOGY and Reproductive Biology",</u> rastogi p[ublication 2018 11. <u>VERMA and AGRAWAL," A text Book of cytology,"</u>S Chand & co, 1999 12. <u>VERMA, PS, AGARWAL, VK "Chordate Embryology,"</u>S. Chand & co,2000. 13. <u>Pardesi, K and Dubey A, Cell & developmental Biology,"</u> Akhand publishing house, New Delhi, 14. https://www.academic.oup.com 15. https://www.medicplus.gov 16. https://www.neni.nlm.nih.gov 17. https://www.zoologylearningpoint.wordpress.com 18. https://zoologyresources.com <p>Suggested equivalent online courses:</p> <ol style="list-style-type: none"> 8. <u>Sway am online courses</u> https://storage.googleapis.com/uniquecourses/online.html 9. <u>National Digital Library</u> https://ndl.iitkgp.ac.in 10. <u>E- PG Pataskala (MHRD) PORTAL</u> (HTTPS://EPGP.INFLIBNET.AC.IN) 11. <u>Science Direct Open Access Content</u> (https://www.sciencedirect.com/book/9781843342038/openaccess) 							
II	Part-D Assessment and evaluation							
	<p>Suggested Continuous Evaluation Methods:</p> <p>Maximum Marks: 100</p> <p>Continuous Comprehensive Evaluation (CCE): 25</p> <p>University Exam (UE): 75</p>							
	<p>Internal Assessment</p> <p>Continuous Comprehensive Evaluation (CCE):25</p>	<table border="1"> <tr> <td>Class Test</td> <td align="right">15</td> </tr> <tr> <td>Assignment / Presentation</td> <td align="right">10</td> </tr> <tr> <td>Total</td> <td align="right">25</td> </tr> </table>	Class Test	15	Assignment / Presentation	10	Total	25
Class Test	15							
Assignment / Presentation	10							
Total	25							
	<p>External Assessment</p> <p>University Exam</p>	<table border="1"> <tr> <td>Section (A): Three Very Short Questions (50 Words Each)</td> <td align="right">3x3=30</td> </tr> </table>	Section (A): Three Very Short Questions (50 Words Each)	3x3=30				
Section (A): Three Very Short Questions (50 Words Each)	3x3=30							



<u>Section: 25</u> <u>Time: 02.00 Hours</u>	<u>Section (B): Four Short Questions</u> (200 Words Each)	<u>4x9=36</u>
	<u>Section (C): Two Long Questions</u> (500 Words Each)	<u>2x15=30</u>
	<u>Total</u>	<u>75</u>

Part A Introduction
PRACTICAL SYLLABUS

<u>Program Certificate Course</u>	<u>Class: B.SC.</u>	<u>Year : FIRST Year</u>	<u>Session : 2021-2022 onwards</u>
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Subject: ZOOLOGY

<u>1</u>	<u>Course Code</u>	SI-ZOO12P	
<u>2</u>	<u>Course Title</u>	<u>CYTOLOGY, REPRODUCTIVE BIOLOGY & EMBRYOLOGY</u>	
<u>3</u>	<u>Course Type</u>	<u>ELECTIVE</u>	
<u>4</u>	<u>Pre- requisite (if any)</u>	To Study this course a student must have had the subject	
<u>5</u>	<u>Course Learning outcomes (CLO)</u>	<u>On completion of this course, learners will be able to understand:</u> <ul style="list-style-type: none"> The different stages of mitotic and meiotic cell division and special types of chromosomes. Different stages of embryology. Through squash preparations understand the stage of cell division and structure of polygene chromosomes. Enhance collaborative learning and communication skills through practical sessions, team work group discussion assignments & projects. 	
<u>6</u>	<u>Credit Value</u>	<u>2</u>	
<u>7</u>	<u>Total Marks</u>	<u>Maximum Marks: 25+75</u>	<u>Minimum Passing Marks: 33</u>

Part B – Content of the Course

Total No. of Lectures: 30

Lectures – Tutorial – Practical (In hours per week): L-T-P: 0-0-2

<u>Unit</u>	<u>TOPICS</u>	<u>No. of Lab Hours</u>
<u>1.</u>	Spotting related to the cytology a. Prokaryotes and Eukaryotes cell b. Stages of mitotic cell division c. Stages of meiotic cell division d. Lamp brush chromosomes.	<u>13</u>
<u>2.</u>	Spotting related to Reproductive biology & Embryology. I & Testis of Mammal	<u>13</u>



	b. <u>T.S. Ovary of Mammal</u> c. <u>Development stages of frog Embryology</u> d. <u>Developmental stages of Chick embryology.</u>	
3.	<u>Squash preparation of onion root tip to understand the stages of Mitosis</u>	<u>8</u>
4.	<u>Squash preparation of Grasshopper testis to understand the stage of Meiosis</u>	<u>9</u>
5.	<u>Try pan Blue exclusion test of cell viability</u>	<u>3</u>
6.	<u>Squash preparation of salivary gland chromosomes from Chironomus larva/Drosophila</u>	<u>9</u>

KEYWORDS: stages of cell division, stages of embryonic development squash preparation.

Part- C Learning Resources

Text Books, References, and other Resources Books

Suggested reading:

1. Biffa, MM, Knight J. "Experiments in practical development biology", first edition Cambridge university press, 2011
2. Chai Tanya, KV" Cell & molecular biology: a lab manual", PHI, 2013,
3. KELLER, LR Evans, JH, KELLER TCS "experimental developmental biology", academic press, 1998
4. FIGUNAYAT, MM, "A manual of practical Zoology; biodiversity cell biology, Genetics & development biology" scientific publishers, 2019
5. Virtual Labs (<https://www.vlab.co.in>)

Part-D Assessment and evaluation

<u>Internal assessment</u>	<u>Marks</u>	<u>External assessment</u>	<u>Marks</u>
<u>Class interaction Quiz</u>	<u>10</u>	<u>Viva voce on practical</u>	<u>15</u>
<u>Attendance</u>	<u>05</u>	<u>Practical record file</u>	<u>10</u>
<u>Assignment(Charts /Model Seminar /Rural service technology(Dissemination/Report of Excursion/ lab visit/Survey/Industrial visit)</u>	<u>10</u>	<u>Table work/Experiments</u>	<u>50</u>
Total	25		75

Any remarks suggestions: Nil


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Part A Introduction

Programme: Certificate Class: B.Com 1 st Year Session 2021-22	
Subject	Commerce
Course Code	CI-COMA1G
Course Title	Basics Of Business Studies
Course Type	Elective
Pre-Requste	Not Required Open For All
Course Objectives	To impart basic knowledge of the business relevant to business activities.
Course Learning Outcomes	<p>The Successful completion of this course shall enable the students :</p> <ul style="list-style-type: none"> • The course will be helpful to provide basic knowledge of business. • Student will be capable to understand business ethics to guide corporate sector and feel and perform its responsibility towards society. • Student will be capable to understand ethical aspect of business, banking system, banking procedure. • Student will be capable to understand practical banking insurance system, Insurance procedure, stock exchange system. • To help them for employment in related field.
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Total Marks	Max Marks: 25 Minimum Passing



	+75	Marks:33
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Part B Content Of The Course

Total No. of Lectures-60 (In Hour Per Week)3		
Unit	Topic	Lectures
I	<p>Concept Of Business : historical background of business in india, meaning and objectives of business industry, trade and commerce, business sectors: goods and service sectors.</p> <p>Concept and salient features of sole trade,partnership,LLP, and co-operative society, meaning, features, types of joint stock company, online business: need importance, limitations, process, dangers and precautions.</p>	12
II	<p>Business Ethics: historical background of business ethics In india, concept and significance of business ethics, balancing between objectives of business and ethics of business, evaluation of business ethics in india.</p> <p>Corporate Social Responsibility(CSR) historical background of CSR, concept, objectives, and importance of CSR, contribution of indian corporate sector under csr, evaluation of CSR in india.</p>	12
III	<p>Banking: historical background, classification of bank, meaning, definition and functions of commercial banks, role of economics growth , features of indian banking system.</p> <p>Bank Deposits: meaning and types, features of bank account, procedures to open and close bank accounts(including online procedures.</p> <p>Loans And Advances: principles to sanction loans and advances, classification of loans and advances, procedures to apply for house loan, personal loan, evaluation and commercial loan..</p>	12
IV	<p>Insurance: origin and development of insurance, meaning, principle and importance of insurance, classification of insurance.</p> <p>Life Insurance: meaning objectives, principles and importance, types of life insurance policy, claim procedure and settlement.</p>	12



	General Insurance: meaning and objectives and importance, general insurance policies: vehicl, health, household goods, commercial premises and goods and another available policies.	
V	Stock Exchange: historicial background, meaning functions and importance, important termonology related to stock exchange, promary and secondary market, nse, bse, various index and Interpretation of fluctuations in It. Mutual Funds: concept, salient features, importance and types, systematic investment plan(SIP), performance of mutual funds in India.	12
key words/Tags : Business, Ethics, General Insurance, Stock Exchange, Corporate Social Responsibility		

Part C Learning Resources

Suggested Readings:

1. Dr. C.B. Gupta Values & Ethics In Business S.Chand & Sons New Delhi.
2. Dr.C.B. Gupta Business Organization & Management S.Chand & Sons New Delhi
3. Rathi And Agrawal Investmnet & Security Analysis S.Chnad & Sons New Delhi
4. Dr. S.C Saxena & Dr.V.P Agrawal Business Organization And Commnication Sahitya Bhawan Publication ,Agra
5. Dr. Op. Gupta & Dr. Sudhir Kumar Sharma Banking And Insurance Sahitya Bhawan Publication ,Agra
6. Dr. R.L. Nolakha Principles Of Insurance R.B.D. Publication Jaipur.

Suggestive Digital Platforms, Web Links

1. http://cbseacademic.nic.in/web_material/curriculummain20/Sr.secondary/businessstudies.pdf
2. <http://ncert.nic.in/textbook.php?kebsl=0-11>


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PART D ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods : Maximum Marks:100		
Continuous Comprehensive Evaluation(CCE):25 Marks, University Exam(Ue)75 Marks		
Internal Assessment:	Class Test (Objective Type) or Descriptive	15 Marks
Continuous Comprehensive Evaluation(CCE):-	Assignment/Presentation	10
External Assessment: University Exam Section :75 Marks Time :2 Hours	Section A: Three Very Short Question (50 Word Each)	3x3=9
	Section B: Four Short Questions (200 Words Each)	4x9=36
	Section C:Two Long Questions (500 Word seach)	2x15=30
	Total Marks	75


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Part A Introduction

Programme: Certificate Class: B.Com 1 st Year Session 2021-22		
Subject	Commerce	
Course Code	C1-COMB2G	
Course Title	Fundamental Accounting	
Course Type	Elective	
Pre-Requisite	Not Required Open For All (Except The Student Of Commerce)	
Course Objectives	<p>To understand the meaning of accounting, accountancy,</p> <p>To understand the terms used in accounting system</p> <p>To know how the accounting system for non profit organization..</p>	
Course Learning Outcomes	<p>After the completion of the course, wstudent will be able to</p> <ol style="list-style-type: none"> 1. To record the basic journal entries 2 Memorize how to calculate depreciation by applying various methods 3, Maintain the financial statement of a business entity 4. rectify errors in account. 	
Credit Value	6	
Total Marks	Max Marks:25	Minimum Passing Marks:33

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Part B Content Of The Course

Total No. of Lectures-90 (In Hour Per Week)3		
Unit	Topic	Lectures
I	Accounts: history, definition, development, objective, basic concept, principles assumptions and conversion of accounting.	10
II	Principles of double entry system, preparation journal, subsidiary books, preparation of ledger.	15
III	Preparation Of Trial Balance, Rectification Of Errors	10
IV	Preparation Of Final Accounts With Adjustment.	15
V	Depreciation Accounting: definition, reasons governing the existence of depreciation methods, objectives of providing of depreciation , factors determining the amount of depreciation, methods of charging depreciation practical questions of depreciation accounting- fixed and written down value methods only.bank reconciliation.	15
vi	Accounts of non-profit organisation and professionals.	10
<p>key words/Tags : Financial Accounts, Balancesheet, P&L A/C, Single Entry System, Double Entry System.</p>		


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Part C Learning Resources


1. हिन्दी ँष अकादमी, ढोपाल
 2. Dr.R.K.Sharma/ Dr. R.S.Popli, Financial Accounting, Kitab Mahal Pub., Agra .
 3. Anil,Rajesh, Mariya Financial Accounting, Himalaya Publication Nagpur.
 5. Financial accounting-Dr.M.S.shukla, Sahityabharan publication, Agra
 - 6.. M.C.Shukla, T.S.Grewal and S.C.Gupta. Advanced Accounts.Chand & Co. New Delhi.
 7. S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting.Vikas Publishing House, New Delhi.
 8. Deepak Sehgal. Financial Accounting.Vikas Publishing H House. New Delhi.
 9. Gupta R.L, and Radhaswamy M, Advanced Accounting & S chand & Sons, new Delhi.
 10. Bhushan Kumar Goyal and HN Tiwari, Financial Accounting, International Book House
 11. Dr.S,K Singh,Financial Accounting,SBPD Publication ,Indore.
- Suggestive digital platforms,
web links:
- 1.<http://www.ddegjust.ac.in/studymaterial/mba/cp-104.pdf>
 2. <http://www.ddegjust.ac.in/studymaterial/bba/bba-104.pdf>
 - 3.<http://www.dceppanacademy.com/pdf/cma/foundation/fundamentals-of-accounting.pdf>
 - 4.<http://www.academia.edu/38623012/financialaccounting/ifrsedition2ehjerry/wevegand>

PART D ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods : Maximum Marks:100		
Continuous Comprehensive Evaluation(CCE):25 Marks, University Exam(Ue)75 Marks		
Internal Assessment:	Class Test (Objective Type) or Descriptive	15 Marks
Continuous Comprehensive Evaluation(CCE):	Assignment/Presentation	10
External Assessment: University Exam :75 Marks Time :2 Hours	Section A: Three Very Short Question (50 Word Each)	3x3=9
	Section B: Four Short Questions (200 Words Each)	4x9=36
	Section C:Two Long Questions (500 Word each)	2x15=30
	Total Marks	75


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Programme: Certificate Class:B.Com 1 st Year Session 2021-22	
Subject	Rural Banking
Course Code	A1-RBAN2G
Course Title	Banking Institutions in India
Course Type	Elective
Pre-Requste	No pre-requisite
Course Objectives	<p>To understand the meaning of Rural Banking.</p> <p>To Understand The Terms Of Banking Institutions in India</p>
Course Learning Outcomes	<p>After the completion of the course, wstudent will be get to</p> <ol style="list-style-type: none"> 1. student will be gain a strong understanding about the banking structure in india. 2. student will be get acquainted with regulatory structure of banking sector in india 3. students will be understand about various banking institutions including rural banking institutions along with their basic functions and their role in economic development. 4. student will be gain a deeper insight about emerging trends in banking in india.
Credit Value	
Total Marks	Max Marks: 25 +75 Minimum Passing Marks: 33

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Part B Content Of The Course

Total No. of Lectures-60 (In Hour Per Week)2		
Unit	Topic	Lectures
I	Introduction: structure of indian banking system, origin and evaluation of banks, concept ,definition, and importance of bank, primary and secondary functions of bank, role of banks in economic development, prospectus and challanges of indian banking system..	12
II	Regulatory Institutions: objectives of central bank and its role in economy, reserve bank of india, (RBI)-organisation, objectives, role, functions, credit creation and control, banking sector reforms, banking regulation act,1949, new licensing policy(RBI).	12
III	Banking Institutions: types of banks- objectives, structure, functions of commercial banks, (public, private and foreign banks,), development bank, payments bank, small finance banks, indigenous banks, role of banking institutions in economic developments, prospectus and chalanges of banking institutions in india.	12
IV	Rural Banking Instutions: rural banking institutions, features, objectives, structure, functions of commercial banks, co-operative banks, primary agriculture societles, (PACS), regional rurla banks, microcredit, institutions, and nabard, role of banking institutions in rurla development, prospectus and chalengmes, of rurla banking institutions in india.	12
V	Issues And Challenges To Banking Sector: financial inclusion in india, digital banking, technology in banking sector, issue of non-performing assets, (NPA), operational efficeincy & profitablity security issues, recent trends in banking system in india. Commercial Banks, prospectus and chalanges, rural banking institutions, co-operative banks,), regional rural banks, microcredit, NABARD,	12



key words/Tags Indian Banking System, Structure Of Indian Banking System, Challenges Of Indian Banking System., Central Bank, RBI, Banking Sector Reforms, Banking Regulation Act, 1949, New Licensing Policy (RBI), Banking Institutions, Financial Inclusion, Digital Banking, NPA, Recent Trends In India.

Part C Learning Resources

1. Indian Institute Of Banking And Finance (IIBF), Rural Banking (Caiib 2018) Macmillan Publishers India Private Limited, 2018
2. Chakrabarti, Manas, Rural Banking In India, New Century Publications, 2011
3. Gopinath, M.N., Banking Principles And Operations, Snow White Publications 2017
4. Saha Satish Kumar, Indian Banking System, Sbpd Publishing House, 2020-21
5. Chawla, O.P. Evolution Of Banking System In India Since 1900, Sage Publications India Pvt. Ltd. July 2019.
6. Singh, Sultan Banking Sector Reforms, In India, Kanishka Publishing House, 2008
7. Indian Institute Of Banking, Basics Of Banking, Taxmann Publication, 2015
8. Indian Institute Of Banking: banking- an introduction, taxmann publication, 2015

Suggestive Digital Platforms, Web Links:

1. <http://www.rbi.org.in/scripts/abouts/display.aspx>
2. <http://www.nabard.org>
3. <http://www.sayulor.org/books>

Suggested Continuous Evaluation Methods : Maximum Marks:100	
Continuous Comprehensive Evaluation (CCE):25 Marks, University Exam (UE):75 Marks	
Internal Assessment:	Class Test (Objective Type) or Descriptive 15 Marks
Continuous Comprehensive Evaluation (CCE):	Assignment/Presentation 10
External Assessment: University Exam Section :75 Marks Time :2 Hours	Section A: Three Very Short Question (50 Word Each) 3x3=9
	Section B: Four Short Questions (200 Words Each) 4x9=36
	Section C: Two Long Questions (500 Word each) 2x15=30
	Total Marks 75

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Part A Introduction

Programme: Certificate Class: B.Com 1 st Year Session 2021-22	
Subject	Rural Banking
Course Code	AI-RBANIG
Course Title	Money & Banking
Course Type	Elective
Pre-Requste	No pre-requisite
Course Objectives	<p>To understand the meaning of Rural Banking,</p> <p>To understand the terms of Money and Banking</p>
Course Learning Outcomes	<p>After the completion of the course, wstudent will be able to</p> <ol style="list-style-type: none"> 1. Understand about the origin of money and banking 2. Learn about concept of money, its functions, value, money market and monetary policy operations. 3. Understand about various banking institutions along with their basic functions and their credit creation role. 4. Understand about the central bank of our country and assess the objectives and functions of reserve bank of India (RBI) 5. Also analyze the banking sector reforms and gauge at the recent trends in banking system in India.


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Credit Value	4	
Total Marks	Max Marks:25 +75	Minimum Passing Marks:33

Part B Content Of The Course

Total No. of Lectures-60 (In Hour Per Week)2		
Unit	Topic	Lectures
I	Money: Meaning, functions, and classification: concept, definition, functions and importance of money classification of money, role of money in capitalist, socialist and mixed economies. essential quality of good money, money aggregates, paper money- meaning, forms, principles & methods of note issue in india. gresham's law. demonetization.	12
II	Value Of Money And Economic Functions: theories of value money- quantity theory of money, fisher's and cambridge equations and income theory, economic fluctuations- inflation and deflation of money stagflation.	12
III	Money Market And Monetary Policy: functions and importance of money market, indian money market, monetary policy, and its objectives, indicators and instruments of monetary policy, monetary policy in an open economy, current monetary policy in india.	12
IV	Banking Institutions: concept definition, functions, and importance of bank, types of bank, commercial banks, development banks, co-operative banks, Regional rural banks (RRB), micro finance institutions, private banks, indigenous banks, credit creation, role of banking in an economy.	12
V	Central Banks And Policy Reforms In Banking objective of central bank and its role in the economy, reserve bank of india(RBI)- organisation, structure, and its functions, credit creation and control by RBI, nationalization of banks and its objectives, banking sector reforms, recent trends in banking system in india.	12

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key words/Tags : Money , Role Of Money, Paper Money, Demonetization, Money Aggregate, Value Of Money, Economic Fluctuations, Inflation, Deflation, Stagflation, Money Market, Credit Control, Monetary Policy, Current Monetary Policy In India, Types Of Bank, Credit Creation, Role Of Bank, Ina An Economy, Central Bank, RBI, Nationalization Of Bank, Banking Reforms, Bank Recent Trends.

Part C Learning Resources

- 1 Brandi Michael- Money, Banking, Financial Market & Institutions,Cengage, New Delhi 2019 2 Nd Edition.,
2. Wright Robert E- Money And Banking. Saylor Foundation New York 2012
3. Samys Guru- Banking Theory, Vijay Nicule Publication, Chennai 2015
4. Trivedi I.V. Dashora Rakesh, Nagpur, Ashok Jain Sanjay- Money And Financial System, Ramesh Books Depo, Jaipur, New Delhi 2006
5. Mishra J.P, Money And Banking, Sahitya Bhawan Publication, Agra.
- 6 . Mincy And Banking, M.P. Granth Academy, Bhopla,

Suggestive digital platforms, web links:

1. www.moneybanking.com
2. <http://www.nahard.org>
3. [http:// www.saylor.org/books](http://www.saylor.org/books)
4. <http://www.epw.in/>
5. <http://onlinecourses.nptel.ac.in/>
6. <http://www.eds.org/sehoul/state-bank-of-india>

PART D ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods : Maximum Marks:100		
Continuous Comprehensive Evaluation(CCE):25 Marks, University Exam(Ue)75 Marks		
Internal Assessment:	Class Test (Objective Type) or Descriptive	15 Marks
Continuous Comprehensive Evaluation(CCE):	Assignment/Presentation	10
External Assessment: University Exam Section :75 Marks Time :2 Hours	Section A: Three Very Short Question (50 Word Each)	3x3=9
	Section B: Four Short Questions (200 Words Each)	4x9=36
	Section C:Two Long Questions (500 Word seach)	2x15=30
	Total Marks	75

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Part A Introduction

Programme: Certificate Class: B.Com 1 st Year Session 2021-22	
Subject	Business Organization And Management
Course Code	C1-COHB16
Course Title	Business Organization And Management
Course Type	Elective
Pre-Requste	No pre-requisite
Course Objectives	
Course Learning Outcomes	<p>After the completion of the course, wstudent will be able to</p> <p>CO1: Develop a basic understanding about business organization and its forms.</p> <p>CO2: develop rudimentary concept of plant location, layout and size of business units and their respective importance in the practical world.</p> <p>CO3: acquire an understanding of business combinations rationalization and nationalization.</p> <p>CO4: gain insight into the management process and its functions of planning, organization, staffing, directing, and control.</p>
Credit Value	6
Total Marks of Technology & Medical Sciences Sehore (M.P.)	Max Marks:25 Minimum Passing Marks:33



Part B Content Of The Course

Total No. of Lectures- [In Hour Per Week) L/T/P:4/0/0

Unit	Topic	Lectures
I	<p>Business Organization & Its Forms</p> <p>Business concept, meaning, features, stages of development of business, importance of business, classification of business activities.</p> <p>Business Organization: meaning, characteristics, objectives, evolution of business organization, difference between industry and commerce and business and profession, modern business and its characteristics.</p> <p>Forms Of Business: sole trader, partnership, HUF, limited liability partnership, joint stock company, one person company, micro, small and medium enterprises..</p>	18
II	<p>plant location and layout and size</p> <p>Plant Location: concept, importance, factors affecting plant location, plant layout, : concept objectives, types and principles of layout, factors affecting layout, size of business unit: criteria for measuring the size of unit, factors affecting optimum size.</p>	18
III	<p>Business Combination</p> <p>Meaning, characteristics, objectives, causes, forms and kinds of business combination, rationalization, & nationalization,</p>	18
IV	<p>Management: concept, of management, , nature and importance of management, functions of management,, taylors scientific management, henry fayol's principles of management,</p> <p>Planning: concept, importance, process, types of plans, decision making, process, individual vs group decision making</p> <p>Organising: concept & principles of organising: formal/ informal organization, virtual organization, organization structure ,span of management</p> <p>Delegation, Of Authority centralization and decentralization, line and staff authority</p>	18



	Staffing: nature and scope of staffing, man power planning- concept and importance ,recruitment: concept and source, e- recruitment, selection concept, important tests and types of interview,performance appraisal: objectives and modern methods.	
V	<p>Directing: concept and importance of directing</p> <p>Communication: concept and importance, channels of communication, formal/ informal communication, barriers of communication</p> <p>Motivation: concept and intrinsic extrinsic motivation, theories of motivation maslow's and need theory, hierarchy, herzberg two factors theory ,Mcgreger theory, X and Y theory.</p> <p>Leadership: concept , style, leadership, theories,-Trait theory, behavioural theory, contingency / situational theory,</p> <p>Conflict: meaning& types of conflict.</p> <p>Control: concept, nature, importance , process and methods, Controlling, techniques, of control financial and quality</p>	18
<p>Key Words: Business Organization, Industry And Commerce , Small And Medium Enterprises, Plant Location, Plant Layout, Size Of Business Unit, Business Combination, Rationalization, & Nationalization, Management:Concept, Scientific Management, Henry Fayol's Principles Of Management, Planning, Organising, Delegation Of Authority ,Staffing, Performance Appraisal, Communication, Formal/ Informal Communication</p> <p>Directing, Motivation, Leadership, Conflict, Control.</p>		

Part C Learning Resources

- 1 Koonz Harold O, Dunneli And Wehrich, Heinz" Essentials Of Management New Delho Tata Macro Hills , Latest Edition
2. Drucker Peter, Business Organization And Management,, Tasks Responsibilities And Practices Allied Publishers New Delhi 2020
3. C.B. Gupta Business Organization And Management S.Chand Publication.
4. Shukla M.C Business Organization And Management , S.Chand New Delhi .
5. Chhabra T.N. Business Organization And Management , Sun India Publication , New Delhi
- 6 . Shah & Tated, Business Organization And Management, Sahitya Bhawan Publication.

Suggestive digital platforms, web links:

- 1http://ebooks.read.com/authors-eng/h-c-morgan/ business- organization-and-management
2. http://in.pinterest.com/pin/83513



3. <http://nptel.ac.in/noc/course/noc21/sem2>

PART D ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods : Maximum Marks: 100		
Continuous Comprehensive Evaluation(CCE):25 Marks, University Exam(Ue)75 Marks		
Internal Assessment:	Class Test (Objective Type) or Descriptive	15 Marks
Continuous Comprehensive Evaluation(CCE):	Assignment/Presentation	10
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	Section B: Four Short Questions (200 Words Each)	4x9=36
	Section C:Two Long Questions (500 Word seach)	2x15=30
	Total Marks	75


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Part A Introduction

Program: Certificate	Class B.A. (Plain) I Year	Year:2021	Session:2 020-2021
Course Code	AI-ECON-2G		
Course Type (Core Course/ Elective Course)	Elective Course		
Course Title	Indian Economy- An Introduction (Economics)		
Credit Value	04		
Total marks	Max. Marks :75+25		Min. Passing in Marks:33
Course Objectives:	<p>CO-1. The main objective of this paper is to introduce the student to basic understanding of the Indian economy and measurement of various macro-economic variables.</p> <p>CO-2. Students will be able to evaluate the consequences of economic activities on institution, individual and social welfare.</p> <p>CO-3. To make awareness among the students about various economic issues in India.</p> <p>CO-4. Organizing social and economic activities such as business club, exhibitions, effective salesmanship, and business fair for development of commercial attitude among the students</p>		
Course learning out comes:- CLO	<p>After completing this, students will be able to under the basic concepts of the Indian economy .they will be familiar with the issues related to Agriculture, Industry, Foreign Trade, economic Planning and various economic problems of India .They Will also be able to able to understand the various issues of Madhya Pradesh Economy</p>		

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Part B- Course Contents:

Total No of Lectures-Tutorials - Practical (in hours per week):
3 hours

UNIT	Topics	No of Lectures
I Introduction	1. Characteristics of Indian economy 2. Trends and Sectorial Composition of National Income 3. Sectorial Distribution of work force 4. Nature Resources Endowments :- land ,water Livestock forest and mineral Resources 5. Demographic Features: Population, Composition size and Growth Rates 6. Problems and causes of over Population and Population policy	12 Lectures
II Agriculture	1. Nature and Importance Characteristics of Indian Agriculture 2. Trends in Agriculture Production and Productivity 3. Green Revolution – Objectives achievements and failures 4. Agriculture: Finance and Insurance 5. Agriculture Marketing	12 Lectures
III Industry and foreign trade	1. Industrial Development of India after Independence 2. New Industrial Policy of 1991 3. Role of Public sector in Industrialization 4. MSME- Definition, Characteristics and its Role Problems and Remedies of small – scale 5. and cottage industries 6. Start up India and Make in India Aatm Nirbhar Bharat	



<p>IV Planning and Development</p>	<ol style="list-style-type: none"> 1. Planning in India:- Objectives, Strategy, achievements and failures 2. NITI Aayog 3. Problems of Indian Economy-Poverty, Unemployment and Regional Inequality 4. Infrastructure Composition- Power, Transport and Communication. 	<p>12 Lectures</p>
<p>V Economy of Madhya Pradesh</p>	<ol style="list-style-type: none"> 1. Salient features of Madhya Pradesh Economy 2. Nature Resources of Madhya Pradesh:- land ,water forest and mineral 3. Trends and Regional Disparities in Agriculture Sector of Madhya Pradesh 4. Industrial Development in Madhya Pradesh 6 Infrastructure Developments in Madhya Pradesh- Power, Transport And Communication 7. Employment oriented schemes in Madhya Pradesh 	<p>12 Lectures</p>
<p>Key words: Sectorial Composition, Human Resources of India, Indian Agriculture , Industrialization, Infrastructure, Five year Plan in India , Regional Disparities , Industrial Development</p>		

Part c- Learning resources	
Reference Books ,Other resources	
<p>1. Suggested readings: 1. Pannagariya, Arvind (2020) –India Unlimited :Reclaiming the lost Glory , harper collins publishers India</p> <p>2. Mishra and Puri (2020) – Indian Economy Himalaya publishing House New Delhi.</p> <p>3. Rudra Dutta and Sundaram - – Indian Economy, S.Chand and Company House</p>	

New Delhi,

4. Hariharan, N.P (2008) -Lights and Shades of Indian Economy Vishal publishing, Jalandhar
5. Uma Kapila (20th Edition) (2009) Indian Economy since Independence, Academic Foundation, New Delhi.
6. Reserve Bank of India- Annual Reports

Suggested Equivalent online course:

<https://online.course.nptel.ac.in/noc21hs/preview>

Suggested Digital platform:

1. <https://www.indiabudget.gov.in/economicsurvey/ebookes2021/index.html>
2. [https://des.mp.gov.in/Ports/o/Economic surely/ebookes2021%2020-21.pdf](https://des.mp.gov.in/Ports/o/Economic%20surely/ebookes2021%2020-21.pdf)
3. www.indiabudget.gov.in/economic survey/
4. <https://www.rbi.org.in/scripts/AnnualReportMainDisplay.aspx>.

Part D-Assessment and Evaluation

Suggested continuous Evaluation Methods:

Max. Marks :100

Continuous Comprehensive Evaluation (CCE):25 Marks

University Exam 75 Marks

Internal Assessment:	Class Test	15
Continuous Comprehensive Evaluation(CCE):25 Marks	Assessment/Presentation	10

External Assessment:

University Exam Section: 75

Time:2.00 hours


 Controller of Examinations
 Sri Satya Sai University of Technology
 & Medical Sciences Sehore (M.P.)



PART A INTRODUCTION

Program: Certificate		Class: BA I	Year: 2021	Session: 2021-22
Subject: History				
1	Course Code	AI-HIST-2G		
2	Course Title	Constitutional History of India		
3	Course Type (Core Course/Elective/Generic Elective/Vocational/....)	Elective		
4	Pre-requisite (if any)	This course can be opted by any student who has passed 12th class.		
5	Course Learning outcomes (CLO)	Students will analyze the salient features of the constitutional development during Company's Rule in India from 1773 - 1857 and to assess their impact on the freedom struggle of India. They will know about the influence of the British Crown on India. They will be able to write a detailed essay on the various acts passed during the Crown's period in India from 1858- 1947 and their impact on the socio political life of India. Students will be able to critically examine the major reforms by the British Government in India and highlight their salient features. They will gain the knowledge of Indian Constitution.		
6	Credit Value	04		
7	Total Marks	Max. Marks: 25+75=1	Min. Passing Marks: 33	

PART B- CONTENT OF THE COURSE

Total No. of Lectures-Tutorials-Practical.(in hours per week) : L-T-P : 2 H/W

Unit	Topics	No. of Lectures
I	Constitutional Development During Company's Rule (1773, 1793) Regulating Act of 1773 : causes for the passing of the Regulating Act, main provisions of the Act. Bengal Judicature Act 1781, Pitt's India Bill of Dundas 1783, Fox India Bill 1783, Pitt's India Act of 1784, Claiter Act 1793.	12
II	Constitutional Development During Company's Rule.(1833-1854) Charter Act of 1813: main provisions of the Act; Charter Act of 1833-background, main provisions; Charter Act of 1853 - background, main provisions of the Act, significance of the Act. Government of India Act 1854.	12

III	<p>Constitutional Development during the Rule of the Crown Government of India Act, 1858 - Background, main provisions of the Act, evaluation of the Act, Queen Victoria's Proclamation Letter', significance of the proclamation.</p> <p>Indian Council Act 1861- causes for the passing of the Act, provisions of the Act, provisions related to Provincial Legislative Assemblies defects of the Act, significance of the Act,</p> <p>Indian Council Act 1892 - causes for passing of the Act, main provisions of the Act, defects of the Act, significance of the Act.</p>	12
IV	<p>Morley-Minto Reforms and Mont-Ford Reforms</p> <p>Government of India Act 1909 - Causes for passing of the Act, Government's outlook towards the reforms, main provisions of the Act, defects of the Act, significance of the Act</p> <p>Government of India Act 1919 - Causes for passing of the Act, significance of the Montague declaration, Montague-Chelmsford Report, passing of the Act, preamble of the Act, main features of the Act.</p>	
V	<p>Provincial Autonomy, Indian Independence and Indian Constitution The Government of India Act of 1935 - Features of the Act, 'Home Government, Advisors of the Indian Secretary, High Commissioner, proposed Federal Plan—organization, criticism, conclusion. Meaning of Provincial autonomy.</p> <p>Government of India Act, 1947-The Mountbatten Plan, Factors responsible for the Independence of India, provisions and significance of the Act. Main Features of Indian Constitution.</p>	12

Keywords/Tags: Act, Constitution, Crown and Reforms and Autonomy

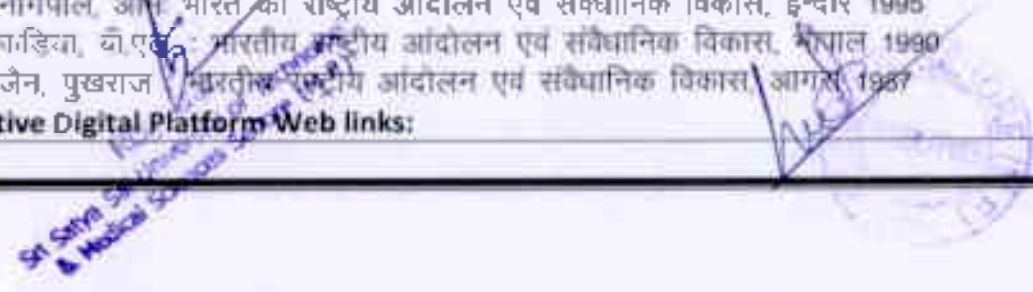
Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings

- 1- Sumit Sarkar: Modern India 1885 to 1947. Macmillian, 1983
- 2- R. Jeffery, J Masselos: From Rebellion to the Republic
- 3- Paul Brass: The Politics of India since Independence
- 4- Agarwal, R.C.: Indian National Movement and Constitutional Development, New Delhi
- 5- Desai A.R.: India's Path of Development
- 6- Tara Chand: History of Freedom Movement in India Vot1,2,3,4
- 7- Bipan Chandra and Others: Freedom Struggle.
- 8- Majumdar, R.C.: History & Culture of Indian People, Vol. 8, 9, 10 &11, Bombay, 1954
- 9- Grover and Yashpal : Indian National Movement and Constitutional Development, Delhi
- 10- अग्रवाल आर.सी.: भारतीय संविधान का विकास राष्ट्रीय आन्दोलन, नई दिल्ली,1996
11. ताराचंद: भारतीय स्वतंत्रता आन्दोलन का इतिहास, खंड 1,2,3,4 नई दिल्ली 1996
- 12- पांडे, श्रीनेत्र: आधुनिक भारत का इतिहास, भाग 1 एवं 2 इलाहाबाद 1988
- 13- ग्रोवर एवं यशपाल: भारतीय स्वतंत्रता संग्राम तथा संवैधानिक विकास, नई दिल्ली 1995
- 14- शिंह, वीरकेश्वर प्रताप: भारतीय राष्ट्रीय आन्दोलन एवं संवैधानिक विकास, नई दिल्ली 1995
- 15- नागपाल, आर.सी.: भारतीय राष्ट्रीय आंदोलन एवं संवैधानिक विकास, इन्दौर 1996
- 16- पांडेया, बी.एन.: भारतीय राष्ट्रीय आंदोलन एवं संवैधानिक विकास, भोपाल 1990
- 17- जैन, पुखराज: भारतीय राष्ट्रीय आंदोलन एवं संवैधानिक विकास, आगरा 1987

Suggestive Digital Platform Web links:



- 1- <https://byjus.com/free-ias-prep/constitutional-development-of-india/>
- 2- <http://www.ignru.ac.in/eContent/BA-PoliticalScience-02Sem-DrudaySingh>
- 3- [Indian%20Governmen1%20and%20Politics.pdf](#)
- 4- <https://www.jstor.org/stable/1226621?seq=1>
- 5- https://en.wikipedia.org/wiki/Constitution_of_India
- 6- <https://constitutionnet.org/country/constitutional-history-india>
- 7- <https://blog.lpleadersin/history-and-develument-of-the-constitution-of-india/>

Suggested equivalent online courses:

Part D – Assessment and Evaluation

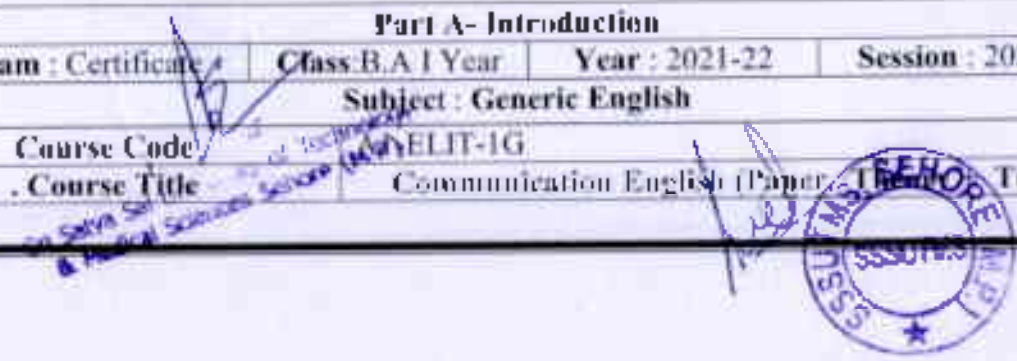
Suggested Continuous Evaluation Maximum
 Marks: 100
Methods: Marks University Exam (UE) 75 marks
 Continuous Comprehensive Evaluation (CCE): 25

Internal Assessment: Evaluation (CCE): 25 Continuous Comprehensive	Class Test	15
	Assignment/Presentation	10

External Assessment: University Exam Section: 75 Time: 02:00 Hours	Section (A) : Three Very Short Question (50 Words Each) Section (B) : Four Short Questions (200 Words Each) Section (C) : Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09 = 36 02 x 15 = 30 Total 75
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Any Remarks/ Suggestions:

Part A- Introduction			
Program : Certificate	Class: B.A I Year	Year : 2021-22	Session : 2021-2022
Subject : Generic English			
Course Code	GENELIT-1G		
Course Title	Communication English (Paper I) Tutorial		



	<p>2.4 Précis writing and paraphrasing 2.5 Vocabulary enrichment</p> <p>Keywords/Tags: LRWS, Receptive skills, Attentive listening, Word stress, Syllable, Received pronunciation(RP), Summarizing pragmatic competence.</p>	
III	<p>Practicing writing speaking skills</p> <p>3.1 Formal and informal writing of letter and invitation, meeting minutes, official orders and appointment creative writing listening to talks and presentation, note making tips.</p> <p>3.2 Communicative approach lexical approach task based learning.</p> <p>3.3 Report writing story writing daily routine in English</p> <p>3.4 Situational conversation between two friends on different topics .</p> <p>Keyword/Tags Productive skills code mixing, Situational conversation, Structural English, Frequent use of proverbs, phrases and idioms.</p>	15+04
IV	<p>Application of communicate in English</p> <p>4.1 Translation (from Hindi to English and vice versa)</p> <p>4.2 Group and Peer discussion ,role play</p> <p>4.3 Contrastive analysis between 1.1 and 1.2 at structural, Phonological and lexical levels with example</p> <p>Keywords/ Tags: Literary translation, translation theories L1 interference, Bilingualism types of Role –play conversational English</p>	10+04

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. "A communicative grammar of English" Leech Geoffrey, and Jan Svartvik Routledge, 2003 Third edition.
2. "CLT for ESL Teachers and Learners" Gautam .GS, Classical Publishing Company, New Delhi India 2012 First ed.
3. "Communicative English for Globalization" Gautam GS ,Classical Publishing Company, New Delhi India 2030 First edition.
4. "Communicative English language skills Sumi Sumague Juhin Arjuna Society Publishing 2020.
5. "Communicative Methodology in Language Teaching Brumfit C Cambridge University Press 1984.
6. "Language Teaching a Scientific Approach" Lado Robert, McGraw -Hill New York 1964.
7. "Motivation -The Teacher's Responsibility" Allwright, Dick ELTS Journal 31st 4 1977..
8. "Problems and Principles in Language Teaching Brumfit C Pergamon Institute of English 1980.
9. "The Learner -Centred Curriculum" Nunan D Cambridge University Press 1988.



Suggested digital platform weblinks :

1. www.skillsyouneed.com/ips/what-is-communication.html
2. www.slideshare.net/mwakidimi/communication-notes-69103614

Suggested equivalent online courses:

- <https://www.coursera.org/specializations/improve-english> Improve your English Communication Skills Specialization by Gerry Landers, Amalia B. Stephens, Karen Peterson, Georgia Tech Language Institute.

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 10 Total Marks 25
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 x 03 = 09 04 x 09= 36 02 x 15 = 30 Total 75

Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks

Any remarks/ suggestions: Tutorial activities (based on syllabus) in the class by students and teacher are desirable. These will strengthen the student's knowledge of communicative English.

Internal Assessment: Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 10 Total Marks 25
External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 x 03 = 09 02 x 15 = 30

(Signature)
Rajendra K. S.
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)



भाग - अ - परिचय			
कार्यक्रम : प्रमाण-पत्र	कक्षा : प्रथम वर्ष	वर्ष : 2021	सत्र 21-22
विषय : प्रयोजनमूलक हिंदी (Functional Hindi), प्रश्न पत्र प्रथम (वैकल्पिक)			
1	पाठ्यक्रम का कोड	A1-FHIN-1G	
2	पाठ्यक्रम का शीर्षक	हिन्दी और विज्ञापन व्यवसाय	
3	पाठ्यक्रम का प्रकार	जेनेरिक (Generic Elective)	
4	पूर्वपेक्षा (Prerequisite)	इस कोर्स का अध्ययन करने के लिए, छात्र ने किसी भी संकाय/विषय में कक्षा 12वीं अथवा समकक्ष परीक्षा उत्तीर्ण की हो। (Open for all)	
5	पाठ्यक्रम अध्ययन की परित्वियां (कोर्स लर्निंग आउटकम) (CLO)	<p>आज के वैश्वीकरण एवं बाजारवाद के दौर में विज्ञापन एक सशक्त माध्यम के रूप में उभरकर सामने आया है। विज्ञापन का क्षेत्र अत्यधिक व्यापक एवं बहुआयामी है। न केवल उत्पादन कंपनियों द्वारा वस्तु का प्रचार-प्रसार किया जा रहा है बल्कि जनकल्याण, शैक्षणिक संस्थाओं एवं सूचनाओं के प्रचार-प्रसार में भी विज्ञापनों की महती भूमिका है। हिन्दी आज बाजार की जरूरत बन गयी है। हिन्दी बोलने-समझने वालों की संख्या में आश्चर्यजनक वृद्धि होने के कारण विपणन-कंपनियों को अपने उत्पाद बेचने के लिए हिन्दी में तैयार विज्ञापन की अत्यंत आवश्यकता है। हिन्दी भाषा के माध्यम से विभिन्न जनसंघार माध्यमों में विज्ञापन व्यवसाय द्वारा रोजगार की अपार संभावनाएं हैं। विज्ञापन की अवधारणा, आवश्यकता, निर्देश व सिद्धान्त, विज्ञापन-लेखन की रचना-प्रक्रिया से विद्यार्थी को परिचित कराना ही इस पाठ्यक्रम के अध्ययन-आध्यापन का प्रयोजन है।</p> <p>पाठ्यक्रम के अध्ययन से -</p> <p>1. इस पाठ्यक्रम के अध्ययनोपरान्त विद्यार्थी को प्रिंट मीडिया, इलेक्ट्रॉनिक मीडिया, विज्ञापन एजेंसियों व अन्य संस्थाओं में विज्ञापन-लेखन के माध्यम से रोजगार के अवसर उपलब्ध हो सकेंगे।</p> <p>विभिन्न प्रकार के विज्ञापनों से संबंधित स्लोगन, गीत, जिंगल-लेखन, तुकांत कविता, रेखाचित्र, बैनर, पोस्टर, रंग-संयोजन, कैलेंडर निर्माण आदि के कौशल का विकास</p>	

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 Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

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		<p>विद्यार्थी में हो सकेगा।</p> <p>3. अपने देश समाज एवं क्षेत्र विशेष के उपभोक्ता की रुचि, क्व-शक्ति एवं वस्तु की मांग से विद्यार्थी विज्ञापन-लेखन के दौरान परिचित होगा, जिससे उसमें विश्लेषण क्षमता का विकास हो सकेगा।</p> <p>4. विज्ञापन की तथ्यात्मक बनाने के लिए विद्यार्थी विभिन्न उत्पाद कंपनियों के उत्पादों की जानकारी प्राप्त करने का प्रयास करेगा जिससे उसमें तुलनात्मक एवं तार्किक विवेचन की क्षमता का विकास होगा, जिससे वह स्वयं का व्यवसाय आरंभ करने के लिए भी प्रेरित हो सकेगा।</p> <p>5. विज्ञापन-लेखन के अभ्यास से विद्यार्थी में कल्पनाशीलता, रचनात्मक एवं भाषा के विविधता भरे कौशल की अभिवृद्धि होगी।</p>	
6	क्रेडिट मात्र	सैद्धान्तिक - 4	
7	कुल अंक	अधिकतम अंक 25+75	न्यूनतम उत्तीर्ण अंक : 33

भाग - ब - पाठ्यक्रम की विषयवस्तु

व्याख्यात की कुल संख्या - ट्यूटोरियल - प्रायोगिक (प्रति सप्ताह घंटे में) : 3 घण्टे प्रति सप्ताह (L-T-P : 3-0-0)
कुल व्याख्यान : 60

इकाई	विषय (Topics)	व्याख्यान की संख्या
I	<p>विज्ञापन : अर्थ, परिभाषा एवं विशेषताएँ।</p> <p>विज्ञापन का उद्देश्य, आवश्यकता एवं महत्व।</p> <p>विज्ञापन और व्यापार का संबंध।</p> <p>विज्ञापन का इतिहास और विकास।</p> <p>विज्ञापन : कानून और आचार संहिता।</p>	15
II	<p>विज्ञापनों का वर्गीकरण।</p> <p>विज्ञापन के प्रकार अर्थ और आधारभूत सिद्धान्त।</p> <p>विज्ञापन - निर्माण की प्रविधि : प्रारूप-निष्पादन,</p>	

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15

	अभिकल्पना (डिजाइन) और अभिविन्यास (ले-आउट)। विज्ञापन-भाषा की विशिष्टताएँ एवं भाषा-संरचना।	
III	विज्ञापन के विविध माध्यम - मुद्रण माध्यम - समाचार पत्र, पत्रिकाएँ। श्रव्य माध्यम - रेडियो, एफ.एम. रेडियो, मुनादी। दृश्य श्रव्य माध्यम - टी.वी., इंटरनेट, मोबाईल, सोशल मीडिया, ई-विज्ञापन। अन्य माध्यम - होर्डिंग, पोस्टर, बैनर, पर्चे, स्टीकर, प्रदर्शनी आदि।	15
IV	विज्ञापन के नए संदर्भ : प्रायोजित कार्यक्रम। विज्ञापन का उपभोक्ता बाजार एवं अर्थव्यवस्था पर प्रभाव। हिन्दी विज्ञापनों से जुड़ी प्रमुख एजेंसियों का परिचय। हिन्दी भाषा के विकास में विज्ञापनों की भूमिका।	15

सार बिन्दु (की वर्ड) टैग : विज्ञापन, विज्ञापन-भाषा, मुद्रित माध्यम, दृश्य-श्रव्य माध्यम, सोशल मीडिया, ई-विज्ञापन, विज्ञापन एजेंसी, ले-आउट, अभिकल्पना, डिजाइन

भाग-स - अनुशंसित अध्ययन संसाधन

पाठ्य पुस्तकें, संदर्भ पुस्तकें, अन्य संसाधन

अनुशंसित सहायक पुस्तकें / ग्रंथ / अन्य पाठ्य संसाधन / पाठ्य सामग्री :

1. अग्रवाल, नयु - "भारतीय विज्ञापन में वैदिकता" - प्रकाशन विभाग, नई दिल्ली, सं.-1995
2. कुलश्रेष्ठ, डॉ. विजय - "जनसंपर्क, प्रचार एवं विज्ञापन" - राजस्थान प्रकाशन, जयपुर, सं.-2017
3. कुलश्रेष्ठ, डॉ. विजय - "विज्ञापन : सिद्धांत और प्रयोग" - माया प्रकाशन मंदिर, जयपुर, सं.-2018
4. जेठवानी, जयश्री एवं अन्य - "विज्ञापन और जनसंपर्क" - सागर पब्लिकेशन्स, नई दिल्ली।
5. तिवारी, डॉ. रामचन्द्र - "विज्ञापन व्यवसाय एवं कला" - आलेख प्रकाशन, दिल्ली, सं.-2008
6. पाण्डेय, कैलाश नाथ - "विज्ञापन बाजार और हिंदी" - वाणी प्रकाशन, दिल्ली सं.-2018
7. पाण्डेय, आशा - "हिंदी विज्ञापनों की भाषा" - ब्लेकी एण्ड पब्लिशर्स प्रा.लि., दिल्ली, सं.-1986
8. परीकर, आशुतोष - "हिंदी विज्ञापनों का पहला दौर" - अनन्य प्रकाशन, दिल्ली, सं.-2017
9. महाजन, अज्ञोक - "विज्ञापन" - हरिप्रसाद साहित्य अकादमी, पंचकुला, सं.-2010
10. मोहन, महेन्द्र - "एडवर्टाइजिंग मैनेजमेंट" - मैगोनिल एजुकेशन इंडिया, सं.-2010
11. शर्मा, कुनुद - "विज्ञापन की दुनिया" - प्रभात प्रकाशन, दिल्ली, सं.-2010



12. यादव, नरेन्द्र सिंह - "विज्ञापन तकनीक एवं सिद्धान्त" - हिन्दी एवं अकादमी, जयपुर, सं.
-2017
13. इट्याल, एकेश्वर प्रसाद - "विज्ञापन कला" - राजस्थान हिंदी ग्रंथ अकादमी, जयपुर, सं.
-1989

अनुसंधित वेबसाइट एवं डिजिटल संपर्क-सूत्र :

1. www.ndl.iitkgp.ac.in. (National Digital Library of India)
2. <http://www.eittpublication.mhrd.gov.in/>
3. <http://ugcmoocs.inflibnet.ac.in/>
4. <http://ignou.ac.in/eGyankosh>
5. <http://ugcmoocs.inflibnet.ac.in/>
6. <http://www.swayamprabha.gov.in/>
7. www.mghv.in


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Part A Introduction			
Program : Certificate		Class: B.A.1 st Year	Year: 2021
Session :2021-2022			
Subject : Psychology			
1	Course Code	A1-BECO-1G	
2	Course Title	Organizational Behavior	
3	Course Title (Core Course/Elective /Generic Elective /Vocational).....	Elective	
4	Pre- requisite (if any)	-	
5	Course Learning outcomes (CLO)	The course will enable the students to develop an understanding of the principles of human behavior in organizations with relevance of the Indian business context.	
6	Credit Value	Theory -6	
7	Total Marks	Max. Marks: 25+75=100	Min. Passing Marks: 33
Part B			
Content of the Course-GE Subject-I (Organizational Behavior)			
Total No. of Lectures –Tutorials –Practical (in hours per week):			
Total No. of Lectures=90			
Unit	Topics	No. of Lectures	
Unit I	INTRODUCTION: Concept of Organizational behaviour(OB); Management roles, skills and activities; Disciplines that contribute to OB; Opportunities for OB(Globalization, Indian workforce diversity, customer service, innovation and change, networked organizations, work-life balance, people skills, positive work environment, ethics	12	
Keywords /Tags : Organizational Behavior(OB); Globalization; Innovation; change; Networked organizations; Work-Life balance; people skills; Environment; ethics			
Unit II	INDIVIDUAL BEHAVIOUR: 1. Learning, attitude and job satisfaction: concept of learning, conditioning, shaping and reinforcement. Concept of attitude, components, behavior and attitude. Job satisfaction; causation; impact of satisfied employees on workplace. 2.Motivation: Concept, Theories(Hierarchy of needs, X and Y, Two factor, McClelland, Goal setting, Self-efficacy, Equity theory); Job characteristics model; Redesigning job and work arrangement; Employee involvement; Flexible benefits, Intrinsic rewards 3.Personality and Values: Concept of personality; Myers-Briggs Type Indicator(MBTI); Big Five model. Relevance of values; Indian values; Linking personality and values to the workplace(person-job fit, Person-organization fit) 4. Perception, Decision Making and Emotions: Perception and Judgment; Factors; linking perception to individual decision making; Decision making in organizations, Ethics in decision making; Emotional labour; Emotional Intelligence	13	



Keywords /Tags : Learning; Attitude; Job satisfaction ; Motivation; personality; values; perception; decision making emotions		
III	<p>GROUP BEHAVIOUR:</p> <p>1.Group and Work Teams: Concept; five stage model of group development; Group think and shift; Indian perspective on group norms. Groups and teams; Types of teams; Creating team players from individuals; Team building and team based work(TBW)</p> <p>2. Leadership: Concept; Trait Theories; Behavioral Theories(Ohio and Michigan studies); Contingency theories(Fiedler, Hersey and Blanchard, Path-goal); Authentic leadership; Mentoring, Self leadership, online leadership; Inspirational Approaches(transformational, Charismatic); Comparison of Indian Leadership styles with other countries. Exercises, games and role plays may be conducted to develop team and leadership skills</p>	11
Keywords /Tags : Groups, Work teams; Leadership		
VI	<p>ORGANISATIONAL CULTURE AND STRUCTURE:</p> <p>Concept of culture; impact(functions and liability);creating and sustaining culture; Employees and culture; Creating positive and ethical cultures. Concept of structure, Prevalent organizational designs, New Design options.</p>	12
Keywords /Tags : Culture ; structure		
V	<p>ORGANISATIONAL CHANGE, CONFLICT AND POWER:</p> <p>Forces of change; planned changes; Resistances; Approaches(Lewin's model, Organizational Development); Learning organization; Organisational change in Indian businesses. Concept of conflict; Traditional view and interactions view of conflict; Conflict process; Functional/Dysfunctional. Introduction to power and politics.</p>	12
Keywords /Tags : Change; Resistance; Conflict; Power, Politics		


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Part C-Learning Resources

Text Book, Reference books, other resources

Suggested Reading:

1. Luthans Fred, "Organizational Behaviour", McGraw Hills
2. Hellriegel, Stocum and Woodman, OB, South-western, Thomson learning, 9th ed, 2001
3. Behavior in organization, Jerald Greenberg, 8th ed, pearson edu
4. Arnold John, Robertson, Ivan L and cooper, Cary, I, "Work psychology: understanding human behavior in the workspace" Macmillan India Ltd, Delhi.
5. Dwivedi, R.S; "Human relations and organizational behavior: A global perspective". Macmillan India Ltd, Delhi.

Suggestive equivalent online courses:

1. <https://www.coursera.org/courses?query=economics>
2. <https://www.mooc-list.com/tags/economics>
3. <https://www.coursera.org/learn>
4. <https://ocw.mit.edu/courses>
5. <https://nptel.ac.in/courses/macroeconomics>
6. <https://nptel.ac.in/courses/economics>
7. https://nptel.ac.in/courses/managerial_economics

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 25

University Exam (UE) 75 marks

Time: 02:00 Hours

Internal Assessment:	Class Test	15
Continuous Comprehensive Evaluation(CCE):	Assignment/Presentation	10
	Total	25
External Assessment:	Section (A): Three Very Short Questions(50Words Each)	03*03=09
University Exam :	Section(B): Four Very Short Questions(200Words each)	04*09=36
	Section(C): Two Long Questions(500Words Each)	02*15=30
	Total	75


 Registrar
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Part A Introduction			
Program: Certificate/Diploma/ Degree	Class: B.A. 1 st Year	Year: 2021	Session : 2021-2022
Subject : Political science			
1	Course Code	A1-POSC-1G	
2	Course Title	Indian political system	
3	Course Title (Core Course/Elective /Generic Elective /Vocational/.....)	Elective	
4	Pre- requisite (if any)	To study this course, a student must have passed 12 th Student of any subject can study this course.	
5	Course Learning outcomes (CLO)	1. Students will be able to understand nature of Indian political System and its determinates. 2. They will be able to answer questions related to the functions and role of the president, prime Minister, parliament and Supreme Court, party system in the institutional settings of Indian political system. 3. They will be a able to understand basic problems of Indian political system. 4. They will be able to identify the challenges of Indian political system.	
6	Credit Value	Theory-6	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks: 33
Part B- Content of the Course			
Total no of Lectures –Tutorials –Practical (In hours per week): 4 hours per week			
Total Lectures - 60 hours			
Unit	Topics	No. of Lectures	
1	Fundamentals of India Indian political system 1. Nature of Indian political system. 2. Determinants of Indian political system. 2.1 Salient Features of Indian Constitution 2.2 preamble 2.3 fundamental rights 2.4 Directive principles of state policy 3. Federal system 4. Parliamentary system	23	

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II	Institutional setting of Indian political system 1. Role of functions of president , prime Minister and Council of Ministers 2. Parliament and its working 3. Supreme Court and judicial Review 4. Panchayati raj Institutes	23
III	Problems of Indian political system : 1. Linguism. 2. Regionalism 3. Casteism 4. Communalism	22
IV	Challenges of Indian political system : 1. Poverty 2. Social justice 3. Gender justice 4. Defection politics 5. Election Reforms	22

Keywords/ Tags

Part C-Learning Resources

Text Books, Reference Book, Other resources

Suggested Readings:

- 1- Austin,G "The Indian Constitution: Cornerstone of a Nation", Oxford University press, Delhi,1966.
- 2- Basu,D.D " Introduction to the Constitution of India",24 th edition,LexisNexi Publication, Gurgaon, Haryana, 2020.
- 4- Jayal, Nirja Gopal and pratap Bhanu Mehta, Companion to politics in India student edition", Oxford University press New delhi.2010.
- 4- Kashayap, Subhash, Our constitution: an Introduction to Indias Constitution and Constitutional law" National Book Trust, India. 2011.
- 5- Kashayap, subhash," Constitution of India", National Book Trust, India, 2004.
- 6- Kaviraj,"politics in india", Oxford University press Delhi, 1970.
7. Kothary, R, Politics in India", orientLongman, New Delhi, 1970.
8. M. Laxmikant, Indian polity ", McGraw Hill Education

- 9- Narang, A.S "Indian Government and politics", Geetanjali publishing House, New Delhi,1996 (Latest edition)
- 10-Sharma, B.K" Introduction to the Constitution of india", PHI Learning Delhi. 2019.
- 11- Pylee, M.P.,Saxena, R "Federalizing India in the age of Globalizations", primus Book, New Delhi, 2013.
- 12- Roy, H& Singh, M.P "Indian POLITICAL System", Pearson, Delhi 2018.

Suggestive digital platforms web links

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1. <https://WWW.Jstor.org/stable/2125628?seq=1>
2. <https://politicalscience.stanford.edu/research/political-theory>
3. <https://link.springer.com/referenceworkentry/10.1007%2F978-1-4020-8265-8-1431>
4. <https://www.YouTube.Watch?v=fdTNlx52weg>

Suggestive equivalent online courses:

NPTL- Introduction to political Theory by Prof. Mithlesh kumar jha. IIT gwahati

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:100

Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks

Internal Assessment:	Class Test	15
Continuous Comprehensive Evaluation(CCE):25	Assignment/Presentation	10
External Assessment: University Exam Section: 75 Time:02.00 Hours	Section (A): Three Very Short Questions(50Words Each)	03x03=09
	Section(B): Fore Short Questions(200Words each)	04x09=36
	Section(C): Two Long Questions(500Words Each)	02x15=30 Total 75

Any remarks suggestions:


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Part A Introduction			
Program : certificate Course	Class: B.A. 1st Year	Year: 2021	Session : 2021-2022
Subject :Sociology			
1	Course Code	AI-SOCI-1G	
2	Course Title	Introduction to Sociology	
3	Course Title (Core Course /Elective /Generic Elective /Vocational/.....)	Elective	
4	Pre- requisite (if any)	This is an elective paper open for all H.A. 1 st Year Students, except those who have opted Sociology as core paper.	
5	Course Learning outcomes (C.L.O)	<ol style="list-style-type: none"> 1. This course will enhance the conceptual Learning and understanding of the basic concept used in Sociology. 2. The Paper will contribute in enriching the vocabulary and scientific temperament of the student about human society. 3. In this course student will get information about employment opportunities related to the discipline of Sociology. 4. The Course will provide Knowledge about social-cultural processes. 	
6	Credit Value	Theory-4	
7	Total Marks	Max. Marks; 25+75	Min. Passing Marks: 33
Part B- Content of the Course			
Total no of Lectures –Tutorials –Practical (in hours per week): 6 hours per week			
Unit	Topics	No. of Lectures	
I	Emergence of Sociology 1.Tradition of Indian Thinking 2.Sociology 2.1 Meaning 2.2 Scope 2.3 Subject Matter 2.4 Nature 2.5 Importance 3.Development of Sociology 4. Job opportunities in Sociology	10	
Keywords /Tags : Emergence of Sociology ,Tradition of Indian Thinking,Development of Sociology , Importance of Sociology, Job opportunities in Sociology			
II	Basic Concepts : 1. Society 2. Relation between Individual and Society 3. Community 4. Institution 5. Association 6. Social Group 7. Status and Role	12	
Keywords /Tags : Relation between Individual and Society , Social Structure, Social Group, Social Status, Association in Sociology			


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III	Social Organization and Institutions: (Concept, Emergence, Developments, Forms and Challenges) 1. Family 2. Kinship 3. Marriage 4. Caste, Class and Power 5. Race	12
Keywords /Tags : Social Organization, Social System, Social Institution, Class, Kinship, Race in Sociology		
VI	Social Cultural Processes : 1. Culture 1.1 Meaning 1.2 Characteristics 1.3 Types 1.4 Culture and Civilization 2. Socialization 2.1 Meaning 2.2 Characteristics 2.3 Stages 2.4 Agencies 3. Social processes 3.1 Cooperation 3.2 Accommodation 3.3 Competition 3.4 Conflict	14
Keywords /Tags : Culture, Social Process, Civilization, Socialization, Cooperation		
V	Social Control and Change: 1. Social Control 1.1 Concept 1.4 Means of Social Control 2. Social Stratification 2.1 Concept 2.2 Bases 3. Social Change 3.1 Meaning 3.2 Characteristics 3.3 Factors of social Change 3.4 Patterns of social change	12
Keywords /Tags : Social Control, Social Stratification, Social Change, Factors of Social change, Patterns of Social Change.		
Part C-Learning Resources		
Suggested Readings: 1-Maclver, Robert M & Charles Hunt Page (1949) Society: An Introductory Analysis, New York. 2- Beville Andre (1965) Caste Class & Power, California University, Berkeley. 3-Ghury GS (1961) Caste Class & Occupation, Popular Book Depot, Bombay. 4-Ogburn & Nimkof (1947) Hand Book of Sociology, K. Paul, Trench, Prehner and Comp. LTD. London. 5- Giddens, A. (2006). Sociology (5 th ed.), Oxford University Press London 6-Horton and Hunt (1964) Sociology – The Discipline and its Dimensions: New Central Book Agency, Calcutta.		


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7- Johnson Harry M.(1988)Sociology- A Systematic Introduction. Allied Publisher Pvt Ltd, New Delhi.			
8-दुवे श्यामाचरण(1993) मानव और संस्कृति, राजकमल प्रकाशन, नई दिल्ली,			
9-आहुजा राम (2008) समाजशास्त्र विवेचना और परिप्रेक्ष्य, रावल पब्लिकेशन, जयपुर			
10- अग्रवाल जी के (2018) समाजशास्त्र की Part A Introduction नवन पब्लिकेशन,आगरा			
Program	Certificate/Diploma/Degree	Class / Year	Year:2021 Session:2021-22
11- सिह जी पी (2019) समाजशास्त्र अवधारणाएँ एवं सिद्धांत, रावल पब्लिकेशन, जयपुर			
12- श्वेल डी एस (2020) समाजशास्त्र, कैलाश पुस्तक सदन, नेपाल			
13- पाटिल अशोक डी एवं मर्दोरिया एस एस (2015) समाजशास्त्र परिचय, मध्यप्रदेश हिन्दी ग्रन्थ अकादमी, नेपाल			
Suggestive digital platforms web links			
https://nios.ac.in/online-course-material/sr-secondary-courses/Sociology-(331).aspx			
Suggestive equivalent online courses:			
IGNOU & Other centrally/state operated Universities /MOOC platforms as "SWAYAM" in india and Abroad.			
Part D-Assessment and Evaluation			
Suggested Continuous Evaluation Methods:			
Maximum Marks:100			
Continuous Comprehensive Evaluation (CCE): 25marks University Exam (UE) 75 marks			
Internal Assessment: Continuous Comprehensive Evaluation(CCE):25	Class Test Assignment/Presentation	15 10	
External Assessment: University Exam Section: 75 Time:02.00 Hours	Section (A): Three Very Short Questions(50Words Each) Section(B): Fore Short Questions(200Words each) Section(C): Two Long Questions(500Words Each)	03 x 03=09 04 x 09=36 02 x 15=30Total 75	
Any remarks suggestions:			


 Registrar
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 Sehore, Madhya Pradesh



Subject: NCC		
1	Course Code	
2	Course Title	NCC Awareness
3	Course Type(Core course/Elective/Generic Elective/Vocational/...)	Elective
4	Pre-requisite (if any)	To study this course ,a student must have passed 12 th with any subject and must be medically fit. This course can be opted as an elective and it is open for all
5	Course Learning outcomes(CLO)	The students will develop a sense of responsibility and there by display sense of patriotism, secular values, discipline, improve bearing and develop the quality of immediate and implicit obedience of good things.This paper will enable the students to build and develop leadership through communication. The significant relationship between personality traits and leadership will be achieved and executed.
6	Credit value	04
7	TotalMarks	Max.Marks: 25+75 Min.PassingMarks:33
Part B- Content of the Course		
Total numbers of Lectures(In hours per week) :2hours per week Total lectures:60Hours I.-T-P (02-00-00)		
Unit	Topics	No of Lectures
I	History of National Cadet Corps: <ul style="list-style-type: none"> ▪ National Cadet corps of Independent india ▪ National Cadet corps Act,1948 ▪ Motto of National Cadet corps ▪ Aims and Objectives. ▪ Emblem,NCC flag,NCC song. ▪ Organization of NCC-Army,Navy and Air Wing. ▪ Training centres of NCC 	15
II	Introduction to Defence Services <ul style="list-style-type: none"> • Army, Navy and Air Force. • Organizational Structure in Charts • Regimental Structure: command and control • Badges and Ranks;Army, Navy,Air Force • Honors and Awards. 	15
III	Personality development: <ul style="list-style-type: none"> • Introduction to personality development • Factors influencing and shaping the personality • Team work and team building, social skills, Etiquettes and manners, Decision making and problem solving, Change your mind set 	15
IV	Leadership: <ul style="list-style-type: none"> • Introduction and type of Leadership • Leadership traits 	15

	<ul style="list-style-type: none"> • How to develop leadership. ▪ Leadership case study(Field Marshal General Sam H.F.J.Manekshaw and General K.M Cariappa) <p>First Aid:</p> <ul style="list-style-type: none"> • Scope and objectives • First aid in common emergencies,Dressing of Wounds. 	
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Part C- Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

S No	Name of Writers	Name of Book	Name of Publishers	Year of publication
1	Sabharwal,D.P	Personality Development	Finger print publishing,India	2015
2	Sabharwal,D.P	Personality Development(Hindi)	publishing,India	2021
3	Gurav, Aarti	50 Mantras of Personality Development	Buzzing stock Publishing	2013
4	Vasudeva, Sangeetha	Personality Development	Clever Fox publishing	2021
5	Kapoor ,Shikha	Personality Development and Soft skills	Dream Tech Press	2020
6	Sinha, Surya	Complete Personality Development course (Hindi)		2012
7	Agrawal,(Dr.) Vijay	Student and Personality Development (Hindi)	Benteen Books	2012
8	Shekhar,(Dr). Priyanshu	Personality Development guide (Hindi)	PrabhatPrakashan	2016
9	Anand, Arunsagar	Personality Development Course (Hindi)	V & S Publication	2013
10	Sharma, Robin	Leadership Wisdom	Jaico publishing House	2003
11	Maxwell, John C	5-Levels of leadership	Cross liance	2014
12	Dravid,Rahul and Iyer,Prakash	The Secret of Leadership	Penguin ,India	2020
13	Dr. Bomi	The Leadership Handbook		2020
14	Bindra, Vivek	Everything about Leadership	Diamond Pocket Books	2018
15	Carnegie,Dale	The Leader in you	Amazing reads	2018
16	Suhramanian, Arunesh and	Leadership by Values	Notion Press	2020

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	Ramiah, Ramkrishan			
17	Manivannan, C. and Manivannan, T. Latha	Text Book of First Aid and Emergency Nursing	EMMESS Medical Publishers	2020
18	Popli, Harvinder and Sharma, Nirmal	Emergency First aid Safety Oriented	CBS Publishers	
19	Jain, N. C. and Saakshi	First Aid and Emergency Case	AITBS Publishers	2019
20	Pippa, Dr. Keech	Practical Guide to First Aid	Anees Publishing House	
21	Gupta, RK	NCC National Cadet Corps (Hindi & English)	Ramesh Publication	2021
22		Hand Book of NCC	Kanli Publication, Itawa	2017
23		Hand Book of NCC an unique book for NCC Cadets	Naveen Publication	2019
24	Ranjan, Shashi and kumar, Aashish	Hand Book of NCC	Goodwin Publication	2021
25	Chauhan, Lt (Dr) Rajeev kumar	NCC National Cadet Corps	Aakriti publication	2021
26		Cadets Hand book	NCC Directorate M.p. & C.G.	
27	Goyal, Harion	Personality Development	Kalpaz Publication, India	
28	Mitra, Barun K	Personality Development and Soft Skills	Oxford University Press India	
29	Mishra, Rajeev k	Personality Development- Transform Yourself	Rupa and Company India	
2. Suggestive digital platforms web links: 1. https://www.en.m.wikipedia.org 2. https://www.firstaidforfree.com				
Suggested equivalent online courses:				

Part D- Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum marks: 100

Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam (UE) 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE): 25 Marks	Class Test Assignment/Presentation	15 10
	External Assessment: University Exam Section: 75 Time : 02.00 Hours	Section (A): Three Very Short Questions (50 words Each) 03x03=09 Section (B): Four Short Questions (200 Words Each) 04x09=36 Section (C): Two Long Questions (500 Words Each) 02x15=30 Total 75

Handwritten signature and stamp of the Head of Department, Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)



Any remarks/Suggestions: NIL

Part A Introduction


Registrar
Sri Satya Sai University of Technology
& Medical Sciences, Sehore (M.P.)



Program: Certificate/Diploma/Degree		Class: 1 Year	Year:2021	Session:2021-22
Subject: NCC				
1	Course Code	NBCOSE(Y-106P)		
2	Course Title	NCC Training		
3	Course Type(Core course/Elective/Generic Elective/Vocational/...)	Elective		
4	Pre-requisite (if any)	To study this course ,a student must have passed 12 th with any subject and must be medically fit. This course can be opted as an elective and it is open for all		
5	Course Learning outcomes(CLO)	Aim of the Course is to inculcate a sense of discipline, create self confidence and to create a human resource of organized,trained youth and to develop the quality of immediate and implicit the obedience of orders. Trained the youth to meet any medical emergency by giving aid.		
6	Credit value	02		
7	TotalMarks	Max.Marks: 25+75	Min.PassingMarks:33	
Part B- Content of the Course				
Total numbers of Lectures-Tutorials-Practical (in hours per week) :2hours per week				
L-T-P:00-00-01				
S.No	Topics	No of Lectures	No of Tutorial	
UNIT-I	Drill: General and Words of command:Attention,Stand at ease, Stand easy, Turning; Right turn,Left Turn and About turn.Sizing, Forming up In three ranks, Numbering and dressing of Troupe. Salute in Army,Navy and Air Force, Its description and training, Falling out and Dismissing.	15		
UNIT-II	Group Discussion on current topics and issues(National & internationals) • Public Speaking/Extempore • First Aid: Bandages and CPR	15		
	TOTAL	30		
Keywords/ Tags: Drill, Troupe,Salute,First aid, CPR				
Part C-Learning Resources				
Text Books,Reference Book, Other Resources				
Suggested Readings:				
S No	Writers	Name of Book	Name of Publishers	Year of publication
1	Ranjan, Bhashi and	Hand book of NCC	Goodwin Publication	2021

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	kumar,Aushish			
2	Chauhan, I.(Dr)Rajeev kumar	NCC National Cadet Corps	AakritiPublication	2021
3		Cadets Hand book	NCC Directorate M.p.& C.G	
4	Goyal, Hariom	Personality Development	KalpazPublication, India	
5	Mitra,Barun K	Personality Development and Soft Skills	Oxford University Press India	
6	Manivannan,C.andManivannan,T.Latha	Text Book of FirstAid and Emergency Nursing	EMMESS Medical Publishers	2020
7	Popli,Harvinder and Sharma, Nirmal	Emergency First aid Safety Oriented	CBS Publishers	
8	Jain,N>C>and Saakshi	First Aid and Emergency Case	AITBS Publishers	2019
9	Pippa,Dr.Keelb	Practical Guide to First Aid	Anees Publishing House	
10	Gupta,RK	NCC National Cadet Corps(Hindi & English)	Ramesh Publication	2021
11		Hand Book of NCC	Kanti Publication, Itawa	2017
12		Hand Book of NCC an unique book for NCC Cadets	Naveen Publication	2019

2.Suggestive digital platforms web links: 1. <https://www.en.m.wikipedia.org>
2. DG NCC TRAINING APP.

:

Part D- Assessment and Evaluation

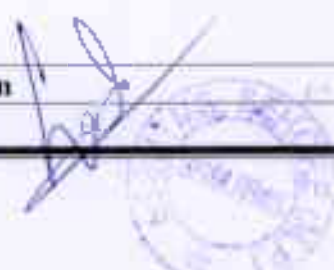
Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz	10	Viva Voce on Practical	15
Attendance	05	Practical Record File	10
Assignments	10	Table Work /Experiments	50
TOTAL	25		75

Any remarks/Suggestions

Part A: Introduction

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Program:- Certificate/Diploma/Degree/ Course		Class: 1 Year	Year:2021	Session:2021-22
Subject: National Service Scheme (NSS)				
1	Course Code	NSS:101		
2	Course Title	Concept of National Service Scheme		
3	Course Type	Elective		
4	Pre-requisite (if any)	To study this course ,a student must have passed 12 th with any subject. This course can be opted as an elective and it is open for all		
5	Course Learning outcomes(CLO)	<p>Course Objective:-</p> <ol style="list-style-type: none"> 1. Main objective of syllabus is developing the personality and character of the students youth through voluntary community service. It will also help them understand the rich cultural service. It will also help them understand the rich cultural diversity of india and have pride through a better Knowledge of the Country. 2. Understand the community in which they work and their relation. 3. Identify the needs and problems of the community and involve them in problem-solving. 4. Develop capacity to meet emergencies and natural disasters. 5. Practice national integration and social harmony and. 6. Utilize their knowledge in finding practical solutions to individual and community problems. <p>Learning Outcome:- To impart hands- on skills in Preparation. The end of the paper, a student should be able to:</p> <ol style="list-style-type: none"> 1. Understand the importance of having community problems and their solution. It might help in job opportunity in some Government approved NGOs, and Ministry of youth affairs and Sports. 2. The students can carry out basic information about Community, which in turn and be of great help in disaster management fields. 3. Students can also go for Social Community Courses, Opening opportunities in different social activity related department. 		
6	Credit Value	Theory -04		
7	Total Marks	Max.Marks: 25+75	Min.Passing Marks:33	

Part B- Content of the Course		
Total numbers of Lectures(in hours per week): 2 hours per week Total lectures: 60 Hours		
Unit	Topics	No of Lectures

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I	Introduction and Basic Concepts of NSS: <ul style="list-style-type: none"> • History and Philosophy. • Aims and Objectives. • Emblem sign, NSS badge, NSS flag. • NSS song: Lakshya Geet, Sadbhawna Geet, Rastriye yuva Geet. Key Words:- Concept of NSS.	15 Hours
II	Organization of NSS, Regular Activities and Programmes: <ul style="list-style-type: none"> • Organization structure of NSS. • Concept of regular activities. • Basis of adoption of village/ slums. • Methodology of conducting survey. • Calendar of NSS activities. • Maintenance of nss work diary. Key Words:- Regular Activities.	15 Hours
III	Day camp, Special camp and Personality development: <ul style="list-style-type: none"> • Various Demension of day camp. • Special camp at college/Unit level. • Other Camps: District level camp, University level camp, State level Leadership Training camp. • NIC camp, Sahshik activity camp, pre -RDC, RDCcamp. Key Words:- Youth Camping.	15 Hours
IV	Youth and volunteerism: <ul style="list-style-type: none"> • Definition, Issues, challenges and opportunities for Youth. • Youth as an agent of social change. • Indian Tradition of volunteerism. • Needs and importance of volunteerism. • Motivation and constraints of volunteerism. Key Words:- Youth volunteerism.	15 Hours

Part C- Learning Resources

Text Books, Reference Books, Other resources

Suggested Reading Materials:

1. National Service Scheme Manual, Government of India.
2. Training Programme on national Programme scheme, TISS.
3. Orientation Courses for NSS programme officers, TISS.
4. Case material as Training Aid for field workers, Gurmeet Hans.
5. Social service opportunities in Hospitals, Kapil K. Krishan, TISS.
6. Social Problems in India, Ram Ahuja.

Suggested equivalent online Courses:

<http://www.thebetterindia.com/140/national-service-scheme-nss>

<http://en.wikipedia.org/wiki/national-service-scheme>

<http://nss.nic.in>

Part D- Assessment and Evaluation (Theory)

Maximum Marks:	100
Continuous comprehensive Evaluation (CCE):	25
University Exam (UE):	75

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Time: 02.00Hours		
Internal Assessment: Continuous Comprehensive Evaluation (CCE):	Class Test	15
	Assignment/Presentation	10
	Total	25
External Assessment: University Exam	Section(A): Three Very Short Questions (50 words Each)	03x03= 09
	Section(B): Four Short Questions (200 words Each)	04x09 =36
	Section(C): Two Long Questions (500 words Each)	02x15 =30
	Total	75

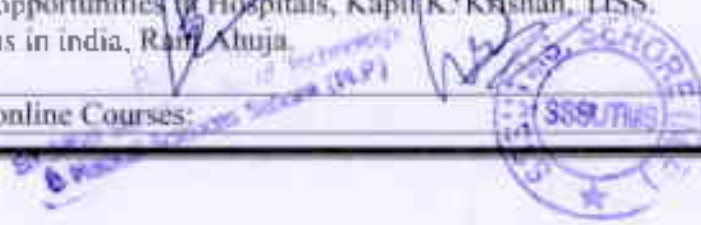
Part A : Introduction			
Program:- Certificate/Diploma/Degree/Course		Class: B.Sc.1 Year	Year:2021 Session:2021-22
Subject: National Service Scheme (NSS)			
1	Course Code	NSS:102	
2	Course Title	Project Tool of NSS	
3	Course Type	Practical/ Project Work	
4	Pre-requisite (if any)	To study this course ,a student must have passed 12 th with any subject. This course can be opted as an elective and it is open for all	
5	Course Learning outcomes(CLO)	<p>Course Objective:- Each student Will Have the option to select two skill-areas out of the list based on the local conditions and opportunities, and will Prepare a report based on field situation.</p> <p>Learning Outcome:- To impart hands- on skills in Preparation. The end of the paper,a student should be able to: Project work of NSS will aim to enhance the employment potential of the NSS volunteers or, alternately to help them to job opportunities in government approved NGOs,ministry of youth Affairs and Sports.</p>	
6	Credit Value	Practical -02	
7	Total Marks	Max.Marks: 25+75	Min.Passing Marks:33

Part B- Content of the Practical Course	
Total numbers of Lectures (In hours per week) :2hours per week Credits -02 (Total Lectures :30 Hours)	
<ul style="list-style-type: none"> Internal Assessment- Marks-25 1. Class Interaction (05) 	Scheme of Practical Examination :- Max.Marks (25+75=100) Max.

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<ul style="list-style-type: none"> • Quiz (05) • Seminar. (07) • Assignments. (08) • External Assessment:- Marks-75 • Report of Regular Activities in the Society. (15) • Report of NSS Volunteerism. (10) • Report of Communication Skills. (10) • Report of Camping Activity . (15) • Report of Excursion/Training/Survey/Data Collection . (10) • Viva-Voce. (05) • Practical Record (10) 	Max.
List of Practical/ Project Activity:- Communication Skill:- Personality development, communications Skill development, Problem-Solving. Key Words- Communication skill project activity.	05
Youth and Community :- Adoption of slum, Survey of slum, Service of Slum, Identification of problems of slum areas. Key Words- Youth community project activity.	07 Hours
Youth and Health:- AIDS, Drugs and substance abuse, Home nursing, First Aid, Yoga as a tool for healthy lifestyle etc. Key words- Regular activity, project activity.	05 Hours
Environmental Issues:- Natural disaster management, natural resource management, Rain water harvesting, Afforestation, Waste management etc. Key words- Natural resources/ disaster management project activity.	06 Hours
Awareness Programme :- Peer mentoring in preventing crimes, cyber crime and prevention juvenile justice, save girls child protection, Blood donation awareness, swacch Bharat abhiyan, Corona virus awareness etc. Key Words- Volunteerism awareness project activity.	07 Hours
Part C : learning Resources	
Text Books, Reference Books, Other resources	
Suggested Reading Materials: <ul style="list-style-type: none"> • National Service Scheme Manual, Government of india. • Training Programme on national Programme scheme, TISS. • Orientation Courses for NSS programme officers, TISS. • Case material as Training Aid for field workers, Gurmeet Hans. • Social service opportunities in Hospitals, Kapil K. Krishan, TISS. • Social Problems in india, Ram Ahuja. 	
Suggested equivalent online Courses:	



<http://www.thebetterindia.com/140/national-service-scheme-nss>
<http://en.wikipedia.org/wiki/national-service-scheme>
<http://nss.nic.in>

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भाषा पाठ्यक्रम : प्रथम प्रवर्ग पत्र - हिन्दी भाषा

(भाग- ए) परिचय			
कार्यक्रम : कृषी लेवल प्रमाण-पत्र	कक्षा : बी.ए. / बी.कॉम / बी. एस. सी. / बी. एच. एम. सी. / बी. सी. ए. / बी. बी. ए. (प्रथम वर्ष)	वर्ष : 2021	सत्र : 2021-2022
विषय : आधार पाठ्यक्रम			
1	कोर्स कोड :	XI-FCEAIT	
2	कोर्स का शीर्षक	भाग और संस्कृति	
3	कोर्स का प्रकार	आधार पाठ्यक्रम	
4	कोर्स उपेक्षित	कक्षा 12वीं उल्लिखित किसी भी विषय समूह में	
5	कोर्स वित्तीयन उपलब्धि (लर्निंग आउटकम) (CLO)	<ul style="list-style-type: none"> उत्कृष्ट साहित्यिकताओं के अध्ययन से स्तम्भेविकसितकटना। सांस्कृतिकवैतनाजौररुष्ट्रीय भावनाकाविकसकटना। भाषा-ज्ञान। सामान्य शब्दावलीऔरविशेष शब्दावली के अध्ययन द्वाराभाषा एवंसंस्कृतिबोध काविकसकटना। विशिष्ट शब्दावली (बीज शब्द/की घड़ी) सेपरिचितकरवानेदुए बोध के स्तम्भेविकसितकटना। प्रतियोगीपरीक्षाओंकेतुतैयास्कटना। 	
6	क्रेडिट मान	02 क्रेडिट	
7	कुल अंक	50 अंक	
8	उल्लिखित अंक	17 अंक	

(भाग - बी) कोर्स सामग्री

व्याख्यान की कुल संख्या : वर्ष में अधिकतम 15 घंटे

यूनिट	विषय	व्याख्यान की संख्या
इकाई - एक	<ul style="list-style-type: none"> मैवलीशरणगुप्तपरिचय पाठ : मातृभूमि (कविता) प्रेमचन्द : परिचय पाठ : शतरंज के खिलाड़ी (कहानी) व्यंग्य : शरदजोशी: जीपपरसवारइतलिया 	5 घण्टे
इकाई -दो	<ul style="list-style-type: none"> वैचारिक-भारतीय भाषाओंमेंराम आचार्यप्रेमचन्द शुक्लपरिचय पाठ : उत्साह (भावमूलक विबंध) रामधारी प्रिंठ दिनकरपरिचय पाठ : भारत एक है (संस्कृति) 	5 घण्टे



	<ul style="list-style-type: none"> • आदिशंकराचार्य- जीवन व दर्शन 	
इकाई -तीन	<ul style="list-style-type: none"> • पर्यायवाची शब्द : विलोम शब्द : अनेक शब्द के लिए एक शब्द (हिन्दी व्याकरण) • संधि और उसके प्रकार (हिन्दी व्याकरण) • बीज शब्द- धर्म, अद्वैत, भाषाअवधारणा, उदासीकरण। 	5 पन्ने
तारिकेन्दू (मई घंटे) / टैम		
सर्वाकारे :		
मैथिलीभाषणजुगल	मैथिलीभाषणजुगल की व्युत्पत्तिमातृभूमि	
प्रेसमंद	प्रेसमंद शतरंज के खिलाड़ी	
रामधारी सिंह टिबकर	भारत एक हैरतमधारी सिंह टिबकर	
आचार्यरामचन्द्र शुक्ल	उत्सवहर्षिचंद्र रामचन्द्र शुक्ल	
स्वामीविवेकानन्द	शिवश्रीव्याकरण	
धर्मक्याहै		
भाषाविकास		
भाषापरिभाषा		
अवधारणाकाअर्थ एवंपरिभाषा		
उदासीकरण की विशेषता		
पर्यायवाची शब्द		
विलोम शब्द		
अनेक शब्द के लिए एक शब्द		
संधि		

(भाग-सी)

अनुसंधित अध्ययन संसाधन

पाठ्य पुस्तकें, संदर्भपुस्तकें, अन्य संसाधन

- प्रेमचन्द-सावसरोवर, खण्ड- 3
- आचार्यरामचन्द्र शुक्ल-विन्तामणि, भाग-1
- डॉ. वासुदेवनन्दनप्रसाद, आधुनिकहिन्दीव्याकरणऔररचना, भारतीयभवन, सखुखाड़ीरोड, पटना, बिहार
- डॉ. राजेश्वरचतुर्वेदी, हिन्दीव्याकरण-उपकारप्रकाशन, अमरा 2 प्र.
- हिन्दीज्ञानकोश

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- इन्टरनेटसागरी-डिजिटललिडित

Part A Introduction			
Program : UG Level	Class : I Year	Year : 2021	Session : 2021-2022
Subject : FOUNDATION COURSE (ENGLISH)			
1	Course Code		XI-FCHHIT

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2	Course Title	English Language and Indian Culture
3	Course Type (Core Course/Elective/Generic Elective/Vocational)	Foundation Course
4	Pre-Requisite (if any)	To Study this course, a student should have basic knowledge of English language. This course will be studied by all the students of UG level under the Foundation course category.
5	Course Learning outcomes (CLO)	Through this course the students will be able to: <ol style="list-style-type: none"> 1. Prepare for various competitive exams by developing their English language competence. 2. Promote their comprehension skills by being exposed to a variety of text and their interpretations. 3. Build and enhance their vocabulary. 4. Develop their communication skills by strengthening grammar and usages. 5. Inculcate values which make them aware of national heritage and environmental issues, making them responsible citizens.
6	Credit Value	(Credit) 2
7	Total Marks	Max. Marks :50 / Min. Passing Marks :17

Part B - Content of the Course

Total No. of Lectures - Tutorials - Practical (in hours per week) : L-T-P


Unit	Topics	No. of Lectures
1	Reading, Writing and Interpretation Skills: <ol style="list-style-type: none"> 1. Where the mind is without fear - Rabindranath Tagore (Key Word: Patriotism) 2. National Education - M.K. Gandhi (Key Word: Edification) 3. The Axe-R.K. Narayan (Key Word: Environment) 4. The wonder that was India - A.L. basham (an Excerpt) (Key Indianness) 5. Preface to the Mahabharata C. Rajagopalachari (Key Word: Indian Mythology) 	05
2	Comprehension Skill: Unseen passage followed by multiple choice questions	05
3	Basic language skills: <ol style="list-style-type: none"> 1. Vocabulary building: Suffix, Prefix, Synonyms, Antonyms, Homophones, Homonyms and One-word Substitution. 2. Basic Grammar: Noun, pronoun, adjective, verb, adverb, prepositions, articles, Time and tense. 	10

Part C- Learning Resources



Text Books, Reference Books, Other resources			
Suggested Readings :			
<ul style="list-style-type: none"> • Essential English Grammar – Raymond Murphy, Cambridge University Press. • Practical English Grammar Exercises 1 – A.J. Thomson & A.V. Martinet, Oxford India. • Practical English Usage – Michael Swan, Oxford • English Grammar in Use – Raymond Murphy, Cambridge University Press. 			
Suggested web links:			
Suggested equivalent online courses:			
Part D- Assessment and Evaluation			
Max. marks : 50	Min. Marks:17	University Exam (UE)	Total:50
U.E. Time 2 Hours			
External Assessment (UE)	Time: 2 hours		
Fifty Multiple Choice / Objective / True-False type questions to be asked. Each Question carries one mark.			

Part A Introduction			
Program : UG Level	Class : I Year	Year : 2021	Session : 2021-2022
Subject : FOUNDATION COURSE (ENVIRONMENTAL EDUCATION)			
1	Course Code	XI-FCACIT	
2	Course Title	Environmental Education	


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3	Course Type (Core Course/Elective/Generic Elective/Vocational)	Foundation Course
4	Pre-Requisite (if any)	A Course intended to create awareness about the life of human beings which is an integral part of environment and to inculcate the skills required protecting the environment from all sides. To study this course, the student must have a knowledge about the environmental components, pollution, biodiversity, and ecosystem at senior secondary, Class 12 th level.
5	Course Learning outcomes (CLO)	<ol style="list-style-type: none"> 1. To understand various aspects of life forms, ecological processes, and the impacts on them by the human during anthropogenic era; 2. To build capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices, and policies, and develop framework to make inform decisions. 3. To develop empathy for all life forms, awareness, and responsibility towards environmental protections and nature preservation. 4. To develop the critical thinking for shaping strategies such as scientific, social, economics, administrative & legal, environmental protection, conservation of biodiversity, environmental equity and sustainable development. 5. To prepare for the competitive exams.
6	Credit Value	(Credit) 2
7	Total Marks	Max. Marks :50 / Min. Passing Marks :17

Part B - Content of the Course

Total No. of Lectures -15 Hrs. (01 Hours per week): Total No. of Lectures: 15

Unit	Topics	No. of Lectures
1	Reading, Writing and Interpretation Skills: <ul style="list-style-type: none"> • Multidisciplinary nature, scope and importance of environment. • Components of environment: Atmosphere, Hydrosphere, Lithosphere, and biosphere. • Brief account of natural resources and associated problems: Land resources, water resources, energy resource. • Concept of sustainability and sustainable development. 	05 Hrs.



	Keywords: Environment, Forest Mineral, Food, land, Energy, Sustainable development.	
2	Biome, Ecosystem and biodiversity: <ul style="list-style-type: none"> • Major biomes: Tropical, Temperate, Forest, Grassland, Desert, Tundra, Wetland, Estuarine and marine. • Ecosystem: Structure function and types their preservation & restoration. • Biodiversity and its conservation practices. Keywords: Biome, Ecosystem, Biodiversity	04 Hrs.
3	Environmental pollution, management and social issues: <ul style="list-style-type: none"> • Pollution: Types, control measures, management and associated problems, • Environmental law and legislation: Protection and conservation acts. • International agreement & programme. • Environmental movements, communication and public awareness programme. • National and International organizations related to environment conservation and monitoring. • Role of information technology in environment and human health. Keywords: Pollution, Environmental Legislation, Environmental Movement, Environmental programme and organization.	06 Hrs.
Suggested activities: (At least one) <ol style="list-style-type: none"> 1. Visit to an area to document environmental assets: Rivers/forest/flora/fauna. 2. Visit to a local polluted site Urban/Rural/Industrial/Agriculture. 3. Study of simple ecosystem. 		

Part C- Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings :

- Singh J.S. S. P. and Gupta S.R.; "Ecology; Environment science and conservation, "S Chand Publishing, New Delhi (2018)
- Divan, S. and Rosencranz, A., "Environmental Law and Policy in India: Cases, Material & Status" Oxford University Press, India, (2002) 2nd Edition.
- Odum, E.P., "Fundamentals of Ecology", Philadelphia Saundres, (1971).
- Bharucha, Erach, "Environmental Studies" Universities press India Pvt. Ltd. Hyderabad (2014) (Hindi Edition also available).
- Kaurik. Annaba, Kaurik. C.P. "Perspective in Environmental Studies", New age International Publishers, (2018), 6th Edition.
- Astana D.K AstanaMe era, "A Textbook of Environmental Studies," S. Chand Publishing New Delhi, (2007).
- National Digital Library(<https://ndl.iitkgp.ac.in/homestudy/science>)
- Epg-Pathshala (<https://eopp.inflibnet.ac.in/Home/Download>)
- NPTEL (<https://nptel.ac.in/course.html>)
- Coursera (<https://www.coursera.org/search?query=environmental+science&page=1>)



- इरका बसन्दा, पर्यावरण अध्ययन, ओरियन्ट ब्लैकस्वाल् प्राइवेट लिमिटेड नई दिल्ली (2014)
- इयाभंकर बिभाठी, पर्यावरण अध्ययन, मोतीलाल बनारसीदास पब्लिशर्स दिल्ली (2005)
- रतन जोशी, पर्यावरण अध्ययन, साहित्य प्रबन्ध पब्लिकेशन्स (2018)

Suggested web links:

Suggested Equivalent Online Courses:

1. The health effects of climate change (edx)
2. Climate change: Financial risk and opportunities (edx)
3. Introduction to environmental law and policy (coursera)
4. Women in environmental Biology (coursera)
5. Our Earth: It's Climate, History and process (coursera)
6. Ecology, physiology, environmental science (national digital library)


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Program :Certificate Course		Class:BBA,1 st Year	Year: 2021	Session :2021-2022
Subject :YOGIC SCIENCE				
1	Course Code	AI-YOSC1F		
2	Course Title	YOGA AND MEDITATION (PAPER-2)		
3	COURSE TYPE	FOUNDATION COURSE		
4	Pre-requisite (if any)	For BBA1 year student, this course is compulsory for all.		
5	Course Learning outcomes (CLO)	1. After studying this course, student will be able to : <ul style="list-style-type: none"> • Take care of their own physical mental emotional, social and spiritual health. 		
6	Credit Value	Theory-2		
7	Total Marks	Max. Marks; 50	Min. Passing Marks: 17	
Part B- Content of the Course				
Total no of Lectures –Tutorials –Practical (in hours per week): 2 hours per week				
Unit	Topics		No. of Lectures	
I	Introduction to yoga and yogic practices <ol style="list-style-type: none"> 1. Yoga: Etymology, definition, aim. Objectives and misconceptions. 2. Yoga: its origin history and development. 3. Rules and regulations to be followed by yoga practitioners 4. Introduction to yoga practices 5. Shatkarma: meaning, purpose and their significance in yoga sadhna 6. Key words: history and development of yoga ,shatkarma, common yogic practices. 		10	
II	Breathing Practices And Pranayama <ol style="list-style-type: none"> 1. Sectional breathing (Abdominal, thoracic Clavicular) 2. Yogic deep Breathing 3. Concept of puraka and kumbhaka 4. Concept of Bandha and Mudra 5. Anumoaviloma/ Nadishodhna 6. Shitali 7.bhramari Keywords: sectional breathing, Deep breathing, Bandha& Mudra, shitali, bhramari.		10	


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III	Practices leading to meditation 1. Recitation of pranava Mantra 2. Recitation of Hymns, in vocation and prayers 3. Antra Maun 4. Breath Meditation 5. Om Dhyana Key words: pranava Mantra, Antermaun, Breath meditation, omdhiyan.	10
	Part C-Learning Resources Text BOOKS, REFERENCES BOOKS, OTHER RESOURCES Suggested Readings: 1. Singh S.P&yogiMukesh: foundation of yoga, standard publication, New Delhi, 2010. 2. Swami DhinrendraBrahachari: yogasanavijnana, Dhinrendra yoga, publication, New Delhi, 1966. 3. Saraswati, Swami Satynand: Asana, pranayam, mudra, Bandha (apmb), yoga publication trust, Munger, 2013. 4. H.R Nagendra: asana, pranayama, Mudra, Bandha, swami vivekanand, yogprakashan, Bangalore, 2002. 5. IshwarBhardwaj: saralyogasana, satyam publishing House, New Delhi, 2018. 6. ShiriRaisinghchouhan: Mudra Rahsya, Bhartiayogsansthan ,new delhi,2014 7. Dr. Vishwanathan Prasad sanha: Dhiyan yoga, Bhartiayogsansthan, New Delhi, 1987. 8. Shirdeshraj: Dhiyansadhna, Bhartiya yoga sansthan, NewDelhi, 2015.	
Suggestive digital platforms web links 1. www.rishikeshnathyogshala.com		
Suggestive equivalent online courses: 2. http://theyoginstitute.org		
Part D-Assessment and Evaluation Maximum Marks:50 University Examination (objective) 50 Time : 01.00 Hour		
External Assessment: University Examination	Objective questions	50
Total		50


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Bhopal-Indore Road, Opp. Pachama oilfield plant, Pachama, Dist.-Sehore M.P. PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@sssutms.co.in

MINUTES OF BOARD OF STUDIES MEETING

Name of Department:- Department of Science

Minutes of Board of Studies Committee Meeting, held on Date 12/06/2017

The Board of Studies Committee Meeting was held in the room of Dr. Kanchan Shrivastava Dean, Faculty of Education SSSTMS following members were present.

1. Dr.Kanchan Shrivastava ,Prof. Department of Economics
2. Dr. Deepak Mittal,Asst.Prof. Department of Science
3. Dr.Neelam Tripathi, Asst.Prof. Department of Science
4. Dr.Gajraj Singh, Asst.Prof. Department of Commerce
5. Dr. Reshma Arya, Asst.Prof. Department of History
6. Dr.Abhilasha Pathak, Asst.Prof. Department of Sociology
7. Mr. Abhishek Kuraliya, Asst.Prof. Department of Computer Science
8. Mr.Zuber Khan , Asst.Prof. Department of Maths
9. Mrs.Shobha Vyash Asst.Prof. Department of Hindi
10. Dr. Tabassum Khan ,Professor , Hindi
11. Ms.Khushboo Vaidya, Asst.Prof. Department of Microbiology

The chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda: 1 Discussion of all UG yearly and all PG semester wise Scheme & syllabus UG 1st to IIIrd Year and PG 1st to IVth Semester.

Discussion: In The BOS Meeting,the proposed All PG and UG course was discussed for academic session 2017-18.



(Signature)
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Bhopal-Indore Road, Pachama, Dist. Sehore, M.P. PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@sssutms.co.in

Resolution: It is resolved that the new syllabus and scheme of all UG yearly and all PG semester wise Scheme & syllabus UG 1st to IIIrd Year and PG 1st to IVth Semester approved .

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairperson)



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MSC Zoology I SEMESTER

SUBJECT CODE	COMPULSORY/OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CGE/INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
ZOO101	COMPULSORY	Hisystematics, Taxonomy, Evolution	70	28	30	10	100	38	50	18	150	56
ZOO102	COMPULSORY	Structure & Function of Invertebrates	70	28	30	10	100	38	50	18	150	56
ZOO103	COMPULSORY	Quantitative Biology, Biodiversity and wildlife	70	28	30	10	100	38	50	18	150	56
ZOO104	COMPULSORY	Biomolecules & Structural Biology	70	28	30	10	100	38	50	18	150	56


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**Biosystematics, Taxonomy and evolution
ZOO101**

UNIT-I

Definition and basic concepts of biosystematics taxonomy and classification. - History of Classification
Trends in biosystematics: Chemotaxonomy cytotaxonomy and molecular taxonomy, Dimensions of speciation and taxonomic characters.
Species concepts species category:- different species concepts subspecies and other Infra-specific categories. Theories of biological classification: hierarchy of categories.

UNIT-II

Taxonomic Characters — Different kinds.
Origin of reproductive isolation, biological mechanism of genetic incompatibility. Taxonomic procedures:
Taxonomic collections, preservation, curating, process of identification.
Taxonomic keys, different types of keys, their merits and demerits.
International code of Zoological Nomenclature (ICZN): Operative principles, Interpretation and application of Important rules: Formation of Scientific names of various Taxa.

UNIT-III

Taxonomic categories.
Evaluation of biodiversity indices.
Evaluation of Shannon — Weiner index.
Evaluation of Dominance Index.
Similarity and Dissimilarity Index.

UNIT-IV

Concepts of evolution and theories of organic evolution.

Neo Darwinism and population genetics:

A- Hardy-Weinberg law, of genetic equilibrium.

B- A detailed account of destabilizing forces:

- i- Natural selection
- ii- Mutation
- iii- Genetic Drift
- iv- Migration
- v- Meiotic Drive.
- vi- Trends In Evolution
- vii- Molecular Evolution
 - a) Gene evolution
 - b) Evolution of gene families
 - c) Assessment of molecular variation



UNIT-V Origin of higher categories

Phylogenetic – gradualism and punctuated equilibrium. –

Major trends in the origin of higher categories –

Micro and macro evolution.

Molecular population genetics –

Pattern of changes in nucleotide and amino acid sequence. –

Ecological significance of molecular variations (genetic polymorphism)

Genetic & Speciation –

Phylogenetic and biological concept of species. –

Patterns and mechanism of reproductive isolation.

Modes of speciation (allopatry & sympatry) –

Origin and Evolution & Economically important microscopes and animals.


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STRUCTURE AND FUNCTION OF INVERTEBRATES
ZOO102

UNIT-I

1. Origin of metazoa
2. Organization of Coelom
 - A. Acoelomates
 - B. Pseudocoelomates
 - C. Coelomates
3. Locomotion.
 - A. Amoeboid flagellar and ciliary movement in protozoa
 - B. Hydrostatic movement in Coelenterata
 - C. Annelida and Echinodermata

UNIT-II

- A. NUTRITION AND DIGESTION**- Patterns of Feeding and digestion in lower metazoa, Mollusca, Chordata Filter feeding in polychaeta.
- B: Respiration** - Organs of respiration : Gills, lungs and trachea, respiratory pigments, Mechanism of respiration.

UNIT-III

EXCRETION

- Excretion in lower invertebrates.
- Excretion in higher invertebrates.
- Mechanism of Osmoregulation.

UNIT-IV

NERVOUS SYSTEM.

- A. Primitive Nervous systems-Coelenterata and Echinodermata.
- B. Advanced nervous system in Annelida, Arthropoda (Crustacea and Insecta) and Mollusca (Cephalopoda)

UNIT-V

A. INVERTEBRATES LARVAL FORMS AND THEIR EVOLUTIONARY SIGNIFICANCE. Trematoda and Cestoda

- A. Larval forms of Crustacea
- B. Larval forms of Mollusca
- C. Larval forms of Echinodermata.

B. 1. Structure affinities and life history of the following minor noncoelomate Phyla -

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A. Rotifera

B. Entoprocta

2. Structure affinities and life history of the following minor Phyla

A. Phoronida

B. Ectoprocta

Suggested Readings:

1. Hyman, L.H. The Invertebrates, Vol. 1, protozoa through Ctenophora, McGraw Hill Co., New York
2. Barrington, E.J.W. Invertebrate structure and function, Thomas Nelson and Sons Ltd., London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
4. Hyman, L.H. The Invertebrates. Vol. 2. McGraw Hill Co., New York.

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**Quantitative biology, biodiversity and wildlife
ZOO103**

UNIT-I

Quantitative biology –
Basic mathematics for biologists –
matrices and vectors –
Exponential functions –
Differential equations Integration –
Periodic functions –
Probability distribution properties and probability theory

UNIT-II

Experimental designing and sampling theory
Completely randomized design and randomized block design
Analysis of variance
Co-relation- types of correlation
Karl persons coefficient correlation
Regression

UNIT-III

Biodiversity –
Concept and principal of biodiversity –
Causes for the loss of biodiversity
Biodiversity conservation method –
Medicinal uses of forest plant

UNIT-IV

Wildlife of India, types of wildlife –
Values of wildlife positive and negative –
Wildlife protection Act –
Conservation of wildlife in India –
Endangered and threatened species

UNIT-V

Wildlife and conservation
National Parks and Sanctuaries
Project Tiger Project Gir Lion and Crocodile breeding project



wildlife in M.P. with references to Reptiles Birds and mammals
Biospheres reserves

Suggested Readings:

1. Bataschelet, E. Introduction to mathematics for site scientist springer-verlag, Berlin Jorgensarr, S.E. Fundamental of Ecological modling E. sevier New York –
2. Lenderen D. Modelling in behavioral ecology. Chapman & Hall London U.K. - Sokal, R.R. and F. J. Rohit Biometry Freeman San Francisco - Snedecor, G.W. and W.G. colhran, statical methods, Affiliated East, West Press New Delhi (Indian ed.)


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Msc (Zoology)



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BIOMOLECULES AND STRUCTURAL BIOLOGY
ZOO104

UNIT-I

Chemical Foundation of biology

pH, PK, acids bases, buffers, weak bonds

Free energy, resonance, isomerisation

Acid soluble pool of living tissues — aminoacids, monosaccharides, oligosaccharides, nucleotides, peptides.

Nanoparticles

Biomaterials

UNIT-II

1. Primary, Secondary, Tertiary and quaternary structures of proteins, protein folding and denaturation
2. DNA & RNA: Double helical structure of DNA, Structure of RNA, role of RNA in gene expression
3. DNA replication, recombination and repair
4. Functional importance of lipid storage and membrane lipids
5. Membrane channels and pumps

UNIT-III

Biodiversity –

1. Basic concepts of metabolism: Coupled and Interconnecting reactions of metabolism cellular energy resources and ATP synthesis
2. Glycolysis and glyconeogenesis
3. Citric acid cycle .
4. Oxidative phosphorylation : Protein and it's regulation
5. Fatty acid metabolism: Synthesis and degradation of fatty acids

UNIT-IV

1. RNA synthesis and splicing
2. Biosynthesis of amino acids
3. Biosynthesis of nucleotides
4. Biosynthesis of membrane lipids and steroids
5. Protein synthesis

UNIT-V

1. Enzymes: Terminologies, classification and basics of enzyme kinetics
2. Mechanism of enzyme catalysis



3. Regulation of enzyme action
4. Concept of free energy and thermodynamic principals in biology
5. Energy rich bonds, compound and biological energy transducers

Suggested Readings:

1. Voet, D. and LG. Wet, biochemiAry John Wiley & Sons.
 2. Freifelder, D, Physical Biochemistry W.H. Freeman &Co.
 3. Segal, I.H. Biochemical cakulations John Wiley and Sons
 4. Creighton, T.E. Protein Structure and Molecular Properties W.H. Freeman & Co
- U.K. - Sokal, R.R. and F. J. Rohit Biometry Freeman San Francisco - Snedecor, G.W. and W.G. colhran, statical methods, Affilted East, West Press New Delhi (Indian ed.)


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(Biology)




MAY 2015-16

MSC ZOOLOGY SECOND SEMESTER

Code	Subject	CCE/ INTERNAL		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
ZOO-201	General and Comparative Animal Physiology and Endocrinology	30	11	70	25	-	-	100	36
ZOO-202	Population Ecology and Environmental physiology	30	11	70	25	-	-	100	36
ZOO-203	Tools and techniques In Biology	30	11	70	25	-	-	100	36
ZOO-204	Molecular Cell Biology and Genetics	30	11	70	25	-	-	100	36
ZOO-205	Lab.1	-	-	-	-	100	36	100	36
ZOO-206	Lab.2	-	-	-	-	100	36	100	36


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GENERAL AND COMPARATIVE ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY
ZOO201

UNIT-I

1. Respiratory pigments through different phylogenetic groups
2. Transport of oxygen and carbon dioxide in blood and body fluids
3. Regulation of respiration
4. Physiology of impulse transmission through nerves and synapses
5. Autonomic nervous system, neurotransmitters and their physiological Functions

UNIT-II

1. Patterns of nitrogen excretion in different animal groups
2. Comparative physiology of digestion
3. Osmoregulation in different animal groups
4. Thermoregulation in homeotherms, poikilotherms and hibernation
5. Physiology of pregnancy, placental hormones, pregnancy diagnosis tests, parturition and breast and lactation

UNIT-III

1. Comparative study of mechanoreception
2. Comparative study of photoreception
3. Comparative study of phonoreception
4. Comparative study of chemoreception
5. Comparative study of equilibrium reception

UNIT-IV

1. Bioluminescence as means of communication among animals
2. Pheromones and other similar chemicals as means of communication among animals
3. Chromatophores and regulation of their function among animals
4. Hormones, their classification and chemical nature
5. Mechanisms of hormone action

UNIT-V

1. Phylogeny of endocrine glands (pituitary, pancreas, adrenal, thyroid)
2. Ontogeny of endocrine glands
3. Neuroendocrine system
4. Hormone receptors - signal transduction mechanisms
5. Hormones and reproduction
 - a. Seasonal breeders
 - b. Continuous breeders

Suggested Readings:

1. E.J.W. Barrington-General & comparative Endocrinology-Oxford, Clarendon Press
2. R.H. Williams-Text Book of Endocrinology-W.B. Saunders
3. C.P. Martin-Endocrine Physiology-Oxford University Press.
4. Molecular Cell Biology-J. Darnell, H. Lodish and D. Baltimore-Scientific American Book USA
5. Molecular Biology of the cell-B. Alberts, D-Bray, J.Lewis, M. Raff, K. Roberts and J.D. Watson, Garland



Population Ecology and Environmental physiology
ZOO202

UNIT-I

1. Populations and their characters.
2. Demography : Life tables, generation time, reproductive value.
3. Population growth: Growth of organisms with non-overlapping generations, stochastic and time lag models of population growth, stable age distribution.
4. Population regulation: Extrinsic and intrinsic mechanisms.

UNIT-II

1. Adaptations : Levels of adaptations, significance of body size.
2. Aquatic environments : Fresh water, marine, shores and estuarine environments.
3. Eco-physiological adaptations to fresh water environments.
4. Eco-physiological adaptations to marine environments.
5. Eco-physiological adaptations to terrestrial environments.

UNIT-III

1. Environmental limiting factors.
2. Inter and intra-specific relationship.
3. Predatory- prey relationship, predator dynamics, optimal foraging theory (patch choice, diet choice, prey selectivity, foraging time).
4. Mutualism, evolution of plant pollinator interaction.

UNIT-IV

Environmental pollution and human health.

1. Conservation management of natural resources.
2. Environmental impact assessment.
3. Sustainable development.

UNIT-V

1. Concept of homeostasis.
2. Endothermic and physiological mechanism of regulation of the body temperature.
3. Physiological response to oxygen deficient stress.
4. Physiological response to body exercise.
5. Meditation, yoga and their effects.

Suggested Readings:

1. Cherrill, J.M. Ecological Concepts. Blackwell Science Publication, Oxford, U.K.
2. Elseth, B.D. and K.M. Baumgartner. population Biology. Van Nostrand Co., New York.
3. Jonjensen, S.E. Fundamentals of ecological modeling. Elsevier, New York.
4. Krebs, C.J. Ecology. Harper and Row, New York.
5. Krebs, C.J. Ecological Methodology. Harper and Row, New York.
6. Eckert, R. Animal Physiology: Mechanism and Adaptation. W.H. Freeman and Co., New York.
7. Hochachka, P.W. and G.N., Somero. Biochemical adaptation. Princeton, New Jersey.



Tools and techniques in Biology
ZOO203

UNIT-I

1. Microscopy, principle & applications
 - Light microscope and phase contrast microscope
 - Fluorescence microscope
 - Electron microscope
 - Confocal microscopy
2. General Principle and applications of
 - Colorimeter
 - Spectrophotometer
 - Ultra centrifuge
 - Flame photometer
 - Beer and Lambert's law.
3. Microbiological techniques
 - Media Preparation and sterilization
 - Inoculation and growth monitoring.
 - Microbial assays.
 - Microbial identification (cytological staining methods for bacterial and fungal strains)
 - Use of fermentors

UNIT-II

1. Computer aided techniques for data presentation data analysis, statistical techniques.
2. Cryotechniques
 - Cryopreservation of cells, tissues, organs and organisms.
 - Cryosurgery
 - Cryotomy
 - Freeze fracture and freeze drying.
3. Separation techniques.
 - Chromatography, principle type and applications.
 - Electrophoresis, Principles, types and applications PAGE and agarose gel electrophoresis.
 - Organelle separation by centrifugation.

UNIT-III

1. Radioisotope and main isotope techniques in biology.
 - a. Sample preparation for radioactive counting
 - b. Autoradiography.
2. Immunological techniques
 - Immunodiffusion (Single & Double)
 - Immuno electrophoresis
3. Techniques immuno detection
 - Immuno cytotoxic chemistry
 - Immunofluorescence, immunodetection, immunofluorescence.
4. Surgical techniques.



- Perfusion techniques
- Stereotaxy
- Indwelling catheters
- Biosensors.

UNIT-IV

1. Histological techniques
 - Principles of tissue fixation
 - Microtomy
 - Staining
 - Mounting
 - Histochemistry
2. Cell culture techniques.
 - Design and functioning of tissue culture laboratory
 - Culture media, essential components and Preparation
 - Cell viability testing.

UNIT-V

1. Cytological techniques
 - Mitotic and meiotic chromosome preparations from insects and vertebrates.
 - Chromosome banding techniques (G.C.Q. R. banding)
 - Flowcytometry.
2. Molecular cytological techniques
 - In site hybridization (radio labelled and non-radio labelled methods)
 - FISH
 - Restriction banding
3. Molecular biology techniques
 - Southern hybridization
 - Northern hybridization
 - DNA Sequencing
 - Polymerase chain reaction (PCR)

Suggested Readings:

1. Introduction to instrumental analysis-Robert Braun-McGraw Hill.
2. A biologist Guide to principles and Techniques of Practical Biochemistry- K. Wilson and K.H. Goulding EIBS Edn.
3. Clark & Swizer. Experimental Biochemistry. Freeman, 2000.
4. Loquin and Langeron. Handbook of Microscopy. Butterworths, 1983
5. Boyer. Modern Experimental Biochemistry. Benjamin, 1993
6. Freifelder. Physical Biochemistry. Freeman, 1982.
7. Wilson and Winkler. Practical Biochemistry. Cambridge, 2000.
8. Cooper. The Cell-A Molecular Approach. ASM, 1997
9. John R.W. Masters. Animal Cell culture- A practical approach. IRL Press.
10. Robert Braun. Introduction to instrumental analysis. McGraw Hill



Molecular Cell Biology and Genetics
ZOO204

UNIT-I

Biomembrane

- Molecular composition arrangement and functional consequences
- Transport across cell membrane diffusion active transport, pumps, uniports, symports and antiports
- Micro filaments and microtubules structure and dynamics
- Cell movements intracellular transport, role of kinesis and dynein

UNIT-II

Cell. Cell signaling

- Cell surface receptors
- Second messenger system
- Signaling from plasma membrane to nucleus
- Gap junctions and connexins
- Integrins

UNIT-III

Cell. Cell adhesion and communication

- Ca^{++} dependant homophilic cell . cell adhesion
- Ca^{++} independant homophilic cell .cell adhesion
- Gap junctions and connexins
- Genome organization, hierarchy in organization
- Chromosomal organization of genes and non-coding DNA

UNIT-IV

Sex determination

- Sex determination in Drosophila
- Sex determination in mammals
- Basic concept of dosage compensation
- Cytogenetic of human chromosomes
- Human genome project (HGP) purpose 2 implicate

UNIT-V

Genetic Diseases and Genomics

- Human gene therapy
- Prenatal diagnosis & genetic counseling
- Genetic screening
- Structural Genomics
- Functional Genomics
- Gene libraries
- Transgenic animals & their applications



Suggested Readings:

- J. Darnell, H. Lodish and D. Baltimore molecular cell biology scientific American book

- B. Alberts D, Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, molecular biology of the cell, Garland Publishing Inc, New York,
- John R. W. animal cell culture A practical approach masters, Irl. Press
- Alberts et. al. Essentials cell biology garland publishing Inc, New York 1998
- J.M. Barry molecular biology
- Philip E. Hanman Gene Action
- L.C. Dunn, principals of Genetics
- A.M. Winchester genetics
- Edgar Alterbrg Genetics
- L.C. Dunn genetics and the origin of species
- Bengt A. Kihlman actions of chemicals of dividing cells


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M.Sc. (ZOOLOGY) III Semester Scheme

Code	Subject	CCE/INTERNAL		Theory		Practical	
		Max	Min	Max	Min	Max	Min
ZOO301	Comparative Anatomy of Vertebrates	30	11	70	25	0	0
ZOO302	Developmental Biology	30	11	70	25	0	0
ZOO303	ECO- TOXICOLOGY	30	11	70	25	0	0
ZOO304	ENDOCRINOLOGY	30	11	70	25	0	0
ZOO-305	Lab.1	0	0	0	0	100	36
ZOO-306	Lab.2	0	0	0	0	100	36


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Paper- I: Comparative Anatomy of Vertebrates
ZOO301

Unit-1

1. Origin of Chordata: Concept of Protochordata
2. Development, structure and functions of integument and its derivatives (glands, scales, feathers and hairs)
3. Respiratory system : Characters of respiratory tissue, external and internal respiration, Comparative account of respiratory organs.
4. Comparative account of Digestive System.

Unit-2

1. Evolution of heart.
2. Evolution of aortic arches and portal systems.
3. Blood circulation in various vertebrates groups.
4. Comparative account of jaw suspensorium and vertebral column.

Unit-3

1. Evolution of urinogenital system in vertebrates.
2. Comparative account of organs of olfactory and taste.
3. Comparative anatomy of brain and spinal cord (CNS).
4. Comparative account of peripheral and autonomous nervous system.

Unit-4

1. Comparative account of lateral line system.
2. Comparative account of electroreception.
3. Flight adaptations in vertebrates.
4. Aquatic adaptations in birds and mammals.

Unit-5

1. Origin, evolution general organization and affinities of Ostracoderms .
2. General organization, specialized, generalized and degenerated characters of Cyclostomes.
4. General account of Elasmobranchi, Holocephali, Dipnoi and Crossoptergii.

Suggested Reading Materials:

1. Carter, G.S. Structure and habit in vertebrate evolution – Sedgwick and Jackson, London.
2. Kingsley, J.S. Outlines of Comparative Anatomy of Vertebrates, Central Book Depot, Allahabad.
3. Kent, C.G. Comparative anatomy of vertebrates
4. Malcom Jollie, Chordata morphology. East – West Pres Pvt. Ltd., New Delhi.
6. Smith, H.S. Evolution of Chordata structure, Hold Rinchart and Winston Inc, New York.
7. Sedgwick, A.A. Students Text Book of Zoology, Vol.II

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MSc Zoology III semester
Paper- II: Developmental Biology
ZOO302

Unit -I:

1. Basic concept of development: cell division and cell cycle, chromosomal puffs and gene activation, cell commitment and differentiation
2. Morphogen gradients, cell fate, cell potency and morphogenesis.
3. Gametogenesis: origin and migration of primordial germ cell; production of male gametes (spermatogenesis), gene expression during spermatogenesis and sperm maturation.
4. Production of female gametes(oogenesis) gene expression during amphibian oogenesis, ovulation and ovum transport in mammals.

Unit-II:

1. Fertilization and early development: pre fertilization events, biochemistry of fertilization , post fertilization events.
2. Establishment of polarity in amphibians and birds.
3. Gastrulation and formation of germ layer in mammals.
4. Multiple ovulation and embryo transfer technology: in vitro oocyte maturation and super ovulation.

Unit-III:

1. Hormonal regulation of development of mammary glands and lactation
2. Hormonal regulation of ovulation, pregnancy and parturition
3. Endocrinology and physiology of placenta
4. Collection and cryopreservation of gametes and embryos

Unit- IV:

1. Teratological effects of xenobiotics on gametes
2. Wolffian lens regeneration
3. Melanogenesis
4. Differentiation and development of gonads

Unit-V:

1. Cell diversification in early embryos, xenopus blastomeres, totipotency & pluripotency
2. Embryonic stem cells, chord-blood cells & their significance
3. Hemopoietic stem cells, formation of blood cells
4. Connective tissue cell family

Suggested Reading Materials:

1. VK Agrawal, Chordate embryology
2. Scott F. Gilbert, Developmental Biology 9th Edition

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Paper- III: ECO- TOXICOLOGY
ZOO303

Unit-1

1. General principles of Environmental Biology with emphasis on ecosystems.
2. Abiotic and biotic factors of ecosystems.
3. Communities of the environment, their structure & significance.
4. Energy flow in environment; Ecological energetic.

Unit-2

1. Productivity, Production and analysis.
2. Recycling and reuse technologies for solid and liquid wastes and their role in environmental conservation.
3. Remote sensing –basic concepts and applications of remote sensing techniques in environmental conservation.
4. Environmental indicators and their role in environmental balance.

Unit-3

1. Kinds of environmental pollution and their control methods.
2. Radioactive compounds and their impact on the environment.
3. Vehicular exhaust pollution causes and remedies.
4. Noise pollution.

Unit-4

1. Toxicology- Basic concepts, Principles and various types of toxicological agents.
2. Toxicity testing principles, hazards, risks and their control methods.
3. Food toxicants and their control methods.
4. Public Health Hazards due to environmental disasters.

Unit-5

1. Pesticides, types, nature and their effects on environment.
2. Important heavy metals and their role in environment.
3. Agrochemical use and misuse, alternatives.
4. Occupational Health Hazards and their Control.

Suggested Reading Materials:

1. Clark : Elements of ecology
2. Odum : Fundamentals of Ecology
3. South Woods : Ecological methods
4. Trivedi and Goel : Chemical and biological methods for water pollution studies


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Paper- IV: ENDOCRINOLOGY
ZOO304

Unit-I:

1. History and scope of endocrinology
2. Endocrine methodologies
3. Mechanism of hormone action
4. Hormones and environment

Unit-II:

1. General and comparative structure of anterior pituitary gland
2. General and comparative structure of neurohypophysis
3. General and comparative structure of thyroid gland
4. General and comparative structure of parathyroid gland

Unit-III:

1. General and comparative structure of pancreas
2. Structure of mammalian pineal body
3. General and comparative structure of adrenal medulla
4. General and comparative structure of adrenal cortex

Unit-IV:

1. Neurosecretion and neuroendocrine mechanism in invertebrates
2. Neuroendocrine system in crustacea
3. Neuroendocrine system in insecta
4. Neuroendocrine system in mollusca

Unit-V:

1. Caudal neurosecretory system in fish
2. General structure of thymus
3. Endocrine integration; migration of birds and fishes
4. Hormones like substances: ectohormones and phytohormones

Suggested Reading Materials:

1. E.J.W Barrington-General & comparative Endocrinology-Oxford, Clarendon Press
2. R.H. Williams-Text Book of Endocrinology-W.B. Saunders
3. C.R. Martin- Endocrine Physiology-Oxford University Press.
4. Molecular CellBiology-J. Darnell, H. Lodish and D. Baltimore-Scientific American Book USA
5. Molecular Biology of the cell-B. Alberts, D-Bray, J.Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Pub. New York.

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**MSC ZOOLOGY
FOURTH SEMESTER**

Code	Subject	CCE/INTERNAL		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
ZOO401	Cell and Molecular Biology	30	11	70	25	-	-	100	36
ZOO402	Insect Anatomy and Physiology	30	11	70	25	-	-	100	36
ZOO403	Aquatic Biology and Aquaculture	30	11	70	25	-	-	100	36
ZOO404	Reproductive Endocrinology	30	11	70	25	-	-	100	36
ZOO-405	Lab.1	-	-	-	-	100	36	100	36
ZOO-406	Lab.2	-	-	-	-	100	36	100	36

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MSc- ZOOLOGY- 4th Semester
PAPER CODE - ZOO-401
CELL AND MOLECULAR BIOLOGY

Unit I

1. Principle and applications of Nanodrop Spectrophotometry
2. Cell Signaling: Principle and applications of Flowcytometry
3. Working principle and applications of Fluorimeter
4. Working principle and applications of Atomic force Microscope

Unit II

5. Cell Fractionation: Differential Velocity and density Gradient centrifugation
6. Basic idea of NMR and ESR
7. Basic idea of X-ray Crystallography
8. Gel Electrophoresis: 1D and 2D- PAGE and isoelectric focusing

Unit III

9. Immunotechniques: Precipitation, immunofluorescence, ELISA and RIA
10. Methods of Protein Purification.
11. DNA protein Interaction.
12. General idea of DNA Microarray, DNA chips and affymetrix.

Unit IV

13. Stem cells: Types, Cultures and Applications
14. Methods and analysis of gene expressions
15. Methods in mutations analysis and reporter assay
16. Recombinant DNA technology: Preparation and applications.

Unit V

17. General Idea of two-hybrid system; Subtractive hybridization and chromosome jumping
18. General idea of RNAase protection assay
19. Genome Analysis: DNS finger printing, RAPD and RFLP
20. Analysis of sequences (DNA and RNA) and next generation sequencing

Suggested Reading:

1. The Cell: Bruce and Alberts
2. Cell Biology - PK Gupta
3. Genetics : PK Gupta and Gardner

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PAPER CODE- ZOO-402
INSECT ANATOMY AND PHYSIOLOGY

Unit I

1. Structure and Function of insect integuments
2. Mechanism of moulting and sclerotization of cuticle
3. Structure and types of spiracles
4. Respiration in aquatic and parasitic insects

Unit II

5. Structure of malpighian tubules including cryptonephridia
6. Physiology of excretion and significance of cryptonephridia
7. Structure of brain and ganglia
8. Central nervous system in different insects

Unit III

9. Structure and functions of mechanoreceptors
10. Structure and functions of chemoreceptors
11. Photoreceptors organs: simple and compounds eye
12. Structure and functions of fat body

Unit IV

13. Compositions and functions of haemolymph
14. Insect circulatory system
15. Digestive system and associated glands of insect
16. Physiology and regulation of digestion

Unit V

17. Neuroendocrine system of insects
18. Chemistry and functions of insect hormones
19. Male and female reproductive system of insects
20. Insect pheromones

Suggested readings:

1. Handbook of Entomology: TV Prasad
2. An introduction of Entomology: PD Shrivastava and RP singh
3. Textbook of Entomology: KP Shrivastava


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PAPER CODE- ZOO-403
AQUATIC BIOLOGY AND AQUACULTURE

Unit I

1. Aquatic Biology: science and its developments
2. Origin and classification of wetlands including lakes
3. Morphology of lakes, reservoirs and ponds
4. Physical and chemical characters of marine environments

Unit II

5. Estuaries and other brackish water environment in India
6. Physical and chemical characteristics of lakes, ponds and rivers.
7. Freshwater biota: planktons, benthos and macrophytes
8. Food chain, food web, energy flow and trophic levels

Unit III

9. Primary productivity in inland water and its determination
10. Degradation of wetlands in India and control measures
11. Aquatic resources : invertebrates and vertebrates
12. Importance and management of aquatic resources in India

Unit IV

13. Aquatic pollution, its causes and measures
14. Migration pattern of aquatic animals, including aquatic birds
15. Habitat and importance of aquatic wild life
16. Threatened wetlands and endangered aquatic species

Unit V

17. Major sources of Pollution in river and remedies
18. Aquatic toxicology: acute and chronic toxicity.
19. Biological indicators of water pollution
20. Eutrophication and its impact of water bodies.

Suggested readings:

1. Freshwater aquaculture - RK Rath
2. Aquatic biology- RJ Rao
3. Aquaculture - N Arumugam


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PAPER CODE- ZOO-404
REPRODUCTIVE ENDOCRINOLOGY

Unit I

1. Introduction; Reproduction in Myth and Legend
2. Sexual Differentiation and Development
3. Development of the Male Reproductive Organs
4. Male Gross Anatomy Plus Spermatogenesis: Testicular Descent; Erection; Ejaculation.

Unit II

5. Male Reproductive Endocrinology.
6. Blood Testis Barrier; Spermatogenic Waves and Cycles.
7. Semen Physiology; Sperm Anatomy.
8. Overview of Female Reproductive Anatomy; Folliculogenesis.

Unit III

9. Development of the Female reproductive organs
10. Oogenesis; Atresia. Endocrine Control of Ovarian Function.
11. Female; Ovulation; Corpus Luteum Formation.
12. Prostaglandins and Role in Reproduction; luteolysis.

Unit IV

13. The Estrous Cycle; The Menstrual Cycle.
14. Gestation; Prenatal Development and Placentation.
15. Hypothalamus and pituitary; Neuroendocrine Control of Reproduction.
16. Steroidogenesis; Mechanism of Action of Hormones.

Unit V

17. Sperm and Ova Transport; Sperm Capacitation and Acrosome Reaction; Fertilization.
18. Early Embryonic Development and Maternal Recognition of Pregnancy
19. Human Contraception and Human Reproductive Technologies.
20. Diseases and Conditions of the Reproductive System

Suggested readings:

1. Human Physiology - CC Chatterjee
2. Human Reproductive Biology- Richard E. Jones, Kristin H. Lopez
3. Reproductive Endocrinology and Infertility- Dan I Lebovic


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**MSC Botany I SEMESTER
COURSEWISE SCHEME 2015-16**

SUBJECT CODE	COMPULSORY/OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
BOT101	COMPULSORY	Biology & diversity of Viruses, Bacteria And Fungi	70	28	30	10	100	38	50	18	150	56
BOT102	COMPULSORY	Biology & diversity of Algae, Bryophytes & Pteridophytes	70	28	30	10	100	38	50	18	150	56
BOT103	COMPULSORY	Biology & diversity of Gymnosperms	70	28	30	10	100	38	50	18	150	56
BOT104	COMPULSORY	Plant Ecology	70	28	30	10	100	38	50	18	150	56


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Biology & Diversity of Viruses, Bacteria and Fungi
BOT101

UNIT-I

Viruses; characteristics and ultrastructure of virions, isolation and purification viruses; chemical nature, replication, transmission of viruses; economic importance.

UNIT-II

Archaeobacteria and Eubacteria; General account; ultrastructure, nutrition & reproduction; biology and economic importance; cyanobacteria — salient features and biological importance.

UNIT-III

Classification of bacteria, Actinomycetes, Mycoplasma, Rickettsiae, Chlamydia and their significance.

UNIT-IV

Mycology: classification and general characters of fungi; substrate relationship fungi; cell ultra structure; unicellular and multicellular organization; cell wall composition; nutrition (saprobic, biotrophic, symbiotic); reproduction (vegetative asexual, sexual), heterothallic; parasexuality; recent trends in classification.

UNIT-V

Phylogeny of Fungi: Phylogeny of fungi; general account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina; fungi industry, medicine and as food; fungal diseases in plants and human Mycorrhiza; fungi as biocontrol agents.

Suggested Readings:


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Biology & Diversity of Algae, Bryophytes and Pteridophytes
BOT102

UNIT-I

Algae in diversified habitats; thallus organization; cell ultrastructure; reproduction criteria for classification of algae, pigments, reserve foods, flagella classification.

UNIT-II

Salient features of Protochlorophyta, Charophyta, Chlorophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta; algal blooms; algal biofertilizers algae as food, feed and industrial uses.

UNIT-III

Morphology, structure, reproduction and life history of bryophyta; distribution, classification, general accounts of Marchantiales, Jungermanniales, Anthocerotales, Sphagnales, Funariales and Polytrichales; ecological and economic importance.

UNIT-IV

Morphology, anatomy, reproduction and life history of pteridophyta; classification, evolution of stele, heterospory and origin of seed habits.

UNIT-V

Introduction to Psilopsida, Sphenopsida and Pteropsida

Suggested Readings:

Smith G. M. Cryptogamic Botany Vol. 1 (2nd edition)— TataMcGraw-Hill Publishing Company Ltd. Bombay -New Delhi.


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**Biology & Diversity of Gymnosperms
BOT103**

UNIT-I

Introduction: Gymnosperms, the vesseless and fruitless seed plants; evolution of gymnsperms; complexity of female gametophytes.

UNIT-II

Classification of gymnosperms and their distribution in India, Economil importance of gymnosperms

UNIT-III

General account of pteridospermales, cycadeoidales and cordales.

UNIT-IV

Structure, reproduction and interrelationships of cycadales, ginkgoales and coniferales.

UNIT-V

Structure, reproduction and interrelationships of ephedrales, welwitschiale and gnetales.

Suggested Readings:

- Bhatnagar, S.P. and Molra, A; 1996: Gymnosperms, New Age International Pvt, Ltd., New Delhi.
- Singh H.; 1978: Embryology of Gymnosperms, Encyclopedia of Plant Anatomy | Gebruder Bortraeger, Berlin.
- Spome K R; 1991: The Morphology of Gymnosperms; Hutchinson Univ. Library; London.


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Plant Ecology
Paper Code : BOT104

UNIT-I

Population Ecology: Ecology & ecosystem: Definitions, Organization and components, Population & Environment; Population ecology, density & distribution, Natality, Mortality, Survivorship curves, Age structure & pyramids, Fecundity schedules, Life tables; Population growth -- exponential and logistic curves; Intra specific competition and self regulation; r and k-strategists.

UNIT-II

Community organization: Concepts of community and continuum; Analysis of community analytical and synthetic characters, Community coefficients and indices of diversity, interspecific association negative and positive associations; Concept of ecological niche; Concepts of biodiversity; evolution and differentiation of species -- allopatric & sympatric speciation; ecads and ecotypes.

UNIT-III

Ecosystem development and stability; Temporal changes cyclic and non cyclic; Succession processes & types; Mechanism of succession facilitation, Tolerance and inhibition models; Concept of climax persistence resilience and resistance; Ecological perturbation natural and anthropogenic, Ecosystem restoration.

UNIT-IV

Fate of energy in ecosystems: Trophic organization and structure, Food chains & webs; energy flow pathways, Ecological efficiencies consumption, assimilation and production trophic; Primary production methods of measurement, Global patterns, Limiting factors.

UNIT-V

Fate of matter in ecosystems: Recycling pathways; Relationship between energy flow and recycling pathways; Nutrient exchange and cycling; Global biogeochemical cycles of C, N, P and S; Physical, chemical and Biological characteristics of soil.

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**M.Sc BOTANY
SECOND SEMESTER SCHEME**

Code	Subject	CCE/INTERNAL		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
BOT-201	Taxonomy of Angiosperms	30	11	70	25	-	-	100	36
BOT-202	Plant Physiology	30	11	70	25	-	-	100	36
BOT-203	Plant Pathology	30	11	70	25	-	-	100	36
BOT-204	Plant Cell and Molecular Biology	30	11	70	25	-	-	100	36
BOT-205	Lab. 1	-	-	-	-	100	36	100	36
BOT-206	Lab. 2	-	-	-	-	100	36	100	36


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Taxonomy of angiosperms

BOT201

UNIT-I

origin and evolution of angiosperms, general principles of angiosperm phylogeny, evolutionary trends in angiosperms, ecads and ecotypes, concept of taxonomic characters

UNIT-II

international code of botanical nomenclature (icbn), some important rules of nomenclature, principles of taxonomic characters, merits and demerits of major systems of classification.

UNIT-III

Systems of classification, modern trends in plant taxonomy, taxonomic evidence: morphology, anatomy, palynology, embryology, cytology,

UNIT-IV

herbarium and botanical garden, purpose of modern herbarium, techniques of herbarium, description of flowering plant, major Indian herbaria and botanical gardens, relevance of taxonomy to conserve conservation, sustainable utilization of bio-resource and ecosystem research.

UNIT-V

origin and evolution of monocotyledon and dicotyledon flower, salient features, floral diversity of family and phylogeny of the orders; ranales, tubiflorae, glumiflorae, amentiferae, cenrospermae.

Suggested Readings:

1. E.J.W Barrington-General & comparative Endocrinology-Oxford, Clarendon Press
2. R.H. Williams-Text Book of Endocrinology-W.B. Saunders
3. C.R. Martin- Endocrine Physiology-Oxford University Press.
4. Molecular Cell Biology-J. Darnell, H. Lodish and D. Baltimore-Scientific American Book USA


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Plant physiology

BOT202

UNIT-I

water : structure and properties of water ,waterabsorption and conduction,loss of water from plants,atometal physiology. Nutrients and their functions,active and passive absorption of waterand nutrients .

UNIT-II

signal transduction: overview,receptors and G – Proteins, phospholipid signaling,role of cyclic nucleotides . diversity in protein kinases and phosphatases, specific signaling mechanism,eg- two component sensor system in bacteria and plants,sensory photo receptors.

UNIT-III

Photosynthesis: photosynthetic apparatus, pigments and light harvesting complexes, photooxidation of water,calvin cycle. photorespiration,CAM,C3 AND C4 Cycle and its significance.

UNIT-IV

Plant growth regulators: physiological effects and general mechanism of action of plant hormones. Brief account on brassinosteroids,jasmonic acid,NO.And Salicylic acid. Photoperiodism and its significance,endogenous clock and its regulation,vernalization.

UNIT-V

Stress physiology: Plant responses to biotic and abiotic stress, general mechanism of abiotic stress tolerance,drought and salinity stress and antioxidants systems in plants.

Suggested Readings:


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Plant pathology

BOT203

UNIT-I

Fundamentals of plant pathology- history of plant pathology; various levels of parasites ,classification of plant diseases.

Pathogenesis- penetration and entry of plant pathogens,development inside host tissue.

UNIT-II

AGENTS OF PLANT DISEASES,GENERAL Characteristics and symptoms caused by- Agents of infectious diseases (fungi,bacteria ,mycoplasma,virus and nematodes) and agents of non infectious diseases (air ,pollution, chemicals,minerals,temperature)

UNIT-III

Plant diseases; causal organisms,symptoms and management of —

1. Downy mildew of grapes
2. karnel bunt of wheat
- 3 smut of bajra
4. late & early blight of potato

UNIT-IV

: Plant diseases: causal organisms,symptoms and management of -

- 1, yellow vein mosaic of bhindi
- 2, black rust of wheat
- 3, Blight of paddy
- 4,Tikka disease
5. Sandal spike

UNIT-V

Defence mechanism in plants : Structural induced and biochemical defense mechanism, hypersensitivity reaction ,Detoxification of pathogen toxin- Application of molecular biology in diseases ,control strategies,plant quarantines.

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Plant cell and molecular biology

BOT204

UNIT-I

Cell and cell wall- Ultrastructure of prokaryotic and eukaryotic cells; structure, organization and function of plant cell wall, membrane structure and function of model membrane, lipid bilayer membrane protein diffusion, osmosis, ion channels, electrical properties of membranes.

UNIT-II

Structural organization and function of intracellular organelles (mitochondria, plastid, endoplasmic reticulum, golgi bodies, ER.) Cell division and cell cycle, mechanism of programmed cell death.

UNIT-III

RNA synthesis & processing: transcription, dna replication, operon model, extra chromosomal replicons, conformation of nucleic acids (A, B, Z) RNA processing, RNA EDITING, Trna.

UNIT-IV

Prokaryotic transcription- Transcription units; RNA polymerase, structure and assembly, promoters, initiation, elongation and termination.

Eukaryotic transcription- RNA POLYMERASE, Structure and assembly, promoters, DNA damage and repair.

UNIT-V

Translation; Translational mechanism, genetic code, Wobble hypothesis, mechanism of protein synthesis.

Translational factors: Initiation, elongation and termination.


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FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. (BOTANY) III Semester Scheme

Code	Subject	CCE/INTERNAL		Theory		Practical	
		Max	Min	Max	Min	Max	Min
BOT301	Evolutionary and Economic Botany	30	11	70	25	0	0
BOT302	Plant Reproduction	30	11	70	25	0	0
BOT303	Ethnobotany	30	11	70	25	0	0
BOT304	Bio diversity Conservation	30	11	70	25	0	0
BOT-305	Lab.1	0	0	0	0	100	36
BOT-306	Lab.2	0	0	0	0	100	36


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M. Sc. Botany (Semester-III)
Paper-I: Evolutionary and Economic Botany
BOT301

UNIT-I

Evolutionary Biology: Origin of life (including aspects of prebiotic environment and molecular evolution); Concept of evolution; Theories of organic evolution; Mechanisms of speciation. Hardyweinberg genetic equilibrium, genetic polymorphism and selection; origin and evolution of economically important microbes and plants.

UNIT-II

Origin of agriculture: World centers of primary diversity of domesticated plants; Plant introduction: Secondary centers of origin. Plant as a source of renewable energy; Innovations for meeting world food demands.

UNIT-III

Botany, cultivation and uses of –

- a. Food, forage and fodder crops (cereals, pulses, vegetables and fruits)
- b. Fiber yielding plants

UNIT-IV

Botany, cultivation and uses of-

- Medicinal plants
- a. Aromatic plants
 - b. Oil yielding plants

UNIT-V

Important fire-wood, timber-yielding plants and Non-wood forest products (NWFPs) such as Bamboos, rattans, raw materials for paper-making, gums, tannins, dyes and resins, Plants used as avenue trees for shade, pollution control and aesthetics.

Suggested Laboratory Exercises

The practical course is divided into three units:

- i) Laboratory Work
 - ii) Field Survey
 - iii) Scientific visits
- i) Laboratory Work

Food Crops: Wheat, Rice, Maize, Potato, Chickpea(Bengal gram), Sugarcane, Morphology, anatomy, microchemical tests for stored food materials.

Fodder Crops:Sorghum, Bajra, Berseem, Guar, Oat.

Plant Fibres: Cotton, Jute, Sun hemp, Coir.

Medicinal and Aromatic Plants: Study of live or herbarium specimens or other visual materials to become familiar with following plants:

Papaver somniferum, *Atropa belladonna*, *Catharanthus roseus*, *Adhatoda zeylanica*, *Allium sativum*, *Rauwolfia serpentina*, *Withania somnifera*, *Phyllanthus niruri*, *Andrographis paniculata*, *Aloe barbadensis*, *Mentha arvensis*, *Ricinus communis*, *Abutilon indicum*, *Datura sp.*, *Artemisia sp.*, *Petalium murex*, *Ocimum sanctum*, *Vetiveria zizanioides*, *Cymbopogon maritimi*.

Gums, Resins, Tannins, Dyes: Acacia, Terminalia, Tea, Turmeric, *Bixa orellana*, Indigo, *Butea monosperma*, *Lawsonia inermis*.

ii) Field Survey

Prepare a list of important sources of firewood and timber in your locality. Give their local names, scientific names and families to which they belong.

iii) Scientific visits Students should be taken to any protected area, a recognized botanical garden or

museum (such as FRI, BSI, NBRI), to a CSIR laboratory doing research on plants and their utilization and an ICAR research institute or a field station dealing with crops.

Suggested readings:

1. Swaminathan, M.N. & Jain, R.S. *Biodiversity: Implications for global security*, Macmillan, 1982.
2. CSIR 1986. *The Useful Plants in India*.
3. Kothari, 1987. *Understanding biodiversity, life sustainability and equity*, Orient Longman.
4. Sharma, O.P. 1996. *Hills Economic Botany*.
5. Thakur, R.S. *et al.*, *Major Medicinal Plants*.
6. Kocchar, S.L. 1998. *Economic Botany of Tropics*.
7. Richard B. Primack. 1993. *Essentials of Conservation Biology*.
8. Heywood, V.H. & Watson, R.T. 1995. *Global Biodiversity Assessment*.
9. Peter B. Kaufman *et al.*, 1999. *Natural Products from Plants*.
10. Negi, S.S. 1993. *Biodiversity and its Conservation in India*.


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M. Sc. Botany (Semester-III)
PAPER-II: PLANT REPRODUCTION
BOT302

UNIT-I

Male gametophyte: Structure of anther; microsporogenesis; role of tapetum; pollen development and gene expression; male sterility, sperm dimorphism; pollen germination; pollen tube growth and guidance, pollen storage; pollen allergy.

UNIT-II

Female gametophyte: Ovule development; megasporogenesis; organization of embryo sac; structure and functions of embryo sac cells. Pollination: Floral characteristics, mechanisms and vectors.

UNIT-III

Pollen-pistil interaction and fertilization: structure of the pistil; pollen stigma interactions, Self incompatibility- SSI and ISI (cytological, biochemical and molecular aspects); Double fertilization; in-vitro fertilization.

UNIT-IV

Seed Development: Endosperm development during early maturation and desiccation stages; embryogenesis- ultrastructure and nuclear cytology. Storage proteins of endosperms and embryo; Polyembryony; Apomixis; Embryo culture.

UNIT-V

Fruit Growth: Dynamics of fruit growth; Biochemistry and molecular biology of fruit maturation. Dormancy: Importance and types of dormancy; seed dormancy; methods of overcoming seed dormancy.

Suggested Laboratory Exercises

1. Study of microsporogenesis and gametogenesis in sections of anthers.
2. Examination of modes of anther dehiscence and collection of pollen grains for microscopic examination (maize, grasses, Cannabis sativa, Tradescantia, Crotolaria, Brassica, Petunia, Solanum melongena, etc.).
3. Tests for pollen viability using stains and *in vitro* germination. Pollen germination using hanging drop and sitting drop cultures, suspension culture and surface cultures.
4. Estimating percentage and average pollen tube length *in vitro*.
5. Role of transcription and translation inhibitors on pollen germination and pollen tube growth.
6. Pollen storage, pollen -pistil interaction, self incompatibility, *in vitro* pollination.
7. Study of ovules in cleared preparations; study of monosporic, bisporic and tetrasporic type of embryo sac development through examination of permanent, stained serial sections.
8. Field study of several types of flowers with different pollination mechanisms (wind

pollination, thrips pollination, bee/butterfly pollination, bird pollination).

9. Emasculation, bagging and hand pollination to study pollen germination, seed set and fruit development using self compatible and obligate out crossing systems. study of cleistogamous flowers and their adaptations.

10. Study of nuclear and cellular endosperm through permanent slides.

11. Isolation of zygotic globular, heart shaped, torpedo stage and mature embryos from suitable seeds and polyembryony in citrus, jamun, etc. by dissections.

12. Study of seed dormancy and methods to break dormancy.

Suggested readings

1. Bhojwani, S.S. and Bhatnagar, S.P. 2000 The embryology of Angiosperms. (4th revised and enlarged edition), Vikas publishing house, New Delhi.
2. Maheswari, P. An Introduction to Embryology of Angiosperms, 1950.
3. Shivanna, K.R. and Johri, B.M. The Angiosperm Pollen: structure and Function, Wiley Eastern Ltd., Publications, 1989.
4. Johri, B.M., Ambegaokar, K.B. and Srivastava, P.S. Comparative Embryology of Angiosperms, Vol. I & II, SpringerVerlag publication.
5. Bhojwani, S.S. and Bhatnagar, S.P. 1999. The Embryology of Angiosperms, Vikas publishing House, New Delhi.
6. Raghwan, V. 1997. Developmental biology of flowering plants. Springeverlag, New York.
7. Salisbury, F.B. and Ross, C.w. 1992. Plant physiology (4th edn.), Wadsworth publishing, Belmont, California.
8. Shivanna, K.R. and Sawhney, V.K. 1997. Pollen biotechnology for crop production and improvement. Cambridge University press, Cambridge.


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M. Sc. Botany (Semester-III)
Paper-III: Ethnobotany
BOT303

Unit-I

Ethnobotany: Introduction, concept, scope And objectives. Ethnobotany as an interdisciplinary science; relevance of ethnobotany in the present context.

History of plant - human interactions and centers of ethnobotanical studies in the world .Ethnic groups and Ethnobotany; Major and minor ethnic groups or Tribals of India, and their life styles.

Unit-II

Methodology of Ethnobotanical studies: a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places f) Protocols Plants vs. Traditional Life: a) Food plants b) Intoxicants and Beverages c) Resins and oils d) Ropes and Bindings materials Plants in traditional life with reference to magico-religious rituals and social customs;

Unit-III

Medicinal plants used in traditional system of medicine with examples from local plants. A brief account ethnoveterinary medicine and its significance in Indian context. Contribution of ethnobotany in modern medicine with special examples and ethnobotany directed drug Discovery

Unit-IV

Role of ethnobotany in the conservation of native plant genetic resources; sacred groves and sacred plants of Haryana and India Ethnobotany and legal aspects; ethnobotany as a tool to protect interests of ethnic groups;

UNIT-V

National and international initiatives for benefit sharing and intellectual property rights and conservation of traditional knowledge The ethnobotanical data documentation with special reference to Traditional Knowledge Digital Library

Practicals

1. Collection of ethnobotanical data: From a local forest area and from a local people ethnobotanical data are to be collected. The details of resource persons are documented (Photography, video, tape recording, etc.)
2. Analysis of ethnobotanical data disease-wise, plant part wise, habit-wise, region-wise and pictorial presentation of these data.
3. Calculation of total importance value (TIV) index of a species based on ethnobotanical uses; demonstrate the evaluation of two ethnobotanical sites for prioritization or disposal.
4. Submission of Ethnomedicinal herbarium /Museum specimens like leaves, barks, tubers, nuts, etc. of economic/medicinal use.

Spotters:

1. Ethnic food plants:
2. Ethnomedicinal plants:
3. Ethnoveterary plants:
4. Magio- religion/ ornamental plants:
5. A visit to a Tribal area to collect data
6. Listing of Crude drugs in pansari shops (local crude drugs shops) and their identification (little known drugs only)

Suggested Readings

- Faulks, P.J. 1958. An introduction to Ethnobotany, Moredale pub. Ltd. London
- Jain, S.K. (ed.) 1981. Glirapses of Indian. Ethnobotny, Oxford and I B H, New Delhi
- Jain, S.K. (ed.) 1989. Methods and approaches in ethnobotany Society of ethnobotanists, Lucknow, India.
- Jain, S.K. 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur
- Jain, S.K. 1995. Manual of Ethnobotany, Scientific Publishers, Jodhpur,
- Sinha, R. K. 1996 Ethnobotany: The Renaissance of Traditional Herbal Medicine - INA - SHREE Publishers, Jaipur
- Colton C.M. 1997. Ethnobotany - Principles and applications. John Wiley



M. Sc. Botany (Semester-III)
Paper-IV: Biodiversity Conservation
BOT304

UNIT-I

Biodiversity: concept; national & global status; endemism, speciation and extinction; levels of biodiversity, hotspots and hottest hotspots; study of Indian biodiversity hot spot, significance of biodiversity; local plant diversity and its socio-economic importance, causes of biodiversity depletion, ICUN categories of threat; Red Data Books.

UNIT-II

Principles of conservation, major approaches to management, Biodiversity Conservation strategies, Protected areas in India - Wildlife sanctuaries; National parks; Biosphere reserves; Wetlands and Ramsar convention, Role of botanical gardens, seed banks, *in-vitro* repositories and cryobanks in biodiversity conservation.

UNIT-III

Plant explorations; invasions and introductions; National Bureau of Plant Genetic Resources (NBPGR), Convention of Biological Diversity (CBD), Indian initiatives in biodiversity conservation, National Biodiversity Authority (NBA), Importance of Ethnobotany in Indian context; Farmers' Rights and Intellectual Property Rights.

UNIT-IV

Phytogeography and forest types of India - Ecological and economic importance of forests, afforestation, deforestation and social forestry; endangered plants, endemism, invasive species;

UNIT-V

Desertification and wasteland reclamation, energy plantations; Effects of global warming, climatic change and stratospheric ozone depletion on plant diversity.

Reference Books

- Odum, E.P. and Barrett, G.W. 2005. Fundamentals of Ecology (5th Ed.) Brooks/Cengage Learning India Pvt. Ltd., New Delhi.
- Kormondy, E.J. 2008. Concepts of Ecology. Prentice Hall of India., New Delhi.
- Subrahmanyam, N.S. and Sambamurty, A.V.S.S. 2008. Ecology (2nd Ed.) Narosa Publishing House, New Delhi
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2008. Ecology, Environment and Resource Conservation. Anamaya Publishers, New Delhi.
- Stiling, P. 2009. Ecology: Theory and Applications (4th Ed.). PHI Learning Pvt. Ltd. New Delhi.
- Rao, S.V.S. 2009. Essentials of Ecology and Environmental Sciences (4th Ed.) PHI Learning Pvt. Ltd.

Msc (Bot)

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Sehore
MS
wef 2016-17

**M.Sc (BOTANY)
FOURTH SEMESTER**

Code	Subject	CCE/INTERNAL		Theory		practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
BOT401	Cytology & Genetics	30	11	70	25	-	-	100	36
BOT402	Plant Bio Technology	30	11	70	25	-	-	100	36
BOT403	Pollution & Biodiversity Conservation	30	11	70	25	-	-	100	36
BOT404	Plant Disease & Their Management	30	11	70	25	-	-	100	36
BOT-405	Lab.1	-	-	-	-	100	36	100	36
BOT-406	Lab.2	-	-	-	-	100	36	100	36

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PAPER I – BOT 401

CYTOLOGY AND GENETICS

UNIT-I

- The dynamic cells, Structural organization of the plant cell, specialized plant cell type
- chemical foundation, biochemical energetics.
- Cell wall - Structure and functions, biogenesis growth.
- Plasma membrane; structure, models and functions, site for ATPase, ion carriers channels and pumps, receptors.

Unit II

Structural and numerical alterations in chromosomes: breeding behaviour of duplications, deficiency, inversion and translocation heterozygotes. Origin, occurrence. production and meiosis of haploids, aneuploids, euploids and allopolyploids. Evolution of major crop plants.

UNIT-III

- Chloroplast-structure, genome organization, gene expression, RNA editing.
- Mitochondria; structure, genome organization, biogenesis.
- Plant Vacuole - Tonoplast membrane, ATPases transporters as a storage organelle.

Unit IV

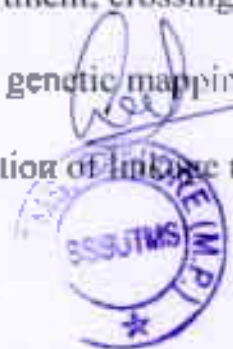
Mendelian and Non-Mendelian Inheritance. Independent assortment, crossing over, linkage groups and chromosome mapping. Genetic recombination and genetic mapping: Correlation of genetic and physical maps; molecular markers and construction of linkage maps.

UNIT-IV

- Nucleus : Structure, nuclear pore, Nucleosome organization.
- Ribosome- Structure and functional significance.

M.S.C.IV

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- Cell cycle and Apoptosis; Control mechanisms, role of cyclin dependent kinases.
- Retinoblastoma and E2F proteins, cytokinesis and cell plate formation mechanisms of programmed cell death.

UNIT-V

- Other cell organelles: Structure and functions of microbodies, microtubules, microfilaments, Golgi apparatus, lysosome, endoplasmic reticulum.
- Techniques in cell biology: Immuno techniques, in situ hybridization to locate transcripts in cell types FISH, GISH, Confocal microscopy.

Suggested Reading:-

1. De Robertis and De Robertis 2005 (Eight edition) (Indian) Cell and Molecular Biology, Lippincott Williams, Philadelphia. [B.I Publications Pvt. Ltd. New Delhi].
2. Sadava David - 2004 (First Indian Edition). Cell Biology, New Delhi.
3. Albert Etal 2002 (Fourth Edition). Molecular Biology of the cell, Garland Science (Taylor and Francis) New York Group (wt)
4. Lodish Etal 2004 (Fifth Edition). Molecular Cell Biology, W H Freeman and company, New York.
5. Giese Arthur 1979 (Fifth Edition). Cell Physiology, Toppan company Ltd., Tokyo, Japan.


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PAPER –II BOT 402

PLANT BIO TECHNOLOGY

Unit-I

Tools of Genetic engineering - Enzymes, Cloning vectors (Plasmids, Bacteriophages, Cosmids, Phagemids, Shuttle vectors, transposons vectors, artificial chromosomes as vector and eukaryotic vectors), Construction of genomic library, and cDNA library, Staggered cleavage, addition of oligopolymer tailing, blunt end ligation, Polymerase Chain Reaction (PCR) Principles, technique and modifications, Gene cloning Vs PCR, application, Applications of PCR.

UNIT- II

Plant Tissue Culture: General introduction, History and Scope and basic concepts, laboratory Organization; media preparation and sterilization techniques, Nutrition of plant tissues-Growth limiting Factor, Concept of cellular differentiation and totipotency, Types of culture, Embryo and Endosperm culture, Induction and maintenance of Callus and suspension Cultures

Unit-III

DNA synthesis and gene sequencing, Aims, strategies for the development of transgenic –Transformation vectors, Promoters from heterologous sources and its utility, Terminators, Markers and Reporter genes, *Agrobacterium* mediated gene transfer, Molecular genetics of TDNA transfer from *Agrobacterium* to plants. Direct gene transfer methods, Comparison of vector – mediated & vector free methods, Gene tagging in transgenic plants

Unit-IV

Chloroplast and Mitochondrial Transformation, Mechanism and Genetics of nitrogen fixation, *nif* & *nod* gene cluster, Fermentation Technology, Genetic improvement of industrial microbes & N₂ fixer, Biofertilizer, Nutritional quality improvement - Golden rice and other development

Unit-V

Molecular markers for introgression of useful traits in plants, Genomics and Proteomics: Genome project, Microarray, protein profiling and its significance, Applications of G.E. to Health, Industry & Agriculture, including gene therapy, IPR and regulatory requirements



References

1. Foster and Twell. (1997). *Plant gene isolation: Principles and Practice*
2. Owen and Pen (1997). *Transgenic plants : (a production system for industrial and pharmaceutical proteins)*
3. Kung and Wu (1993). *Transgenic Plants: Vols 1&2*
4. Potrykus and Spangenberg 1995. *Gene Transfer to Plants*
5. Brown, T.A. 1995. *Gene Cloning an Introduction. (3rd edition). Chapman Hall, 2-6*
Bundary Row, U.K.
6. Rissler and Mellon 1996. *Ecological risks of transgenic crops*


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PAPER –III BOT 403

POLLUTION AND BIODIVERSITY CONSERVATION

UNIT-I

CLIMATE, SOIL AND VEGETATION PATTERNS OF THE WORLD :

Life zones, major biomes, major vegetation types and soil types of the world, barren land.

UNIT-II

POLLUTION, CLIMATE CHANGE AND ECOSYSTEMS :

Air, water and soil pollution:- kinds, sources, quality parameters, effects on plants and ecosystem. Green house gases (Carbon dioxide, methane, nitrous oxide, Chloro fluorocarbons: sources, trends and role), ozone layer, ozone hole, consequences of climate change) Carbon dioxide fertilization, global warming, sea level rise, UV radiation).

UNIT-III

BIOLOGICAL DIVERSITY :- Concepts and levels, status in India, Utilization and concerns, role of biodiversity in ecosystem functions and stability, speciation and extinction, IUCN categories of threat, distribution and global patterns, terrestrial biodiversity hot spots, inventory. World centers of primary diversity of domesticated plants; The Indo Burmese center, plant introductions and secondary centers.

UNIT-IV

CONSERVATION STRATEGIES

Principles of conservation, extinctions, environmental status of plants based on International union for conservation of Nature. In situ conservation, International efforts and Indian initiatives, protected areas in India sanctuaries, national parks, biosphere reserves, Wetlands, Mangroves and coral reefs for conservation of wild biodiversity.


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UNIT-V

Ex situ conservation : Principles and practices, botanical gardens, field gene bank, seed banks, in vitro repositories, cryo banks, general account of the activities of Botanical survey of India (BSI), National Bureau of plant genetic resources (NBPGR), Indian council of Agriculture research (ICAR), Council of scientific and Industrial research (CSIR), and the department of Biotechnology (DBT) for conservation and non formal conservation efforts.

REFERENCE BOOKS :

Threshow, M1985. Air pollution and plant life, Wiley interscience.

Mason C.F. 1991. Biology of fresh water pollution, Longman.

Hill. M.K. 1997. Understanding Environmental pollution, Cambridge University press.

Anonymous, 1987. National gene bank, Indian heritage on plant genetic resources, National


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PAPER –IV
BOT 404

PLANT DISEASES AND THEIR MANAGEMENT

Unit I

Non- infectious disease: Black heart of Potato, Khaira disease of Rice,
Viroid and Viral disease: Potato spindle tuber, Tobacco Mosaic, Yellow vein
mosaic of
Bhindi, Leaf curl of Papaya,
Phytoplasma disease: Little leaf of Brinjal, Witches broom of legumes.

Unit II

Bacterial disease: Citrus canker, Angular leaf spot of cotton, Tundu disease of
wheat, Bacterial wilt of Cucurbit and Crown gall of fruits plants,

Unit III

Fungal disease: Wart disease of potato, Damping off of chilli, Late blight of potato,
Downy mildew & Green ear disease of bajra and Powdery mildew of cereals.

Unit IV

Fungal disease: Ergot of Bajra, Smut of Bajra, Rust of Wheat, Early blight of
Potato, Tikka disease of Groundnut, Blast of Rice, Red rot of Sugarcane, Wilt of
cotton and Blight of Gram.

Unit V

Nematode disease; Ear cockle of Wheat, Molya disease of Barley and Root Knot
disease of
vegetables.

Suggested Reading

Agrios, G.N. 1997. Plant Pathology. Academic Press, London.

Albajes, R., Gullino, M.L., Van Lenteren, J.C. and Elad, Y. 2000.

Integrated Pest and Disease management in Greenhouse Crops, Kluwer Academic
Publishers.

Mehrotra, R.S. 1993. Plant Pathology, Tata McGraw Hill.

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Rangaswamy, G. and Mahadevan, A. 1999. Disease of crop plants in India. Prentice Hall of India, New Delhi.

Trivedi, P.C. 1998. Nematode disease in Plants CBS Publisher & Distributors, New Delhi.

Singh, R.S. 2005. Introduction to Principles of Plant Pathology. Oxford & IBH Publication Co. Pvt. Ltd.

Sharma, P.D. 2006. Plant Pathology. Narosa Publishing House, India

Pandey, B.P. 1997. Plant Pathology, Pathogen and Plant Disease. S. Chand and Company


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Scheme of Examination
Faculty of Science and Computer Science
M.Sc. (MICROBIOLOGY) I Semester Scheme

Code	Subject	CCE/INTERNAL		Theory		Practical	
		Max	Min	Max	Min	Max	Min
MMIB-101	Bacteriology	30	11	70	25	0	0
MMIB-102	Virology	30	11	70	25	0	0
MMIB-103	Mycology	30	11	70	25	0	0
MMIB-104	Microbial Biochemistry	30	11	70	25	0	0
MMIB-105	Lab.1 (Based on paper I & II)	0	0	0	0	100	36
MMIB-106	Lab.2 (Based on paper III & IV)	0	0	0	0	100	36


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FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology

Semester-I

Paper-I: Bacteriology

Code: MMB 101

UNIT-I

History, scope and development of bacteriology, sterilization, isolation, enrichment, pure culture and staining techniques, systematic study of bacteria; morphological, physiological, biochemical and serological studies.

UNIT-II

Habitat, structure, reproduction & classification of bacteria (morphological, biochemical, serological, chemical and molecular aspects), Actinomycetes, Mycoplasma, Rickettsiae, Chlamydiae and their significance.

UNIT-III

The photosynthetic bacteria; cyanobacteria, green bacteria, halobacteria and their economic importance. Methanogenic bacteria and their significance. Chemoautotrophs and Methylophiles; nitrifying bacteria, sulfur oxidizers, iron bacteria, hydrogen bacteria and their economic importance.

UNIT-IV

Enterobacteriaceae and related organisms, their morphological & physiological characters, genetic interrelationship, taxonomic sub-division & their importance in human health. Mycobacteria, cytophage group, filamentous & gliding chaemoheterotrophs & filamentous sulphur oxidizing bacteria.

UNIT-V

Gram positive spore forming bacteria; unicellular endospore formers- Bacillus, Clostridia. Miscellaneous bacteria; lactic acid bacteria, Micrococci, Corynebacteria, Mycobacteria.

Text Books

Text Book of Microbiology	:	RC Dubey and Maheshwari
The Fundamentals of Bacteriology	:	Charles Bradfield Morrey


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FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology

Semester-I

Paper-I: Virology

Code: MMB 102

UNIT-I

General virology: History and development of virology, origin, properties, ultrastructure and chemistry of viruses, virus related agents (viroids, prions), significance of viruses.

UNIT-II

General methods for isolation, identification, characterization and cultivation of viruses: Methodology for isolation, adsorption, One-step growth and burst size of virus. Determination of titre value, isolation of phage resistant strain, cultivation and maintenance of plant, animal and bacterial / cyanobacterial viruses. Identification of viruses by physical, chemical and serological techniques.

UNIT-III

Bacterial/ cyanobacterial viruses: Structure and multiplication of lytic and lysogenic bacteriophage. Significance of lysogeny. Brief account of M13, Mu, T4 and λ , history, structure, genetics and life cycle of cyanophages, significance of bacteriophages and cyanophages.

UNIT-IV

Plant viruses: classification and nomenclature, structure and multiplication of plant viruses with special reference to TMV, cauliflower mosaic virus, effect of viruses on plants, Some common viral diseases of plants (TMV, CMV, leaf Curl of papaya). Transmission of plant viruses and control of viral diseases of plants.

UNIT-V

Animal viruses: Classification and nomenclature of animal and human viruses. Brief account of Adeno-, Herpes, Heparitis, HIV and other oncogenic viruses. Prevention, treatment and control of viral diseases. Viral vaccines including DNA vaccines and interferons.

Text Books

Basic Virology	:	Elliott J. Blumenthal
Microbiology	:	Power and Dagnawala
Textbook of Virology	:	Vinod Singh


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FACULTY OF SCIENCE AND COMPUTER SCIENCE
M.Sc. Microbiology
Semester-I
Paper-I: Mycology
Code: MMB 103

UNIT-I

Status of fungi in the living world, general features of fungi and fungus like organisms; recent trends in the classification of fungi; physiology and growth of fungi; nutritional and environmental factors affecting growth; saprotrophs, parasites and mutualistic symbionts; physiology of reproduction in fungi, phylogeny of fungi.

UNIT-II

Fungal diversity-major taxonomic group, structure, reproduction, life cycle and significance of the following representatives: i) Gymnomycota-general account – cellular slime moulds (Dictyostelium), plasmodial slime moulds (Myxomycetes). ii) Mastigomycota- Coelomomyces, Lageridium, Achlya, Phytophthora, Peronospora, Plasmodiophora. iii) Amastigomycota- Zygomycotina- Mucor, Syncephalastrum, Blakeslea, Cunninghamella, Entomophthora.

UNIT-III

Fungal diversity contd. structure, reproduction, life cycle and significance of the following representatives: i) Ascomycotina- Taphrina, Emericella, Chaetomium, Marchelia, Neurospora, Claviceps, Erysiphe. ii) Basidiomycotina- Puccinia, Melampsora, Ustilago, Polyporus, Lycoperdon, Ganoderma. iii) Deutromycotina- Fusarium, Cercospora, Curvularia, Beauveria, Microsporium, Phoma, Collectotrichum.

UNIT-IV

Fungal genetics: i) Life cycle and sexual process in fungi; structure and organization of fungal genomes (mitochondrial genes, plasmids and transposable elements, virus and viral genes). ii) Genetic variations in fungi- nonsexual variations-haploidy, heterokaryosis, parasexuality; sexual variations- mating or breeding systems- homothallism and heterothallism, mutation, physiological specialization; strain improvement.

UNIT-V

Fungi and biotechnology: production of alcoholic beverages, antibiotics, organic acids, ergot alkaloids; the cultivation of fungi for food-mushrooms, myco protein and mycofoods; role of fungi in agriculture and forestry- mycorrhizae and their application, mycopesticides, mycotoxins, conservation of fungal germplasm.

Text Books

Introductory Mycology : C J Alexopoulos C W Mims
Textbook of Mycology : SR Mishra


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FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology

Semester-I

Paper-I: Microbial Biochemistry

Code: MMB 104

UNIT - I

Structure of water and its solvent properties. Acid base pH and buffer; mono-, bi- and polyprotic buffer. Free energy and spontaneity of reactions. ATP and other phosphorylated compound with their free energy of hydrolysis, phosphoryl group transfer; biological oxidation reductions reaction; coupled reaction and oxidative phosphorylation, inhibitors and uncouplers.

UNIT - II

Enzyme classification, specificity, active site, Enzyme kinetics Michealis Menton equation, determination of kinetic parameters, Bi-substrate reaction and their kinetics. Enzyme inhibition and kinetics, allosteric enzyme, kinetics, and allosteric regulation of phospho fructo kinase

UNIT - III

Structure and chemistry of macromolecules; proteins, carbohydrates and lipids; protein folding; structure and chemistry of biomolecules such as antibiotics; pigments, vitamins as coenzymes; lipid analysis by GLC and mass spectrometry; oligosaccharide and polysaccharide analysis.

UNIT - IV

Biosignaling- Molecular mechanism of signal transduction; gated ion channels, nicotinic- acetyl choline receptor; receptor enzyme- the insulin receptor; G- proteins and cyclic AMP; membrane transport- biomembrana, nutrient transport across membranes, active and passive diffusion, symport, antiport and uniport, Na⁺ K⁺ pumps and their metabolic significance.

UNIT - V

Chromatographic technique- paper and TLC, gel filtration, ion-exchange, affinity; HPLC SDSPAGE, isoelectric focusing, Westerns blotting; protein sequencing, mass spectrometry, MALDITOF- MS.

Text Books

**Text Book of Biochemistry
Biochemistry**

Lehninger and Damodaran M. Vasudevan
Manisha Bansal


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**M.Sc. Microbiology
SECOND SEMESTER**

Code	Course	CCE/Internal		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
MMB-201	Molecular Biology and Recombinant DNA Technology	30	11	70	25	-	-	100	36
MMB-202	Biostatistics and Computer Application	30	11	70	25	-	-	100	36
MMB-203	Microbial Genetics	30	11	70	25	-	-	100	36
MMB-204	Microbial Metabolism	30	11	70	25	-	-	100	36
MMB-205	Lab.I (Based on paper I & II)	-	-	-	-	100	36	100	36
MMB-206	Lab.2 (Based on paper III & IV)	-	-	-	-	100	36	100	36

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**M.Sc. Microbiology
Semester-II**

Paper: Molecular Biology and Recombinant DNA Technology

Code: MMB 201

- Unit-I:** Genetic code, Universality of codons, Central dogma, transcription, reverse transcriptase exo and endo nucleases. RNA polymerases, synthesis of RNA in eukaryotes and prokaryotes, operators, exon and introns, post transcriptional processing of RNA.
- Unit-II:** Translation (protein synthesis) in eukaryotes and prokaryotes, t-RNA synthetase, activation in amino-acids, inhibitors of protein synthesis. Protein folding, Proof reading, wobble effect.
- Unit-III:** Gene expression, regulation of gene expression, Operon concept, catabolite activator protein (CAP), positive and negative control and gene expression in prokaryotes, Lac Operon and Tryptophan Operon, Britton-Davidson model of gene regulation.
- Unit-IV:** Extra chromosomal genetic material, types of plasmids, overlapping genes, Transposons and Silent genes, evolutionary significance of Silent genes, Ribonucleoprotein.
- Unit-V:** Basics of recombinant DNA technology- Vectors used in recombinant technology (Plasmids, phages, cosmids, phagemids, BAC YAC), Genomic and c-DNA Library, Applications of recombinant DNA technology.

REFERENCE BOOKS

MOLECULAR BIOLOGY:

DAVID FREIFELDER


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**M.Sc. Microbiology
Semester-II**

Paper Biostatistics and Computer Application

Code: MMB 202

UNIT-I

Importance and scope of statistics in biochemical experimentation; Elements of Probability-Mathematical and Statistical definitions; Addition and Multiplication theorems; Probability Distribution Functions – Binomial, Poisson and Normal; Area under normal distribution curve.

UNIT-II

Measures of central tendency: Arithmetic, geometric & harmonic means; Measures of dispersion: range, quartile deviation, variance, standard deviation, coefficient of variation, confidence limits of population mean. Tests of significance hypotheses and errors; student t statistics- population mean equals a specified value; equality of 2 independent means (equal & unequal variance), equality of 2 means (paired samples).

UNIT-III

Analysis of variance: one-way analysis (sample sizes equal and unequal), completely randomized design; two-way analysis (one observation per cell), randomized block design; multiple comparisons: least significant difference, Duncan's new multiple range test.

UNIT-IV

Linear regression: regression diagram and equation, regression coefficient, standard error, significant tests, prediction of dependent variable from the independent variable; linear correlation- scatter diagram, correlation coefficient, standard error, significance tests; relationship between regression and correlation coefficients; Non parametric tests: Chi-square statistics, test of goodness of fit, test of independence of attributes; standard line interpolation.

UNIT-V

Introduction to Computers: Basic architecture, generations of computer hardware and software; operating systems-WINDOWS and UNIX; system and application software; introduction to internet- LAN, MAN, WAN, Concept of bioinformatics; application of bioinformatics in microbiology.

Reference Books

Biostatistics : BL Agarwal
Principle of Statistics : SM Shukla and Sahai


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M.Sc. Microbiology
Semester-II
Paper: Microbial Genetics
Code: MMB 203

- Unit-I:** DNA as genetic material, Structure of DNA and RNA, DNA replication (Conservative and semi conservative replication), DNA polymerases, conformational flexibility of DNA, structure of chromosome of eukaryotes, giant chromosomes, satellite chromosomes.
- Unit-II:** Genetic recombination in bacteria transformation, transduction and conjugation. Use of transformation, transduction and conjugation in genetic mapping. Preparation of genetic maps.
- Unit-III:** Sequencing of nucleic acid (Sanger's and Maxam and Gilbert's Method), Genetic recombination and its prospects.
- Unit-IV:** Mutation: Molecular mechanism of mutation, forward and reverse mutation, transition, transversion, Spontaneous and induced mutation through physical, chemical and radiations, base analogs, Conditional, permissive, lethal mutations, mutation frequency, application of mutagenesis.
- Unit-V:** Repair mechanisms, Enzymology of repair mechanism dark repair, post-transcriptional repair, photoreactivation repair and SOS repair.

REFERENCE BOOKS

A TEXT BOOK OF MICROBIOLOGY: RC Dubey and DK Maheshwari
PRINCIPLES OF GENETICS: M. J. Gardner


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M.Sc. Microbiology
Semester-II
Paper: Microbial Metabolism
Code: MMB 204

UNIT-I

Microbial growth: mathematical expression of growth, growth measurement, efficient growth curve, synchronous growth and continuous culture, effect of environmental factors on microbial growth, nutrients diffusion, active transport, group translocation, solutes, temperature, oxygen relations.

UNIT-II

Chemo lithotrophy: Sulphur, iron, hydrogen, carbon monoxide, nitrogen oxidations. Methanogenesis, luminescence. Brief account of photosynthetic and accessory pigments chlorophyll, bacteriochlorophyll, carotenoids, oxygenic, anoxygenic photosynthesis. Electron transport- photoautotrophic generation of ATP, fixation of CO₂- Calvin cycle, reverse TCA, carbohydrate anabolism.

UNIT-III

Respiratory metabolism: Embden Mayer Hoff pathway, Entner Doudroff pathway, glyoxalate pathway, Krebs cycle, oxidative and substrate level phosphorylation, Pasteur effect, fermentation of carbohydrates-homo and heterolactic fermentations. Synthesis of polysaccharides- gluconeogenesis and other pathways.

UNIT-IV

Assimilation of nitrogen: Dinitrogen - nitrate nitrogen-ammonia- denitrification, synthesis of major amino-acids, polyamines; peptidoglycan-biopolymers as cell components.

UNIT-V

Microbial development, sporulation and morphogenesis, hyphae vs. yeast forms and their significance. Multicellular organization of selected microbes. Dormancy. Endospore-structure, properties and germination.

Reference Books

A TEXT BOOK OF MICROBIOLOGY: RC DUBEY AND DK MAHESHWARI


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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

MSC -MICROBIOLOGY- IV- Semester Scheme

Code	Subject	CCE/INTERNAL		Theory		practical	
		Max	Min	Max	Min	Max	Min
MMB401	Agriculture Microbiology	30	11	70	25	0	0
MMB402	Food Microbiology	30	11	70	25	0	0
MMB403	Virology and Mycology	30	11	70	25	0	0
MMB404	Microbial Immunology	30	11	70	25	0	0
MMB-405	Lab.1	-	=	=	=	100	36
MMB-406	Lab.2	-	=	=	=	100	36
MMB-407	Project Work					100	36


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MSC -MICROBIOLOGY- IV- Semester Syllabus

MB: 401 - AGRICULTURE MICROBIOLOGY

UNIT I

1. Microorganisms of soil
2. Rhizosphere and phyllosphere microflora
3. Brief account of Microbial interactions: antagonism, symbiosis, mutualism, commensalism, synergism and parasitism.
4. Nutrient cycle: Carbon cycle, nitrogen cycle, phosphorous cycle and sulphur cycle.

UNIT II

1. Role of enzymes and toxins in pathogenesis.
2. Fungal diseases of plants: Rusts of wheat, linseeds; late blight of potato; red rot of sugarcane.
3. Bacterial diseases of plants : Citrus canker, blight of rice
4. Viral diseases of plants: Leaf curl of Papaya, vein clearing of lady's finger

UNIT III

1. Physical and chemical control of plant diseases.
2. Bacterial control of insect pests: *Bacillus thuringiensis* as bacterial insecticide
3. Viral control of insect pests: Nuclear polyhedrosis viruses (NPV) and cytoplasmic polyhedrosis viruses (CPV)
4. Fungal control of insect pests: Entomopathogenic fungi : *Metarhizium anisopliae*, *Beauveria bassiana*, *Verrucillium lecani*, *Hirsutiella thompsoni*

UNIT IV

1. Storage fungi; Categories of storage fungi, conditions during storage in relation to damage of seeds, harmful effects.
2. Mycotoxins and their effect on human being.
3. General idea about quarantine.
4. Production of biogas and alcohol from agricultural wastes.

UNIT V

1. Biofertilizers: Types, production and application.
2. Mycorrhizae: Types and their application in agriculture and forestry.
3. Vermicomposting.
4. Reclamation of waste agricultural land by microorganisms.

Reference Books

1. Soil Microbiology by Prof. N.S. Subba Rao, Fourth edition, Oxford and IBH Publishing CO, PVT., LTD., New Delhi
2. Introduction to soil microbiology, Alexander M. (1977) John Wiley & Sons, Inc., New York.
3. Modern Soil Microbiology, Dick J, Ellis V, Trevors JT, Wellington, EMH (1997) Marcel Dekker INC, New York.

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MB: 402- FOOD MICROBIOLOGY

UNIT I

1. Microorganisms important in food microbiology; molds, yeast and bacteria –general characteristics, classification and importance.
2. Principles of food preservation, preservation by use of high temperature, low temperature, drying and desiccation.
3. Chemical preservatives and additives.
4. Preservation by radiation.

UNIT II

1. Factors influencing microbial growth in food; Extrinsic and intrinsic factors.
2. Microbial spoilage of food, Chemical changes caused by the microorganisms during spoilage.
3. Spoilage of fish, meat, poultry, eggs, fruits and vegetables.
4. Detection of spoilage and characterization.

UNIT III

1. Classification of food borne diseases.
2. Food borne infections: *Brucella*, *Bacillus cereus*, *Clostridium perfringens*, *Yersinia enterocolitica* and *Escherichia*, *Salmonella* spp.
3. Food intoxication: Staphylococcal intoxication, Clostridial poisoning (*Clostridium Botulinum*).
4. Food adulteration and prevailing food standards in India.

UNIT IV

1. Microbiology of Milk: Sources of microorganisms in milk and types of microorganisms in milk.
2. Microbiological examination of milk (standard plate count, direct microscopic count, reductase, and phosphatase test).
3. Dehydration and pasteurization of milk.
4. Dairy products from microorganisms: Butter, yoghurt and cheese.

UNIT V

1. Microorganisms as source of food: Single Cell Protein (SCP)
2. Mushrooms and food value of mushrooms
3. Food conversions: Lactic acid conversions, soyabean conversions and Bakery
4. Microbiological estimation of food: Sample collection, preparation and analysis techniques

Reference Books

1. Food science By Norman N. Putler, Joseph H. Hotchkiss. Fourth edition, CBS Publishers and Distributors, New Delhi
2. Food Microbiology , by William C. Frazier and Dennis C. Westhoff, Fourth edition, Tata McGraw-Hill Publishing Company Limited, New Delhi
3. Modern Food Microbiology by James M. Jay, Fourth Edition, CBS Publishers and Distributors, New Delhi.


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MB: 403- VIROLOGY AND MYCOLOGY

UNIT- I

1. Brief outline on discovery and origin of viruses.
2. General properties of viruses, morphology and ultra-structure of viruses, capsid and their arrangements, types of envelopes and their composition, measurement of viruses.
3. Viral genome; their types and structure, viral related agents-viroids and prions.
4. Classification and general properties of major families of viruses including detail account of their mode of replication.

UNIT-II

1. Cultivation of viruses- in embryonated eggs, experimental animals and cell lines; primary and secondary cell lines, diploid cell culture.
2. Assay of viruses: physical and chemical methods, plaque method, pock counting and end point method.
3. Serological methods: hemagglutination, hemagglutination inhibition, neutralization test, complement fixation, ELISA, RIA.
4. Purification of viruses: gradient centrifuge, electrophoresis, and chromatography.

UNIT-III

1. Plant viruses: recent advance in classification of plant viruses. Structure and pathogenicity of TMV.
2. Transmission of plant viruses with vector (insect, nematodes and fungi) and without vector (contact, seed and pollens). Biochemical changes induced by virus in plant cell.
3. Animal viruses; nomenclature and classification of animal viruses.
4. General idea about Cyanophage, and Mycophage.

UNIT-IV

1. Bacteriophage: classification, morphology and ultra structure.
2. One step growth curve (latent period, eclipse period, and burst of size.)
3. Life cycle: lytic and lysogenic life cycle of bacteriophages.
4. Brief account of M13, Mu, T4, ϕ x174 and lambda phage

UNIT-V

1. Structure, reproduction and classification of fungi, general characteristics of Zygomycetes, Ascomycetes, Basidiomycetes, and Deuteromycetes.
2. Cultivation of fungi, culture media for fungal growth, effects of environment on growth, isolation, identification and preservation of fungi.
3. Dimorphic fungi, yeast morphology, general characteristics and reproduction, Lichens, Mycorrhiza, and Actinomycetes.
4. Ecology of fungi: concept of fungistatic, fungicidal.

Reference Books

1. Virology: Renato Dulbecco and Harold S. Ginsberg. Fourth edition, J.B. Lippincott Company, USA
2. An Introduction to viruses, S. B. Biswas and Amita Biswas. Forth edition, Vikas Publishing House PVT LTD New Delhi.
3. Textbook of Microbiology by Ananthnarayanan and Paniker's, eighth edition, Universities Press.

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MB: 404 MICROBIAL IMMUNOLOGY

UNIT-I

1. History of immunology, development of immunology as discipline.
2. Immune response: mechanism of innate and adaptive immune response.
3. Hematopoiesis: development of immune cells, regulation of hematopoiesis.
4. Structure, composition and types of cells involve in immune response: mononuclear cells, granulocytes, antigen presenting cells, lymphoid cells. Mediators and process of Inflammation.

UNIT-II

1. Anatomical organization of immune system: primary and secondary lymphoid organs: structure and function.
2. Antigens- structure and properties, factors affecting the immunogenicity, properties of B and T- cell epitopes, haptens, mitogens, super antigen, adjuvants.
3. Antibody: structure, properties, types and function of antibodies, antigenic determinants on immunoglobulin; isotypes, allotypes, and idiotypes, molecular mechanism of antibody diversity and class switching.
4. Cell mediated immunity and its mechanism.

UNIT-III

1. Major histocompatibility complex: organization of MHC genes, types and function of MHC molecules, antigen presentation, MHC polymorphism, MHC related diseases.
2. Complement system: components, activation pathways, regulation of activation pathways and role of complement system in immune response.
3. Cytokines: types, structure and functions, cytokines receptors, cytokine regulation of immune receptors.
4. Immune response to infectious diseases: viral infection, bacterial infection, protozoan diseases, helminthes related diseases.

UNIT-IV

1. Hypersensitivity: type I, II, III and types IV hypersensitivity. Immunodeficiency diseases: primary and secondary immunodeficiency.
2. Autoimmunity: organ specific autoimmune diseases, mechanism of autoimmune diseases and therapeutic approaches.
3. Transplantation immunology: immunologic basis of graft rejection, clinical manifestation of graft rejection and clinical transplantation.
4. Cancer immunology: tumor antigen, immune response to tumor, oncogene and induction, cancer immunotherapy.

UNIT-V

1. Vaccines: Active and passive immunization, vaccine schedule, whole organism vaccine, subunit vaccine, vaccine, DNA vaccine, recombinant vaccine, subunit vaccines and anti-idiotypic vaccine.
2. Hybridoma technology: murine monoclonal antibody production, principle of selection, characterization and applications in diagnosis, therapy and basis research.
3. Antibody engineering: Chimeric and Humanized monoclonal antibodies.
4. Antigen- antibody interaction: avidity and affinity measurements, detection of antigen- antibody interaction by precipitation, agglutination, RIA, and ELISA.



Reference Books

1. Kuby Immunology by Kindt TJ, Goldsby RA, Osborne BA, Kuby J: 6th edition. New York. WH Freeman; 2006.
2. Cellular and Molecular Immunology by Abbas AK, Lichtman AH, Pillai S; Saunders Elsevier; 2007.
3. Immunobiology: The immune system in health and disease by Janeway CA, Travers P, Walport M, Shlomchik MJ: 6th edition. New York, Garland Science Publishing; 2005.
4. Medical Microbiology and Immunology by Levinson W, Jawetz E: Lange publication; 2001.

PRACTICALS

MB- 405- Lab-I

1. To study viral diseases in plants.
2. To study bacterial and fungal diseases in plants.
3. Isolation of rhizobia from root nodules of leguminous plants.
4. Testing of nodulation ability of rhizobia.
5. Inoculation of seeds with rhizobia.
6. To study pesticidal activity of *Bacillus thuringiensis*.
7. Isolation of VAM spores from soil.
8. Isolation of *Azotobacter* species from soil.
9. Isolation of microorganisms from rhizosphere.

MB; 406 Lab II

1. Detection of adulterants in spices, pulses, sugar, tea.
2. Detection of adulterants in milk and milk products.
3. Detection of arsenic by microbiological methods.
4. Detection of nicotinic acid by bioassay.
5. Detection of number of bacteria in milk by SPC.
6. Determination of quality of milk sample by methylene blue reductase test.
7. To demonstrate role of yeast in bread-making.
8. Isolation of microorganisms from spoiled food.
9. Isolation of pathogenic microorganisms from food.


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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)
Scheme of Examination
Third Semester - Master of Science (Microbiology)

Semester III

Semester	Code	Course	CCE/Internal		Theory		Practical		Total
			Max	Min	Max	Min	Max	Min	
III Semester	MMB-301	Environmental Microbiology	30	11	70	25	-	-	100
	MMB-302	Industrial & Food Microbiology	30	11	70	25	-	-	100
	MMB-303	Medical Microbiology	30	11	70	25	-	-	100
	MMB-304	Agricultural Microbiology	30	11	70	25	-	-	100
	MMB-305	Lab.1 (Based on paper I & II)	-	-	-	-	100	36	100
	MMB-306	Lab.2 (Based on paper III & IV)	-	-	-	-	100	36	100
Total			120	44	280	100	200	72	600


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**Sri Satya Sai University of Technology & Medical Sciences,
Sehore (M.P.)**
Scheme of Examination
Third Semester - Master of Science (Microbiology)

Paper code- MMB-301
Environmental Microbiology

UNIT-I

1. Microbial ecology: basic concepts, types and microbial habitats, factors affecting microbial population.
2. Microbial interactions: competition, commensalism, parasitism, mutualism, commensalisms, synergism.
3. Population ecology: characteristics of population, population growth curves (r and k selection) population regulation.
4. Conservation and management of microbial diversity: biodeterioration and biodegradation.

UNIT-II

1. Microbiology of air: microorganism of air, enumeration of air micro flora.
2. Significance of air micro flora.
3. Brief account of air borne transmission of bacteria, fungi, pollens and viruses.
4. Air borne diseases and their prevention.

UNIT-III

1. Soil microbiology: microflora of soil: soil microorganisms associated with plants: rhizosphere, mycorrhizae.
2. Role of microorganisms in organic matter decomposition (cellulose, hemicellulose, lignin).
3. Bioleaching; introduction, application of bacterial leaching techniques, properties of bioleaching.
4. Microbial degradation of xenobiotics, petroleum and oil spills in environmental decay behaviours and degradative plasmid.

UNIT-IV

1. Water microbiology: aquatic microorganisms; fresh water and sea water microflora. Microorganisms and water quality, water pollution.
2. Water purity test and indicator organisms, method used in environmental studies -BOD, COD, DO.
3. Common water born disease and their control measure.
4. Water purification: flocculation, chlorination and purification.

UNIT-V

1. Microbiology of waste water and effluent treatments, aerobic process: primary, secondary and tertiary treatment; trickle filter, oxidation ponds and stabilization ponds, principle of aerobic digestion.
2. Bioremediation of contaminations.
3. Extremophiles -acidophilic, alkalophilic, thermophilic microbes with adaptation and application in ecosystem.
4. Microbial biofilms: physiology, morphology, histochemistry of microbial biofilms, mechanism of microbial adherence, beneficial and harmful role of biofilms.


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Reference Books

1. Microbial Ecology: Fundamentals and applications, Ronald M. Atlas, fourth edition, An imprint of Addison Wesley Longman, Inc, California
2. Environmental chemistry, A.K. De, Wiley Eastern Ltd., New Delhi
3. Environmental Science, Physical Principles and applications; Eghert Boeker et. al.
4. Comprehensive Biotechnology, vol.4, M. Moo-Young (Ed-in-chief), Pergamon Press, Oxford.
5. Wastewater Treatment for Pollution Control By Soli J Arceivala, Second Edition, Tata McGraw- Hill Publishing Company Limited.


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**Sri Satya Sai University of Technology & Medical Sciences,
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**Scheme of Examination
Third Semester - Master of Science (Microbiology)**

Paper code- MMB-302

Industrial & Food Microbiology

UNIT I

1. Microorganisms important in food microbiology; molds, yeast and bacteria –general characteristics, classification and importance.
2. Principles of food preservation, preservation by use of high temperature, low temperature, drying and desiccation.
3. Chemical preservatives and additives.
4. Preservation by radiation.

UNIT II

1. Factors influencing microbial growth in food: Extrinsic and intrinsic factors.
2. Microbial spoilage of food. Chemical changes caused by the microorganisms during spoilage.
3. Spoilage of fish, meat, poultry, eggs, fruits and vegetables.
4. Detection of spoilage and characterization.

UNIT III

1. Classification of food borne diseases.
2. Food borne infections: *Brucella*, *Bacillus cereus*, *Clostridium perfringens*, *Yersinia enterocolitica* and *Escherichia*, *Salmonella* spp.
3. Food intoxication: Staphylococcal intoxication. Clostridial poisoning (*Clostridium Botulinum*).
4. Food adulteration and prevailing food standards in India.

UNIT IV

1. Microbiology of Milk; Sources of microorganisms in milk and types of microorganisms in milk.
2. Microbiological examination of milk (standard plate count, direct microscopic count, reductase, and phosphatase test).
3. Dehydration and pasteurization of milk.
4. Dairy products from microorganisms: Butter, yoghurt and cheese.

UNIT V

1. Microorganisms as source of food; Single Cell Protein (SCP)
2. Mushrooms and food value of mushrooms
3. Food conversions: Lactic acid conversions, soyabean conversions and Bakery
4. Microbiological estimation of food: Sample collection, preparation and analysis techniques

Reference Books:

1. Food science By Norman N. Potler, Joseph H. CBS Publishers and Distributors, New Delhi
2. Food Microbiology, by William C. Frazier and Dennis Fourth edition, Tata McGraw-Hill Publishing Company Limited, New Delhi
3. Modern Food Microbiology by James M. Jay, Fourth Edition, CBS Publishers, New Delhi.


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**Sri Satya Sai University of Technology & Medical Sciences,
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Scheme of Examination
Third Semester - Master of Science (Microbiology)

Paper code- MMB-303

Medical Microbiology

UNIT-I

1. Infection: types of infection, sources of infection, reservoirs and vehicles of infection, predisposing factors.
2. Host-parasite relationship governing the infection and establishment of disease, factors affecting virulence.
3. Normal microflora of human body; normal flora of skin, respiratory, gastrointestinal, genital tract, role of resident flora, concept of probiotics.
4. Mode of spread of infection; Respiratory, skin, wound & burn infection, venereal infections, alimentary tract infection, blood born infection and nosocomial infection.

UNIT-II

1. Infections caused by Gram positive cocci and Gram negative cocci: Source of infection, Pathogenicity, Epidemiology & Lab diagnosis of *Staphylococcus*, *Streptococcus* and *Neisseria* (meningitis, gonorrhoea)
2. Infections caused by Gram negative bacteria of family Enterobacteriaceae: Source of infection, Pathogenicity, Epidemiology & Lab diagnosis of *E.coli*, *Klebsiella*, *Proteus*, *Pseudomonas*, *Shigella dysenteriae* and *Salmonella typhi*.
3. Infection caused by Gram Positive bacilli: Source of infection, Pathogenicity, Epidemiology & Lab diagnosis of *Corynebacterium diphtheriae*, *Bacillus anthracis*, *Clostridium tetani*, *Vibrio cholerae*.
4. Disease caused by acid-fast bacteria and intracellular bacteria: Source of infection, Pathogenicity, Epidemiology & Lab diagnosis of *Mycobacterium tuberculosis*, *Mycobacterium leprae*, *Rickettsia* and *Chlamydia*.

UNIT-III

Morphology, pathogenesis, immune response, diagnosis and prevention of

1. Pox viruses (Variola, Vaccinia, Small pox) Herpes Simplex type I and type II, Picorna viruses (Enteroviruses and Polio viruses).
2. Paramyxo viruses (Rubella virus and Para influenza viruses), Orthomyxo viruses (Measles & Mumps viruses).
3. Hepatitis viruses (Type A, B, C, D, E). Arbo viruses (Alpha virus and Flavi viruses), Rhabdo viruses (Rabies virus).
4. Oncogenic viruses, HIV virus.


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UNIT-IV

1. Important protozoal diseases: Route of entry, Life Cycles, Immunity, disease produced, diagnosis & prophylaxis of *Plasmodium falciparum*, *P. malariae* (Malaria), *Entamoeba histolytica* & *Entamoeba coli* (amoebiasis),
2. Route of entry, Life Cycles, Immunity, disease produced, diagnosis & prophylaxis of *Leishmania*, *Trypanosoma*
3. Fungal infections: description & classification of pathogenic fungi, Infection caused by dermatophytes (Microsporum, Epidermatophyton)
4. Definition, Causative agent, Source of infection, Epidemiology, Symptomatology & Diagnosis of Candidiasis, Histoplasmosis.

UNIT-V

1. Antimicrobial agents: History, Antibiotics, Antifungal and Antivirals (common drugs, their spectrum and mode of action)
2. Methodologies for testing of antibacterial, antifungal, and antiviral drugs (*in vivo* and *in vitro* infectivity models)
3. Preclinical development: Safety profile of drugs (Pyrogenicity, Toxicity –hepato, -nephro, -cardio and neurotoxicity), evaluation of drug (LD50, Acute, subacute and chronic toxicity), Mutagenicity (Ames test, micronucleus test) and
4. Clinical studies: Phase I, phase II, phase III and phase IV of clinical trials –Objectives, Conduct of trials, Outcome

Reference Books

1. Textbook of Microbiology by Ananthnarayanan and Paniker's, eighth edition, Universities Press.
2. Brock Biology of Microorganisms, M.T. Madigan, J.M. Martinko and J. Parker, Ninth edition, Prentice Hall, USA
3. Microbiology: An introduction, G.J. Tortora, B.R. Funke and C.L. Funke.
4. Virology; Renato Dulbecco and Harold S. Ginsberg, Fourth edition, J.B. Lippincott Company, USA
5. An Introduction to viruses, S. B. Biswas and Amita Biswas, Forth edition, Vikas Publishing House PVT LTD New Delhi


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**Sri Satya Sai University of Technology & Medical Sciences, Sehore
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**Scheme of Examination
Third Semester - Master of Science (Microbiology)**

Paper code -MMB-304

Agricultural Microbiology

UNIT I

1. Microorganisms of soil
2. Rhizosphere and phyllosphere microflora
3. Brief account of Microbial interactions: antagonism, symbiosis, mutualism, commensalisms, synergism and parasitism.
4. Nutrient cycle: Carbon cycle, nitrogen cycle, phosphorous cycle and sulphur cycle.

UNIT II

1. Role of enzymes and toxins in pathogenesis.
2. Fungal diseases of plants: Rusts of wheat, linseeds; late blight of potato; red rot of sugarcane.
3. Bacterial diseases of plants : Citrus canker, blight of rice
4. Viral diseases of plants: Leaf curl of Papaya, vein clearing of lady's finger

UNIT III

1. Physical and chemical control of plant diseases.
2. Bacterial control of insect pests: *Bacillus thuringiensis* as bacterial insecticide
3. Viral control of insect pests: Nuclear polyhedrosis viruses (NPV) and cytoplasmic polyhedrosis viruses (CPV)
4. Fungal control of insect pests: Entomopathogenic fungi : *Metarhizium anisopliae*, *Beauveria bassiana*, *Verticillium lecani*, *Hirsutiella thompsoni*

UNIT IV

1. Storage fungi: Categories of storage fungi, conditions during storage in relation to damage of seeds, harmful effects.
2. Mycotoxins and their effect on human being.
3. General idea about quarantine.
4. Production of biogas and alcohol from agricultural wastes.

UNIT V

1. Biofertilizers : Types, production and application.
2. Mycorrhizae : Types and their application in agriculture and forestry.
3. Vermicomposting.
4. Reclamation of waste agricultural land by microorganisms.

Reference Books

1. Soil Microbiology by Prof. N.S. Subba Rao, Fourth edition, Oxford and IBH Publishing CO. PVT., LTD., New Delhi
2. Introduction to soil microbiology. Alexander M. (1977) John Wiley & Sons, Inc., New York
3. Modern Soil Microbiology, Dirk J. Egan V, Trevors JT, Wellington, EMH (1997), New York

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SCHEME 2017-18

M.SC MATHEMATICS I SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL			TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN	
			MAX	MIN	MAX	MIN	MAX	MIN					
MAT101	COMPULSORY	ADVANCED ABSTRACT ALGEBRA - I	70	25	30	11	100	36	0	0	100	36	
MAT102	COMPULSORY	Real Analysis	70	25	30	11	100	36	0	0	100	36	
MAT103	COMPULSORY	TOPOLOGY - I	70	25	30	11	100	36	0	0	100	36	
MAT104	COMPULSORY	COMPLEX ANALYSIS - I	70	25	30	11	100	36	0	0	100	36	
MAT105	COMPULSORY	ADVANCED DISCRETE MATHEMATICS - I	70	25	30	11	100	36	0	0	100	36	
TOTAL			350		150		500				500		

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SYLLABUS M.SC MATHEMATICS – IST SEMESTER

Advanced Abstract Algebra –I

Paper code: - MAT101

Unit - I

Normal & Subnormal series of groups, Composition series, Jordan- Holder series.

Unit- II

Solvable & Nilpotent groups.

Unit- III

Extension field Roots of polynomials, Algebraic and transcendental extensions, Splitting fields, Separable and inseparable extension.

Unit- IV

Perfect field, Finite fields, primitive elements, Algebraically closed field.

Unit – V

Auto morphism of extension. Galois extension. Fundamental theorem of Galois theory Solution of polynomial equations by radicals. Insolubility of general equation of degree 5 by radicals.

Text Book :-

- (1) I.N. Herstein, Topics in Algebra, Wiley Eastern, New Delhi.
- (2) V. Sahai & V. Bisht, Algebra, Narosa Publishing House.

Reference,

- (1) P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra, Cambridge University Press.
- (2) N. Jacobson, Basic Algebra, Vol. II & VIII, Hindustan Publishing Company
- (3) S. Lang, Algebra, Addison- Wesley.
- (4) I.S. Luthar & I.B.S. Passi Algebra Vol-1,2,3, Narosa company.
- (5) Dr.H.K Pathak Advanced Abstract Algebra

MSC MATHEMATICS I SEMESTER SYLLABUS 2017-18

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SYLLABUS M.SC MATHEMATICS – Ist SEMESTER

Real Analysis

Paper code:- MAT102

Unit -I

Definition and existence of Riemann- stieljes integral and its Properties, Integration and Differentiation, The fundamental theorem of Calculus.

Unit – II

Integration of vector- valued function, Rectifiable curves. Rearrangement of terms of a series, Riemann's theorem.

Unit – III

Sequence and series of functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M- Test, Abel's and Dirichlet's tests for uniform convergence, Uniform convergence and continuity, uniform convergence and Riemann- Stieljes integration, uniform convergence and differentiation, Weierstrass approximation theorem, Power series, uniqueness theorem for power series, Abel's and Tauber's theorems.

Unit –IV

Function of several variables, linear transformations, Derivatives in an open subset of \mathbb{R}^n , chain rule, Partial derivative, Interchange of the order of differentiation, Derivatives of higher orders, Taylor's theorem, Inverse function theorem,

Unit –V

Implicit function theorem, Jacobians, extremum problem with constraints, Lagrange's multiplier methods Differentiation of integrals, Partitions of unity, Differential form, Stoke's Theorem.

Text Books:

- 1- Walter Rudin. Principles of Mathematical Analysis, McGraw Hill

Reference :

- 1- T.M. Apostol, Mathematical Analysis Narosa.
- 2- H.L. Rayden, Real Analysis, Macmillan (Indian Edition)
- 3- Dr. H.K Pathak Real Analysis

MSC MATHEMATICS I SEMESTER SYLLABUS 2017-18

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SYLLABUS M.SC MATHEMATICS – Ist SEMESTER

Topology -I
Paper code:- MAT103

Unit -I

Countable and uncountable sets, Infinite sets and the Axiom of choice, Cardinal numbers and its arithmetic, Schroeder- Bernstein theorem, Cantor's theorem and the continuum hypothesis, Zorn's lemma, Well-ordering theorem.

Unit -II

Definition and examples of topological spaces, Closed sets, Closure, Dense subsets, Neighbourhoods, interior and boundary, Accumulation points and derived sets, Bases and sub-bases, Subspaces and relative topology.

Unit -III

Alternate methods of defining a topology in terms of kuratowski Closure Operator and Neighbourhood Systems, Continuous Functions and homeomorphism.

Unit -IV

First and Second Countable spaces, Lindelof's theorems, Separable spaces, Second Countability and Separability.

Unit -V

Path-connectedness, connected spaces, Connectedness on Real line, Components, Locally connected spaces.

Text Books: J.R.Munkres, Topology- A first course, Prentice- Hall of India.

References:

G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill

2, K.D. Joshi: Introduction to general topology, Wiley Eastern.

Dr. H.K Pathak Introduction to general topology

M.Sc MATHEMATICS I SEMESTER SYLLABUS 2017-18

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SYLLABUS M.SC MATHEMATICS – 1st SEMESTER

Complex Analysis -I
Paper code:- MAT104

Unit -I

Complex integration, Cauchy- Goursat theorem, Cauchy integral formula, Higher order derivatives

Unit -II

Morera's theorem, Cauchy's inequality, Liouville's theorem, The fundamental theorem of algebra, Taylor's Theorem.

Unit- III

The maximum modulus principle, Schwartz lemma, Laurent series Isolated singularities. Meromorphic Functions. The argument principle, Rouché's theorem Inverse function theorem.

Unit – IV

Residues. Cauchy's residue theorem. Evaluation of integrals. Branches of many valued functions with special reference to $\arg z, z^a$.

Unit – V

Bilinear transformation, their properties and classification, Definition and examples of conformal mapping .

Text Book:

1. J.B. Conway. Functions of one complex variable, Spring verlag

References:

1. S.Ponnuswamy, Foundation of complex analysis, Narosa Publishing House.
2. L.V. Ahlfors. Complex analysis McGraw Hill
3. Dr .H.K. Pathak Complex analysis


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MSC MATHEMATICS I SEMESTER SYLLABUS 2017-18



SYLLABUS M.SC MATHEMATICS – Ist SEMESTER

Advanced Discrete Mathematics-I

Paper code:- MAT105

Unit – I

Semigroup and monoids, Subsemigroups Submonoids, Homomorphism of semigroups and monoids, Congruence relation and Quotient semigroups, Direct products, Basic Homomorphism Theorem.

Unit - II

Lattices-Lattices as partially ordered sets, their properties, Lattices as Algebraic systems, sublattices, Bounded lattices, Distributive Lattices, Complemented lattices.

Unit - III

Boolean Algebra-Boolean Algebras as lattices, various Boolean identities, joint irreducible elements, minterms, maxterms, minterm Boolean forms, canonical forms, minimization of Boolean functions. Application of Boolean Algebra to switching theory (Using AND,OR,& NOT gates) the Karnaugh method.

Unit - IV

Graph Theory- Definition and types of graphs.Paths & circuits. Connected graphs. Euler graphs, weighted graphs (undirected) Dijkstra's Algorithm. Trees, Properties of trees Rooted & Binary trees, spanning trees, minimal spanning tree.

Unit - V

Complete Bipartite graphs, Cut-sets, properties of cut sets, Fundamental Cut-sets & circuits, Connectivity and Separability, Planar graphs, Kuratowski's two graphs, Euler's formula for planar graphs.

Text Books :-

1. J.P Tremblay manohar. Discrete Mathematical structures,

MSC MATHEMATICS I SEMESTER SYLLABUS 2017-18

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SCHEME 2017-18

M.SC MATHEMATICS II SEMESTER

SUBJECT CODE	SUBJECT NAME	SUBJECT TYPE	THEORY						PRACTICAL			TOTAL		
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN						
MAT201	ADVANCED ABSTRACT ALGEBRA - II	COMPULSORY	70	25	30	11	100	36	0	0	100	36	36	
MAT202	LEBESGUE MEASURE & INTEGRATION	COMPULSORY	70	25	30	11	100	36	0	0	100	36	36	
MAT203	TOPOLOGY - II	COMPULSORY	70	25	30	11	100	36	0	0	100	36	36	
MAT204	COMPLEX ANALYSIS-II	COMPULSORY	70	25	30	11	100	36	0	0	100	36	36	
MAT205	ADVANCED DISCRETE MATHEMATICS - I	COMPULSORY	70	25	30	11	100	36	0	0	100	36	36	
TOTAL			350		150		500					500		

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SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

**Advanced Abstract Algebra —II
MAT201**

Unit- I

Introduction to Modules, Examples, submodules quotient modules. Module homomorphism, isomorphism. Finitely generated modules, cyclic modules.

Unit – II

Simple modules, Semisimple modules, Free modules, Schur's lemma.

Unit – III

Noetherian & Artinian modules and rings, Hilbert basis theorem. Wedderburn-Artin theorem.

Unit – IV

Uniform modules, Primary modules, Noether-Lasker theorem. Fundamental structure theorem of modules over a principal ideal domain and its applications to finitely generated : abelian groups.

Unit – V

Similarity of linear transformation, Invariant spaces, Reduction to triangular forms. Nilpotent transformations. Index of Nilpotency, Invariants of a nilpotent transformation. The primary decomposition theorem.

Reference Books:

P.B. Bhattacharya, S.K.Jain, S.R. Nagpal, Basic Abstract Algebra, Cambridge University Press, (Indian Edition)


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SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

**Lebesgue Measure & Integration
MAT202**

Unit – I

Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability. Non-measurable sets.

Unit – II

Integration of Non-negative functions. The General integral. Integration of Series, Riemann and Lebesgue Integrals.

Unit – III

The Four derivatives. Functions of Bounded variation. Lebesgue Differentiation Theorem, Differentiation and Integration.

Unit - IV

The LP-spaces, Convex functions, Jensen's inequality. Holder and Minkowski inequalities. Completeness of LP.

Unit – V

Dual of space when $1 < p < \infty$ convergence in Measure, Uniform. Convergence and almost uniform convergence.

Reference Books:

G. de Barra. Measure Theory and Integration, Wiley Eastern (Indian Edition)
Walter Rudin, Principles of Mathematical Analysis, McGraw-Hill, International student edition, H.L. Royden, Real Analysis, Macmillan, Indian Edition.


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SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

**Topology- I I
MAT203**

Unit – I

Separation axioms T_0, T_1, T_2, T_3, T_4 : their Characterizations and basic properties. Urysohn's lemma. Tietze extension theorem.

Unit – II

Compactness. Continuous functions and compact sets. Basic properties of compactness. Compactness and finite intersection property. Sequentially and countably compact sets. Local compactness and one point compactification. Stone-vech compactification. Compactness in metric spaces. Equivalence of compactness, countable compactness and one point compactification. Stone-vech compactification. Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential compactness in metric spaces. Connected spaces. Connectedness on the line. Components. Locally connected spaces.

Unit – III

Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Separation axioms and product spaces. Connectedness and product spaces. Compactness and product spaces (Tychonoff's theorem) Countability and product spaces.

Unit - IV

Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Net and filters. Topology and convergence of nets Hausdorffness and nets. Compactness and nets. Filters and their convergence. Canonical way of converging nets to filters and vice-versa. Ultra-filters and Compactness.

Unit – V

The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering spaces. The fundamental group of the circle and the fundamental theorem of algebra.

Reference Books:

1. H.K Pathak, Topology Book


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SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

**Complex Analysis –II
MAT204**

Unit – I

Weierstrass factorization theorem, Gamma and its properties, Riemann Zeta function, Riemann's functional equation.

Unit – II

Runge's Theorem, Mittag-Leffler's theorem, Analytic continuation, Uniqueness of direct analytic continuation, Uniqueness of analytic continuation along a curve, Power series method of analytic continuation.

Unit – III

Schwartz reflection principle, Monodromy theorem and its consequences, Harmonic function on a disc.

Unit - IV

Harnack inequality and theorem, Dirichlet problem, Green's function, Canonical products, Jensen's formula, Hadamard's three circles theorem, Order of an entire function, Exponent of convergence, Borel's theorem, Hadamard's factorization theorem.

Unit – V

The range of an analytic function, Bloch's theorem, The little Picard theorem, Schottky's theorem, Montel Caratheodory and great Picard theorem, Univalent function, Bieberbach conjecture and the V, - theorem.

Reference Books:

J.B.Conway, Functions of one complex variable, Springer-Verlag

S Ponnuswamy, Fundamentals of complex analysis, Narosa Publishing House.

L.V.Ahlfors, Complex Analysis, McGraw Hill


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SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

**Advanced Discrete Mathematics-II
MAT205**

Unit – I

Directed graphs, Indegree and outdegree of a vertex, weighted undirected graphs dijkstra's algorithm, strong connectivity and washell's algorithm directed trees, search trees, tree traversals.

Unit – II

Introductory computability theory-Finite State Machines and their Transition Table Diagrams. Equivalence of Finite State Machines. Reduced Machines, Homomorphism. Finite Automata. Acceptors.

Unit – III

Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata. Moore and Mealy Machines.

Unit - IV

Turing Machine and Partial Recursive Functions, Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules. Derivations.

Unit – V

Sentential Forms, Language generated by grammar, Regular, Context-Free, and Context Sensitive Grammars and Languages. Regular sets. Regular Expressions and the Pumphaj Lemma. Kleene's Theorem. Notions of Syntax Analysis. Polish Notations. Conversion of Infix Expressions to Polish Notation.

Reference Books:

J.R. Treppblay & R. Manohar, Discrete Mathematics and Structures with Applications to Computer Science, McGraw- A


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SCHEME 2017-1B

MSC Mathematics IIIrd SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
MAT301	COMPULSORY	Functional Analysis - I	70	25	30	11	100	36	0	0	100	36
MAT302	COMPULSORY	Advanced Special Function - I	70	25	30	11	100	36	0	0	100	36
MAT303	COMPULSORY	Theory of Linear Operators - I	70	25	30	11	100	36	0	0	100	36
MAT304	COMPULSORY	Integral Transforms - I	70	25	30	11	100	36	0	0	100	36
MAT305	COMPULSORY	Spherical Trigonometry And Astronomy - I	70	25	30	11	100	36	0	0	100	36
MAT306	COMPULSORY	INTERNSHIP/PROJECT	0	0	0	0	0	0	100	36	100	36
TOTAL			350		150		500		100		600	


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SYLLABUS M.SC MATHEMATICS – IIIrd SEMESTER

FUNCTIONAL ANALYSIS -I

MAT301

Unit- I

Normed linear spaces. Banach spaces and examples. Properties of Normed linear spaces
Basic properties of finite dimensional normed linear spaces.

Unit- II

Finite dimensional Non linear Spaces & Sub spaces Equivalent norms, Riesz Lemma, and compactness.

Unit- III

Quotient space of normed linear spaces and its completeness

Unit- IV

(Bounded Linear operators & continuous operators Non - Linear spaces operators

Unit- V

Linear functional, bounded Linear functional Dual spaces with examples.

Text Books:

- (1) E. Kreyszig, Introductory Functional Analysis with application, John Wiley & Sons New York.
- (2) G.F. Simmons, Introduction to Topology & Modern Analysis Mc Graw Hill, New York

Reference:

- [1] B. Choudary and Sudarshan Nanda, Functional Analysis with application Wiley Eastern Ltd.

SYLLABUS M.SC MATHEMATICS – IIIrd SEMESTER

Advanced Special Function -I

MAT302

Unit- I

Gamma and Beta Function: The Euler or Macheroni Constant γ , Gamma Function A series for $\Gamma'(z)/\Gamma(z)$, Difference equation $\Gamma(z+1)=z\Gamma(z)$, value of $\Gamma z / \Gamma(1-z)$, Factorial funtion, Legender's duplication formula, Gauss multiplication theorem.

Unit- II

Hypergeometric funtion and function ${}_2F_1(a,b;c;z)$. A simple integral form valuation of ${}_2F_1(a,b;c;z)$. Contiguous funtion relations, Hyper geometric differential equation and its solutions, $F(a,b;c;z)$ as funtion of its parameters.

Unit- III

Generalized Hypergeometric function.

Unit- IV

Elementary series manipulations, Simple transformation, Relations between function of z and $1-z$.

Unit- V

confluent hyper geometric function and its properties.

Books Recommended :-

1. Rainville, E.D., Special Functions, the Macmillan Co., New York 1971.
2. Srivastava, H.M., Gupta K.C. and Goyal, S.P. :, The H- Functions of one and two variables with applications, South Asian Publication, New Delhi.
3. Saran N., Sharma S.D. and Trivedi - Special Function with application, Pragati Pragati Prakashan 1986.
4. The Saxena V.P.- I-Function, Anamaya- New Delhi, 2008.

Reference Books:-

1. Lebedev, N.N., Sepcial Functions and Their Applications, Prentice Hall, Englewood Cliffs, New Jersey, USA 1995.

2. Whittaker, E.T. and Watson, G.N., A Course of Modern Analysis Cambridge University Press, London, 1963

SYLLABUS M.SC MATHEMATICS – IIIrd SEMESTER

Theory of Linear Operators -I

MAT303

UNIT I

Spectral theory in normed linear spaces, resolvent set and spectrum

UNIT II

Spectral properties of bounded linear operators.

UNIT III

Properties of resolvent and spectrum. Spectral mapping theorem for polynomials.

UNIT IV

Spectral radius of a bounded linear operator on a complex Banach space. Elementary theory of Banach algebras.

UNIT V

General properties of compact linear operators.

Recommended Books :-

- 1- E. Kreyszig Introductory Functional analysis with applications. John Wiley & Sons, New

Reference Book:

1. P.R. Halmos Introduction to Hilbert space and the theory of Spectral Multiplicity, Second edition, Chelsea publishing co. N. Y. 1957
2. N. Dunford and J.T. Schwartz, linear operator-3 part, Interscience/ Wiley, New York 1958-71.
3. G. Bachman and L. Narci, Functional analysis, Academic press New York. 1966.

SYLLABUS M.SC MATHEMATICS – IIIrd SEMESTER

Integral Transforms -I

MAT304

UNIT I

Laplace Transforms

UNIT II

Laplace's equations,

UNIT III

Laplace's wave equation 'fl

UNIT IV

Application of Laplace Transforms

UNIT V

Heat conduction equation.

Recommended Books :-

- Integral Transforms by (Goyal & Gupta.
- Integral Transforms by Sneddon


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SYLLABUS M.SC MATHEMATICS – IIIrd SEMESTER

Spherical Trigonometry and Astronomy-I

MAT305

UNIT-I

Fundamental of Spherical Trigonometry

UNIT-II

solution of right angled triangle

UNIT-III

Properties of Right angle triangle

UNIT-IV

Relation between Sides & angles of a Spherical triangle

UNIT-V

Application of Spherical triangle & Examples.

Recommended Books :-

- Spherical Astronomy - Smarat
- spherical Astronomy – Bell
- spherical Astronomy- G.S Malik



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SCHEME 2017-18 MSC Mathematics IV SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
MAT401	COMPULSORY	Functional Analysis - II	70	25	30	11	100	36	0	0	100	36
MAT402	COMPULSORY	Advanced Special Function - II	70	25	30	11	100	36	0	0	100	36
MAT403	COMPULSORY	Theory of Linear Operators - II	70	25	30	11	100	36	0	0	100	36
MAT404	COMPULSORY	Integral Transforms - II	70	25	30	11	100	36	0	0	100	36
MAT405	COMPULSORY	Spherical Trigonometry And Astronomy - II	70	25	30	11	100	36	0	0	100	36
TOTAL			350		150		500				500	



 Date: _____
 Signature: _____
 Head of Department

SYLLABUS M.SC MATHEMATICS – IVth SEMESTER

Functional Analysis-II

MAT401

UNIT-I

Uniform boundedness theorem and some of its consequences, Open mapping and closed graph theorems.

UNIT-II

Hahn-Banach theorem for real linear spaces, Hahn-Banach theorem for complex linear spaces and normed linear spaces.

UNIT-III

Reflexive spaces, Hilbert spaces, Orthonormal Sets, Bessel's inequality, Complete orthonormal sets and Parseval's Identity,

UNIT-IV


Projection Mapping, Projection theorem structure of Hilbert spaces. Riesz representation theorem.

UNIT-V

Adjoint of an operator on a Hilbert space, Reflexivity of Hilbert spaces. Self-adjoint operators, Positive operators, Projection, Normal and Unitary operators.

Suggested Readings:

- E. Kreyszig, Introductory Functional Analysis with applications, John Wiley & Sons New York,
- G.F. Simmons, Introduction to Topology & Modern Analysis Mc Graw Hill, New York
- B. Choudhary and Sudarshan Nanda, Functional Analysis with applications, Wiley Eastern Ltd


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SYLLABUS M.SC MATHEMATICS – IVth SEMESTER

ADVANCED SPECIAL FUNCTION-II

MAT402

Unit-I

Bessel function and Legendre polynomials :

Definition of $J_n(z)$, Bessel's differential equation, Generating function, Bessel's integral with index half and an odd integer,

Unit-II

Generating function for Legendre polynomials Rodrigues formula, Bateman's generating function, Additional generating functions, Hypergeometric forms of $P_n(X)$.

Unit-III

Special properties of $P_n(X)$, Some more generating functions, Laplace's first integral form, Orthogonality.

Unit- IV

Definition of Hermite polynomials $H_n(x)$, Pure recurrence relations, Differential recurrence relations, Rodrigue's formula, Other generating functions, Orthogonality, Expansion of polynomials, more generating functions.

Unit V

Laguerre Polynomials :

The Laguerre Polynomials $L_n(X)$, Generating functions, Pure recurrence relations, Differential recurrence relation, Rodrigue's formula, Orthogonal, Expansion of polynomials, Special properties, Other generating functions.

BOOKS RECOMMENDED ;

- 1- Rainville, E.D. ; Special Functions, The Macmillan co., New york 1971,
- 2- Srivastava, H.M. Gupta, K.C. and Goyal, S.P.; The H-functions of One and Two Variables with applications, South Asian Publication, New Delhi.
- 3- Saran, N., Sharma S.D. and Trivedi, - Special Functions with application, Pragati prakashan, 1986.

REFERENCE BOOKS.

- 1- Lebedev, N.N, Special Functions and Their Applications, Prentice Hall, Englewood Cliffs, New jersey, USA 1995.
- 2- Whittaker, E.T. and Watson, G.N., A Course of Modern Analysis Cambridge University Press, London, 1963.

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M.Sc MATHEMATICS IV SEMESTER SYLLABUS 2017-18



SYLLABUS M.SC MATHEMATICS – IVth SEMESTER

Theory of Linear Operators-II

MAT403

UNIT-I

Spectral properties of compact linear operators on normed spaces.

UNIT-II

Behaviours of Compact linear operators with respect to solvability of operators equation.

UNIT-III

Fredholm type theorems. Fredholm alternative theorem. Fredholm alternative for integral equation. spectral properties of bounded self – adjoint linear operator on complete Hilbert space.

UNIT-IV

Positive operators Monotone sequence theorem for bounded self – adjoint operators on a complex Hilbert space.

UNIT-V

Square roots of a positive operator. projection operators. with applications,

Suggested Readings:

1. E. Kreyszig Introductory functional analysis with applications, John Wiley & Sons, New York, 1978.
2. P. R. Halmos Introduction to Hilbert space and the theory of Spectral Multiplicity, Second edition, Chelsea publishing co. N.Y. 1957.
3. N. Dunford and J.T. Schwartz, linear operator -3 part, Interscience / Wiley, New York 1958-71.
4. G. Bachman and L. Narci, Functional analysis, Academic press New York, 1966.


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SYLLABUS M.SC MATHEMATICS – IVth SEMESTER

Integral Transforms-II

MAT404

UNIT-I

Application of Laplace Transform to Boundary Value Problems.

UNIT-II

Electric Circuits. Application to Beams.

UNIT-III

The complex Fourier Transform, Inversion Formula, Fourier cosine and sine transform.

UNIT-IV

Properties of Fourier. Transforms, Convolution & Parseval's identity.

UNIT-V

Fourier Transform of the derivatives, Finite Fourier Sine & Cosine Transform, Inversion Operational and combined properties Fourier transform.

Suggested Readings:

- [1] Integral Transforms by Goyal & Gupta.
- [2] Integral Transforms by Sneddon


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SYLLABUS M.SC MATHEMATICS – IVth SEMESTER

Spherical Trigonometry and Astronomy-II

MAT405

UNIT-I

Spherical Astronomy - Various system of references and related topics.

UNIT-II

Celestial sphere,

UNIT-III

Transit instrument.

UNIT-IV

Atmospheric Refraction.

UNIT-V

Time planetary phenomena

Suggested Readings:

1. A text book of spherical trigonometry : Gorakh Prasad. 2- A text book of spherical Astronomy : Gorakh Prasad.
2. Spherical Astronomy – Smart
3. spherical Astronomy – Bell


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**Sri Satya Sai University of Technology & Medical Sciences, Sehore
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M.SC COMPUTER SCIENCE FIRST SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
MCS-101	COMPULSORY	DISCRETE MATHEMATICS STRUCTURES	70	25	30	10	100	35	0	0	100	35
MCS-102	COMPULSORY	PROGRAMING IN "C"	70	25	30	10	100	35	0	0	100	35
MCS-103	COMPULSORY	COMPUTER ORGANIZATION & ARCHITECTURE	70	25	30	10	100	35	0	0	100	35
MCS-104	COMPULSORY	WINDWS & PC SOFT	70	25	30	10	100	35	0	0	100	35
PRACTICAL												
MCS-103B	COMPULSORY	WINDOWS, PC-SOFT	0	0	0	0	0	0	50	18	50	18
MCS-104B	COMPULSORY	PROGRAMMING LANGUAGE - C	0	0	0	0	0	0	50	18	50	18


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DISCRETE MATEMETICS STRUCTURES
MCS101

Unit -I

Mathematical Logics: Introduction statement and notions, connective, normal forms, the theory of inference for the statement calculus, the predicatic calculus.

Unit -II

Set Theory: Basic concepts, representation of discrete structure. relation 2.: ordering, functions, natural numbers, recursion. recursion in mechanical theorem proving.

Unit- III

Algebraic Structures: Introduction, algebraic system, semi groups and monoids, grammars & expressions and their compilation

Unit-IV

Lattices and Boolean Algebra: introduction, lattices as partially ordered sets. boolean funcio-.. representation and minimization of boolean algebra.

Unit-V

Graph Theory: Introduction, basic concepts, storage representation and manipulation of graphs, strivie precedence grammars.

Text Books:

-Discrete Mathematics- John Truss.

Discrete Mathematical Structures with applications to Computer Science

Oren bluy & Memon(TMH)


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COMPUTER ORGANIZATION & ARCHITECTURE

MCS103

UNIT-I

Digital Logic : Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combination circuits (i.e. Half-Adder), Flip-Flops (i.e. SR Flip-Flops, D Flip-Flops, JK Flip-Flops, T Flip-Flops, Edge-Triggered Flip-Flops, Excitation Table), Sequential Circuits.

UNIT-II

Data Representation: Data Type (i.e. Number System, Octal and Hexadecimal Number, Decimal Representation and Alphabetic Representation), Complements, Fix Point Representation, Floating-Point Representation.

Unit-III

Basic Computer Organization and Design Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instruction, Input-Output and Interrupt, Complete Computer Description Design of Basic Computer.

Unit-IV

Central Processing Unit: Introduction, General Register, Organization, Stack Organization, Instruction Formats, Addressing Modes, Reduced Instruction Set Computer (RISC).

Unit-V

Input-Output Organization: Peripheral Devices (ASCII alphanumeric Characters), Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Access (DMA), I/O Processor OOP.

Text Book

1. Computer System Design & Architecture- Henry Jordan (A.W.L.)
2. Computer System Architecture- M.Mor, Mario, P.H.D.


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WINDOWS AND PC SOFTWARE

MCS104

Unit-I

Introduction to MS-DOS: History and Versions of DOS, Functions of DOS, Booting Process, Internal and external DOS commands, creating and executing batch files.

Unit-II

Internal and External DOS Commands Creating and Executing Batch Files.

Introduction for Windows: Features of Windows, Hardware Requirements for Running Version of Windows, New Installation & Up-gradation, Origin of Windows, Part of Window, vs Screen, Types and Accessories.

Unit-III

Introduction to word processing (MS Word) advantages of word processing, introduction & installation editing a file, using paragraph styles newspaper, style column, using macros. Advanced word processing, header & footer, formatting text setting up printer mail merge and other applications Mathematical calculations, table handling.

Unit-IV

Introduction to spread sheet (MS Excel) definition and advantages of electronic- worksheet working on spreadsheet, row and related operations, setting saving and retrieving worksheet file, inserting, cells, printing a worksheet, erasing a worksheet, Graphs creation: types of graphs, creating a chart on chart sheet, 3D column charts, moving and changing the size of chart, printing the chart.

Unit-V

Introduction of MS Power Point Element of power point, exploring menus of power point, working with dialogue boxes adding file text and art and picture to slide printing sizes, view slides, outline slide sorter notes and sides show view, slide setup formatting and enlarging text slides with graphs
PC software for windows and made simple by taxali (TMH)


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Laboratory


1. Write a program to swap the contents of two variables with & without using temporary
2. Write a program to print the Fibonacci a given numbers
3. Write a program to invert 3×3 matrix.
4. Write a program multiply two matrices.
5. Write a program to create an odd magic square.
6. Write a program to find all capital letters in string.
7. Write a program to convert upper case letters to lower case & vice versa in a sentence. of name J S. Write a program to search a number in an array using the algorithm like sequential search.
9. Write a program to check whether a string is a palindrome or not.
10. Write a program to calculate factorial of a no through recursion.
11. Write a program to calculate roots to a quadratic equation


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**M.SC COMPUTER SCIENCE
SECOND SEMESTER**

SUBJECT CODE	SUBJECT NAME	THEORY		CCE / INTERNAL		PRACTICAL		TOTAL MARKS	
		MAX	MIN	MAX	MAX	MIN	MIN	MAX	MIN
MCS201	DATA STRUCTURE AND ALGORITHMS	70	25	30	11	-	-	100	36
MCS202	OPERATING SYSTEM	70	25	30	11	-	-	100	36
MCS203	COMPUTER NETWORKS	70	25	30	11	-	-	100	36
MCS204	JAVA & HTML	70	25	30	11	-	-	100	36
PRACTICAL									
MCS201	PRACTICAL I	-	-	-	-	50	18	50	18
MCS204	PRACTICAL II	-	-	-	-	50	18	50	18


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**DATA STRUCTURES AND ALGORITHMS
MCS201**

Unit-I

Data Representation: Introduction, Linear List, Formula Based Representation, Linked Indirecting Addressing, Simulating Pointers, A Comparison, Applications, Convex Hull, Arrays And Matrices: Arrays, Matrices, Special Matrices- Sparse Matrices,

Unit-II

Stacks: The Abstract Data Type, Derived Class and Inheritance, Formula Based Representation, Linked Representation, Applications. **Queues:** The Abstract Data Type, Formula Based Representation, Linked Representation, Application. **Binary and Other Trees:** Trees, Binary Trees, Properties, Representation, Common Binary Tree Operation, Binary Tree Traversal, the ADT Binary Tree, The Class Binary Tree, ADT And Class Extensions, Applications.

Unit-III

Priority Queues: Introduction, Linear List, Applications. **Tournament Trees:** Introduction, The ADT Winner Tree, The Class Winner Tree, Loser Tree Applications. **Search Trees:** Binary Search Tree, AVL Trees, Red-Black Tree, B-Tree Applications.

Unit-IV

Graphs: Definitions, Applications, Properties, The ADTs Graph and Digraph, Representation of Network, Class Definition: Graph Iterators, Language Features, Graph Search Methods, Applications. **The Greedy Method:** Optimization Problem, The Greedy Method, Applications. **Divide And Conquer:** The Method, Application.

Unit-V

Dynamic Programming: The Method, Applications. **Backtracking :** The Method, Applications. **Branch and Bound:** The Method, Applications.


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& Medical Sciences Sehore (M.P.)



**OPERATING SYSTEM
MCS202**

Unit — I

Overview of the operating system: Evaluation of operating system. Classification of Operating System : Batch OS, Multiprogramming, Time Sharing, Real Time, Combination, Distributed OS .Different Views Of Operating System: Operating System as a Processor Manager, Memory manager, File Manager, Device Manager etc. System Services. System Calls. Hierarchical & Extended Machine View. Design And Implementation Of OS .Functional Requirements. Implementation.

Unit - II

File management: file concept, file types. File based system, disk based system, blocking file operations, creating, writing, reading ,deleting, file access methods, file allocation methods-contiguous, dynamic, linked and indexed allocation performance of allocation methods under various size of files directory system single level two level structured, file protection mechanism layered file system.

Unit - III

Processor management process views, structure, state, process, control block multiprogramming levels of schedulers and scheduling algorithms, evaluation of various scheduling algorithms, multiple processor scheduling, process synchronization, synchronization mechanism, virtual processors, interrupt mechanism, future trends in processor management.

Unit - IV

Memory management: memory management schemes, contiguous allocation, single & partitioned (static & dynamic) segmentation, non-contiguous allocation, paging, virtual memory concepts, demand paging, performing page fault, page replacement algorithms, segmentation and paging ,future trends in memory management, large main memories, storage hierarchies, hardware support of memory management.

Unit - V

Technique for device management, dedicated devices, shared devices, virtual devices, sequential access, direct access devices, channel and control unit, independent devices, operation, buffering, multiple paths, block multiplexing ,device allocation consideration, i/o traffic controller, i/o scheduler, i/o device handlers, virtual devices, spooling system.



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**COMPUTER NETWORKS WITH WINDOWS NT
MCS203**

Unit – I

Analog & digital signal, electronic spectrum, asynchronous & synchronous transmission, ideal channel, band rate, baseband, broadband channel, multiplexer FDM, TDM, STDM, carrier modulation, AM, FM, PCM, PWM, SWM, encoding schemes, the needs and importance of networking, type of networks, server based, peer based, hybrid, layered architecture, LAN topology, network adopted card, logical topology, modem.

Unit – II

Switching technique, message switching, circuit switching, packet switching, virtual circuit, transmission media, OSI reference model, IEEE standards, 802.3, 802.4, 802.5 ALOHA, SLOTTED ALOHA, CSMA, CSMA/CD Bitmap CCITTX.25, CCITT x11, token ring, token bus.

Unit – III

Fast Ethernet, FDDI token ring, wireless LAN, ATM network, principles of internetworking, internet working devices, bridge, routers, gateways, repeater, routing algorithms, distance vector routing, shortest path routing, broadcast routing, multicast routing, ICP/IP protocol, IPV6 addressing, congestion control, traffic shaping.

Unit - IV

TELNET, FTP, SMTP, MINE,SNMP,UDP,URL(Uniform Resource Locator) THTTP source routing bridge, transport bridge, ISDN channel, ISDN services, base band ISDN, broadband ISDN. Different switches, PBX network, network securing application of cryptography to security, data encryption transposition cipher, substitution cipher, PSA algorithms.

Unit – V

Introduction to windows NT, various features, differences with other windows environment and other OS, windows NT workstations versus server, Kernel and its subsystems, Security Models: system level restrictions, server application security, domain group access.


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**PROGRAMMING IN JAVA
MCS204**

Unit – I

History and design features of JAVA, how Java works, basics of JAVA, Application and Applets, using the tools in JDK, javadoc, Java, jdbc etc. Applets, Programming - Creating and executing Java applets, inserting applets in a web page, Java security.

Unit – II

Switching technique, message switching, circuit switching, packet switching, virtual circuit, transmission media, OSI reference model, IEEE standards, 802.3, 802.4, 802.5 ALOHA, SLOTTED ALOHA, CSMA, CSMA/CD Bitmap CCITTX.25, CCITT x11, token ring, token bus, JAVA Language- keywords, Constants, Variables and Data types, Operators and statements: Break, continue, and return, Array, String and String Buffer Classes, Wrapper Classes, Classes, Objects and Methods: Defining a class, adding variables and methods, creating Objects, constructors, class inheritance.

Unit – III

Inheritance, basic types, using super, multi level hierarchy, abstract and final classes, object class, packages and interfaces, packages, Exception Handling, Fundamentals, exception types, uncaught exceptions, throws, throw, try -catch, final, built in exceptions, creating your own exceptions.

Unit - IV

Multithreading Fundamentals, Java Thread model: priorities, synchronization, messaging, thread class, Runnable interface, Interthread communication, suspending, resuming and stopping threads, Input/Output- Basics - Streams, Byte and Character, Streams, predefined streams, Reading and writing from console and files using standard Java Packages Java Package (lang.util, io) Networking-Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Datagram Programming.

Unit – V

AWT Classes, Event Handling and swing classes, AWT Programming, Working with windows, Graphics and text, Using AWT controls, Layout managers and menus, Handling image, animation, sound and video, Event Handling-Different mechanism, the Delegation Event Model, Event Classes, Event Listener interfaces, Adapter and Inner Classes, Java swing applet, icons and labels, text fields, buttons, combo boxes, tabbed and scroll panes, trees, tables.


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COURSEWISE SCHEME 2015-16 MSC Computer Science 3rd SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
MCS301	COMPULSORY	RDBMS Concepts & Oracle	70	28	30	10	100	38	50	18	150	56
MCS302	COMPULSORY	Multimedia Tools & Applications	70	28	30	10	100	38	0	0	100	38
MCS303	COMPULSORY	Software Engineering	70	28	30	10	100	38	50	18	150	56
MCS304	COMPULSORY	Advanced Java Programming	70	28	30	10	100	38	0	0	100	38
MCS306	COMPULSORY	INTERNSHIP	0	0	0	0	0	0	100	36	100	36



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**RDBMS Concept & Oracle
MCS301**

UNIT-I

Relational model- storage organizations for relations. Relations, relational algebra, relational calculus, functional dependencies,, multivalued dependencies, and normalization, relational query language functional dependencies, good & bad decomposition, anomalies as a database: a consequences of bad design, universal relation, normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF relational, algebra, structured query language (SQL), using MS access, implementing SQL functions integrity indexing, view using MS access.

UNIT-II

Degree of data abstraction, the database life cycle (DBLC): Initial study of the database study of the database, database design, implementation and lading, testing and evaluation operation maintain ACE Evaluation.

UNIT-III


Centralized Verses decentralized Design, What is A transaction? Concurrency control (locking Methods, Time stamping method .optimistic method) DDBMS (Distributed database management System) Advantage and Disadvantage .Homogeneous and heterogeneous DBMS, Distributed database transparency Features. Level of Data and Process Distribution: SPSD (Single site Processing .Single site Data), MPSD (Multiple site processing, single site data) MPMD (Multiple site processing, multiple site data)

UNIT-IV

System, client / server: Architecture and Implementation issues, client /Server system, what is client/servers? The forces that Drive client/ server.

UNIT-V

(DSS) Decision Support system: Operational data vs. decision support Data, The DSS Database Requirements. The data warehouse: The evaluation of data warehouse, rules for data warehouse. Online analytical processing (OLAP) OLAP architecture relational, OLAP and and comparison, data mining.


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REFERENCE BOOKS:

1. An introduction to Database system (sixth edition) by c.j.Date
2. Database system (3rd edition) Galgotiya publication (p) Ltd, by Peter rob garlos coronel
3. An introduction to database systems by Bipin C.Desai

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Multimedia Tools and Applications

MCS302

UNIT-I

Multimedia: needs and areas of use, development platforms to multimedia-DOS, windows, Linux identifying multimedia elements-text images, sound Animation and video, making simple multimedia with PowerPoint.

TEXT: concepts of plain & formatted text, RTF & HTML text using common text preparation tools, conservation to and from various text formats, using standard software. Objects linking and embedding concepts, basics of font design, overview of some to editing and designing tools, understanding & using various tools effects.

UNIT-II

importance of graphics in multimedia, vector and graphics, images capturing methods - scanner, digital camera and various attributes of images- size , color depth etc. Various important file format- BMP, DIB, EPS, CIF, PEX, PIC, JPG, TGA, PNG, TIF format- their features and limitations, graphics file form conversions, processing images with common software tools such as photo shop, paint shop pro, coral draw etc. Effect in multimedia, analog v/s digital sound. Basics of digital sounds-sampling. Frequency sound Dolby channels sound on PC, sound standards on PC, capturing editing sound on PC, overview and using someone sound record editing software. Overview of various sound file formats on WAV, MP3, MP4, Ogg, Vorbise etc.

Animation basics of animation, principle and use of animation multimedia, effects of resolutions, pixel depth, images size on quality and storage. Overview of 2-D and 3-D animation techniques software -animation pro, 3D studio & paint shop pro animation. Animation some web - features and limitations, creating simple animations for the web using GIF Animator and flash.

UNIT-III

Video basics of video- analog and digital video. How to use video on PC. Introduction to graphics acceleration cards, Direct X introduction to OAV/DV and IEEE1394 cards, digitization of analog video to digital video. Interlacing and non-interlacing, brief note on various video standards-NTSC, PAL, SECAM, HDIV, introduction to video capturing media & instrument- video disk DVCAM, camcorder, introduction to digital video compression techniques and various file formats-AVI, MPEG, MOVE Real video.

Brief introduction to video editing and movie making tools-quick time video for windows and adobe premier.

UNIT-IV

Authoring tools for CD based multimedia, types of multimedia authoring tools key factor of selecting CD based multimedia authoring tools planning and distribution of a multimedia projects multimedia development team & skills reequipments, stages in designing & producing multimedia products for CD. Testing of product, distribution of multimedia product, various formats of CD and DVDs.

UNIT-V

Multimedia on the web, Bandwidth relationship, broadband technologies, text on the web- dynamic and embedded from technology , Audio on the web- real audio and MP3, MP4 , audio support in HTML graphics -HTML safe color palate, interlaced and non interlaced model, graphics support in HTML, image map video on web-streaming video, real video, MPEG and viral reality on the web.


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Software Engineering
MCS303



UNIT-I

The software problem, software engineering problem, software engineering approach-phased development process, project management and matrices. Software processes - processes, projects, components, characteristics. Software development process - process step specification, waterfall model, prototyping, iterative enhancement, spiral model.

UNIT-II

Software Requirement analysis and specification- software requirements, problem analysis, requirement specification, validation, metrics.

UNIT-III

Planning a software project - cost estimation, project scheduling, staffing and personnel planning, software configuration management plans, quality assurance plans, project monitoring plans, risk management.

UNIT-IV

Software design - design principles, module level concepts, design notation and specification, structure design methodology, verification, coding - programming practice, verification and metrics.

UNIT-V

Software Testing: Testing fundamentals, functional testing, structural testing, testing process.

Software quality Assurance (SQA): Software reviews, software quality factor, SQA activities, formal technical reviews. SQA approach software configuration management -configuration identification, change control , status Accounting and auditing.

Advanced JAVA Programming
MCS304



UNIT-I

Java Basic Review: Java streaming-networking - event handling - multi heading - byte code interpretation - customizing application- data structures- collection classes.

UNIT-II

Distribution computing: Custom sockets - remote method invocation - activation - object serialization - distributed garbage - collection - RMI - HOP - interface definition language - CORBA - JINI overview.

UNIT-III

Java Beans and Swing: Bean concepts - events in bean box - bean customization - persistence - application - deployment using swing - advanced swing techniques - JAR file handling.

UNIT-IV

Java Enterprise applications Jni - Services - java server pages - JDBC - session beans - entity beans - programming and deploying enterprise java beans - java transactions
RELATED JAVA TECHNIQUES.

UNIT-V

Graphics java media frame work - 3 D graphics - internationalization case study - deploying application, E-commerce applications.

REFERENCE BOOKS:

Deitel & Deitel "Java how to program" Prentice Hall. 4th edition 2000.

Gary Cornell and Cay S. Horstmann. "Java Vol 1 and vol 2" Sun Microsystems Press, 1999.

Stephen Asbury, Scott R. Weiner, "Developing Java Enterprise Application" 1998.


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**MSC COMPUTER SCIENCE
FOURTH SEMESTER**

Code	Subject	CCE/INTERNAL		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
MCS401	Unix Internals ,Shell Programming & Linux	30	11	70	25	-	-	100	36
MCS402	Compiler design	30	11	70	25	-	-	100	36
MCS403	ASP.NET and C#	30	11	70	25	-	-	100	36
MCS404	Artificially Intelligence and	30	11	70	25	-	-	100	36
MCS405	Practical A-Unix Internals ,Shell Programming & Linux	-	-	-	-	50	18	50	18
MCS406	Practical B- ASP.NET and C#	-	-	-	-	50	18	50	18


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Paper –I

Unix Internals ,Shell Programming & Linux

MCS401

UNIT-I

Introduction to the kernel: Architecture of the Unix , the buffer cache, internal representation of files ,inode,accessing blocks , releasing box ,structure of regular file ,conversion of path name to an Inode ,inode assignment to new file , allocation disk block .

UNIT-II

System calls for the file system: OPEN,READ,WRITE , CLOSE ,PIPES,the pipe system call opening a named pipes , reading and writing pipes ,closing pipes ,DUP,LINK,UNLINK,system calls for TIME and CLOCK.

UNIT-III

The structure of processes : process states and transitions , layout of system memory, the context of a process saving the context of the process , manipulation of the process address space .

Process control : process creation ,signals , process termination awaiting process termination , the user Id of a process, changing the size of the process.

UNIT –IV

Shell programming : study of different types of shell like C Shell ,Bourne shell etc.shell variable shell script , shell commands. Looping and making choices : for loop, while and until , passing argummnts to scripts. Programming in different shells.

UNIT –V

LINUX file system hierarchy ,editors , common linux command, mounting & Un mounting CD-ROM ,floppy disk ,different access permission , backup & restoring , network configuration command Ipconfig,hostname ,cnet.

Book:

1. The design of Unix operating system by Maurice Bach
2. Advanced unix by Steaphen prala
3. Linux Bible by Christopher Negus


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Paper –II
Compiler design
MCS402

UNIT-I

Paper- Automata Introduction to finite automata ,structure representation, automata and complexity, alphabets ,strings ,language Informal picture of finite automata ,deterministic finite automata , nondeterministic finite automata ,an application.

UNIT-II

Introduction to compiler ,overview of compilation , process, typical compiler stricter ,implementing a compiler . programming language grammars,elements of a formal language grammar, derivation reduction & syntax trees ambiguity regular grammer & regular expression context free grammer.

UNIT-III

Scanning & parsing technique – the scanner , regular grammar and Fsa ,top down parsing ,parsing algorithm top down parsing without backtracking , predictive parser , bottom up parsing , parsing ,Lr parsers , shift reduce parsing .

UNIT-IV

Symbol table organization , memory allocation – static and dynamic memory allocation, compilation control transfer procedure calls, conditional execution ,iteration control construct.

UNIT-V

Lexical syntax errors, semantic , major Issue in optimization , optimizing , transformation ,local optimization , program flow analysis, global optimization .

Books :

1. Introduction to automata theory
2. Compiler construction principles & practice
3. Principles of compiler design


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Paper –III

ASP.NET and C#

MCS403

UNIT-I

Overview of asp.Net framework , understanding asp.Net control ,application web servers, installation of IIS , web forms , web forms control – server control ,client controls , web forms & html ,Adding controls to a web forms ,buttons ,list box etc. Running a web application,creating a multiform web project.

UNIT-II

Form validation : clients side validation,server side validation, validation controls : required field comparison range ,Calendar control , ad rotator control ,internet explorer control . state management view state ,session state application state .

UNIT-III

Architecture of ADO.NET ,connected and disconnected database ,create connection using ADO. Net object modal , connection class , command class data adapter class,dataset class.

Display data on data bound controls and data grid . Database accessing on web application : data binding concept with web , creating data grid binding standard web server controls. Display data on web form using data bound controls .

UNIT-IV

Writing dataset to XML,reading dataset with XML. Web services : Introduction , remote method call using XML ,SOAP,Web service description language building & consuming a web service , Web application deployments .

UNIT-V

Overview of C# , C# and .NET, similarities and differences form JAVA, structure of C# program. Language features :type system, boxing & unboxing ,flow controls ,classes interface ,serialization , delegates ,reflection .

Text & Reference Books :

1. VB.Net Black Book
2. ASP.NET Unleashed
3. C# Programming – Wrox Publication




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Paper-IV

Artificially Intelligence and expert system

MCS404

UNIT -I

General issues and overview of AI ,AI techniques , AI Problems ,AI Techniques , importance and areas of AI ,problem solving state space Search –DLF,BFS problem characteristics, Heuristics search technique : generate and test Hill climbing , best first search ,problem reduction , constraints satisfaction Crypt arithmetic and problems.

UNIT-II

Knowledge representation & mapping , approaches to knowledge representation ,issues in knowledge representation, representing simple facts in logic , representing instance and relationship ,resolution and natural deduction representing knowledge using rules ,procedural v/s declarative knowledge ,logic programming ,forward v/s background chaining ,matching & control knowledge .

UNIT-III

AI programming language prolog- object , relationship , facts rules and variables , prolog syntax and data structures representing objects & relationship by using tree and list, use of cut , I/O of character and structure , symbolic reasoning under uncertainty : introduction to monotonic reasoning , logics for nonmonotonic reasoning , implementation issues , implementation DFS & BFS.

UNIT- IV

Slot and filler structure : semantic nets, frames ,conceptual dependency, scripts,CYC natural languages and NLP , syntactic processing parsing technique , semantic analysis case grammar augmented transition net discourse & pragmatic processing ,translation .

UNIT - V

Definition & characteristics of expert system , representing and using domain knowledge ,expert system shells , knowledge engineering , knowledge acquisition , expert system life cycle & expert system tools , MYCIN & DENDRAL examples of expert system.


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M.SC PHYSICS FIRST SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
PHY-101	COMPULSORY	MATHEMATICAL PHYSICS	70	25	30	10	100	35	0	0	100	35
PHY-102	COMPULSORY	CLASSICAL MECHANICS	70	25	30	10	100	35	0	0	100	35
PHY-103	COMPULSORY	QUANTUM MECHANICS	70	25	30	10	100	35	0	0	100	35
PHY-104	COMPULSORY	ELECTRONIC DEVICE	70	25	30	10	100	35	0	0	100	35
PRACTICAL												
PHY - 105	COMPULSORY	GENERAL LAB	0	0	0	0	0	0	50	18	50	18
PHY - 106	COMPULSORY	ELECTRONIC LAB	0	0	0	0	0	0	50	18	50	18


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Mathematical Physics
PHY-101

UNIT-I

Differential equations ; Recursion relation, generating functions and orthogonality of Bessel functions of first and second kind , Hermite , Legendre , Associate Legendre and Laguerre Polynomials, Curvilinear coordinate system with specific cases of Cartesian, Cylindrical and Spherical coordinate system.

UNIT-II

Integral transform , Fourier integral , Fourier transform and inverse fourier transforms, Fourier transform of derivatives , Convolution theorem . Elementry Laplace transforms. Laplace transform of derivatives , Convolution theorem , Elementry Laplace transforms. Laplace transform of derivatives. Application to a damped harmonic oscillator.

UNIT - III

Green,s function : non -homogeneous boundary value problems , Green's function for one dimensional problem , eigen function expansion of Green,s function , Fourier transform,method of constructing Green's function , Green's function for electrostatic boundary valueproblem and quantum - mechanical scattering problem.

UNIT-IV

Complex variables : Analyticity of complex functions. Cauchy Riemann equations, Cauchy theorem , Cauchy integral formula. Taylors, Maclaurin , Laurent series and mapping. Theorem of residues. Simple cases of contour integration, Jordan's lemma Integrals involving multiple valued functions (Branch point).

UNIT-V

This unit will have a short note question covering all the four units . The studens we have to answer any two questions out of the four.

REFRENC E BOOKS :

HLK. DAS	MATHEMATICAL PHYSICS
GHATAK , GOYAL & GUHA	MATHEMATICAL PHYSICS
ARFKEN	MATHEMATICAL METHODES FOR PHYSICSTS


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CLASSICAL MECHANICS
PHY-102

UNIT - I

Newtonian mechanics of one and many particles systems; Conservation laws, Constraints their classification, Principle of virtual work; D'Alembert's Principle in generalized coordinates, The Lagrange's equation from D'Alembert's principle. Configuration space. Hamilton's principle deduction from D'Alembert's principle, Generalized momenta and Lagrangian formulation of the conservation theorems, Reduction to the equivalent one body problem; the equation of motion and first integrals, the differential equation for the orbit.

UNIT-II

The equations of canonical transformation and generating functions; The Hamilton-Jacobi Action and Angel variables. Poisson's brackets; simple algebraic properties of Poisson's brackets. The equation of motion in Poisson's Brackets notation. Poisson theorem; principle of least action. The Kepler problem, Inverse central force field, Rutherford scattering.

UNIT-III

Theory of small oscillations, Equations of motion, Eigen frequencies and general motion, normal modes and coordinates, Applications to coupled pendulum and linear bistable molecule. Rotating coordinate systems. Acceleration in rotating frames. Coriolis force and its terrestrial astronomical applications, Elementary treatment of Eulerian coordinates and transformation matrices. Angular momentum inertia tensor. Euler equations of motion for a rigid body. Torque free motion for a rigid body.

UNIT-IV

Symmetries of space and time. Invariance under galilean transformation, Covariant four-dimensional formulation, 4 - Vectors and 4 - scalars. Relativistic generalization of Newton's laws, 4- momentum and 4- force, variance under Lorentz transformation relativistic mechanics. Covariant Lagrangian, covariant Hamiltonian, Examples.

UNIT -V

This unit will have a short note *question covering all the four units. The students will have to answer any two questions out of the four.

REFERENCE BOOKS:

H. GOLDSTEIN(ADDISON WESLEY)

N.C. RANA & P. S. JOG

R.G. TAKWALE & P. S. PURANIK

CALASSICAL MECHANICS

CLASSICAL MECHANICS

INTRODUCTION TO CLASSICAMECHANICS

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Quantum Mechanics- I
PHY-103

Unit-I

Basic Postulates of quantum Mechanics, equation of continuity, Normality, orthogonality and closure properties of eigen functions, expectation values and Ehrenfest theorems, solution of Schrodinger equation for one dimensional (a) potential well (b) potential step and (c) Potential barrier.

Unit-II

Linear vector space, concept of Hilbert space, bra and ket notation for state vector, representation of state vectors and dynamical variables by matrices and unitary transformation (Translation and rotation), creation and annihilation operators, matrices for x and p , Heisenberg uncertainty relation through operators (Schwartz inequality).

Unit-III

Solution of Schrodinger equation for (a) linear harmonic oscillator (b) hydrogen -like atom (c) square well potential and their respective application to atomic spectra, molecular spectra and low energy nuclear states (deuteron).

Unit-IV

Angular momentum in quantum mechanics, Eigen values and Eigen function of L^2 and L_z , in term of spherical harmonics, commutation relation. Time independent perturbation theory. Non-degenerate and degenerate cases.

Unit-V

This unit will have a short note question covering all the four units. The students will have to answer any two questions out of the four.

REFERENCE BOOKS:

L. I. SCHIFF	QUANTUM MECHANICS
S GASIOROVICZ	QUANTUM MACHANICS
J. J. SAKURAI	MODERN QUANTUM MECHANICS


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C- PROGRAMMING AND NUMERICAL METHODS
PHY-104

UNIT - I

Transistors: JFET, BJT, MOSFET and MESFET, structure derivations of the equations for I-V characteristics under different condition, microwave devices, tunnel diode, transfer electron devices (Gunn diode), avalanche transits time devices, Impatt diodes and parametric devices.

UNIT - II

Photonic devices: radiative and non-radiative transitions, optical absorption, bulk and thin film photo conductive devices (LDR), diode Photo detectors, Solar cell (open circuit voltage and short circuit current, fill factor), LED (high frequency limit, effect of surface and indirect recombination current, operation of LED), semi-conductors; diode lasers (conditions for population inversion in active region, light confinement factor, optical gain and threshold current for lasing).

UNIT - III

Memory Devices: Read Only Memory (ROM) and Random Access Memory (RAM). Types of ROM: PROM, EPROM, EEPROM and EAPROM, Static and dynamic RAMs (SRAM & DRAM), characteristics of SRAM and DRAM. Hybrid Memories: CMOS and NMOS memory Nonvolatile RAM, ferro-electric memories, charge coupled devices (CCD), storage devices: Geometry and organization of magnetic (FDD & HDD) and Optical (CD-ROM, CD-R, CD-R/W, DVD) Storage devices.

UNIT-IV

Electro-optics, Magneto-optic and Acousto-optic effects, materials properties related to get these effect important ferro electric, liquid crystal and polymeric materials for these devices piezoelectric, electrostrictive and magnetostrictive effects. Important materials for these properties and their applications in sensors and actuator devices, acoustic delay lines, piezoelectric resonators and filters, high frequency piezoelectric devices-surface, acoustic wave devices,

UNIT - V

This unit will have a short note question covering all the four units. The students will have to answer any two questions out of the four.

REFERENCE BOOKS :

SM SZE WILLEY(1985) SEMICONDUCTOR DEVICES -PHYSICS TECHNOLOGY
MS TYAGI INTRODUCTION TO SEMICONDUCTORS DEVICES
AJOY GHATAK AND THYAGRAJAM


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**M.SC PHYSICS
SECOND SEMESTER**

SUBJECT CODE	SUBJECT NAME	THEORY		CCE / INTERNAL		PRACTICAL		Total	
		MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
PHY201	QUANTUM MECHANICS II	70	25	30	11	-	-	100	36
PHY202	STATISTICAL MECHANICS	70	25	30	11	-	-	100	36
PHY203	ELECTRO DYNAMICS AND PLASMA PHY.	70	25	30	11	-	-	100	36
PHY204	ATOMIC AND MOLECULAR PHYSICS	70	25	30	11	-	-	100	36
	PRACTICAL								
PHY205	PRACTICAL I -GENERAL PHYSICS BASED	-	-	-	-	50	18	50	18
PHY206	PRACTICAL II - ELECTRONICS BASED	-	-	-	-	50	18	50	18


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**QUANTUM MECHANICS II
PHY201**

Unit-1

Approximation method for bound states : Rayleigh- Schrodinger Perturbation theory of non-degenerate and degenerate levels and their application to perturbation of an oscillator, normal helium atom and first order Stark effect in hydrogen. Variation method and its application to ground state helium, W K B Approximation method, connection formulae, ideas on potential barrier with applications to theory of alpha decay.

Unit-2

Time dependant perturbation theory: Methods of variation of constants and transition probability, adiabatic and sudden approximation, wave equation for a system of charged particles under the influence of external electromagnetic field, absorption and induced emission, Einstein's A and coefficients and transition probability.

Unit-3

Theory of Scattering, Physical concepts, scattering amplitude, scattering cross section. Born Approximation and partial waves, scattering by perfectly rigid sphere, complex potential and absorption, scattering by spherically symmetric potential, identical particles with spin, Pauli's spin matrices

Unit-4

Schrodinger's relativistic equation (Klein-Gordon equation), Probability and current density, Klein - Gordon equation in presence of electromagnetic field, hydrogen atom, short comings of Klein-Gordo equation, Dirac's relativistic equation for free electron, Dirac's Matrices. Dirac's relativistic equation in electromagnetic field, negative energy states and their interpretation hydrogen atom, hyperfine splitting.

Unit-5

This unit will have a short note question covering all the four units. The students will have to answer any two questions out of the four.

Books Recommended:-

1. L I Schiff
2. S Gasiorowicz
3. B Craseman and J J Powell


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**ATOMIC AND MOLECULAR PHYSICS
PHY204**

Unit-1

Review of Basics of electrostatics and magnetostatics (electric field, Gauss's law, Laplace and Poisson equations, method of images, Biot-Savart law, Ampere law, Maxwell's equations, scalar and vector potentials, gauge transformation, Lorentz gauge, Coulomb Gauge, Solution of Maxwell equations in conducting media radiations by moving charges, retarded potentials, Lienard Wiechert potentials, fields of charged particles in uniform motion, fields of arbitrarily moving charge particle. Quantum states of one electron atom. Atomic orbitals. Hydrogen spectrum, Pauli's principle, Spectra of alkali elements, Spin orbit interaction and line structure of alkali Spectra. Methods of molecular quantum mechanics, Thomas Fermi statistical model, Hartree and Hartree fock method, Two electron system, Interaction energy in L-S and J-J coupling, hyperfine structure (qualitative), line broadening mechanisms (general ideas).

Unit-2

Types of molecules, Diatomic linear, Symmetric top, asymmetric top and spherical top molecules. Rotational spectra of diatomic molecules as a rigid rotator, Energy level and Spectra of non-rigid rotator, intensity of rotational lines,

Unit-3

Vibrational energy of diatomic molecule, diatomic molecule as a simple harmonic oscillator, Energy levels and spectrum, Morse potential energy curve, Molecules as vibrating rotator, Vibration spectrum, of diatomic molecule PQR branches, IR spectrometer (qualitative)

Unit-4

Introduction to ultraviolet, visible and infra-red spectroscopy, Raman spectroscopy: Introduction, pure rotational and vibrational spectra, Techniques and instrumentation, Photo electron spectroscopy, elementary idea about photoacoustic spectroscopy and Mossbauer spectroscopy (principle).

Unit-5

This unit will have a short note question covering all the four units. The students will have,



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COURSEWISE SCHEME 2015-16 MSC PHYSICS 3rd SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
PHY301	COMPULSORY	Condensed Matter	70	28	30	10	100	38	0	100	38	
PHY302	COMPULSORY	Nuclear and Particle	70	28	30	10	100	38	0	100	38	
PHY303	COMPULSORY	Digital Electronics	70	28	30	10	100	38	0	100	38	
PHY304	COMPULSORY	Atomic and Molecular	70	28	30	10	100	38	0	100	38	
PHY305	COMPULSORY	LAB A	0	0	0	0	0	0	50	18	18	
PHY306	COMPULSORY	LAB B	0	0	0	0	0	0	50	18	18	
PHY307	COMPULSORY	INTERNSHIP	0	0	0	0	0	0	100	36	36	



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Condensed Matter
PHY301

UNIT-I

Crystal structure: Bravais lattice in two and three dimension. Simple crystal structures: Hexagonal close packed structure, diamond structure, zinc blende structure, sodium chloride structure, cesium chloride structure.

UNIT-II

Crystal diffraction by X-Ray: Reciprocal lattice, Reciprocal lattice of bcc and fcc lattice, Relation between crystal lattice axes and crystal reciprocal lattice axes. Bragg diffraction. Condition in term of reciprocal lattice vector. Brillouin zones.

UNIT-III

Elastic properties of solids: Stress and strain components, elastic compliance and stiffness constants, elastic energy density, reduction of number of elastic constants, elastic stiffness constants for isotropic body, elastic constant for cubic isotropic bodies, elastic waves, waves in (100) direction, experimental determination of elastic constants.

UNIT-IV

Lattice vibration and phonons: Lattice dynamic of a diatomic linear lattice. Lattice vibrational spectrum. The concept of phonons momentum of phonons. Inelastic scattering of photons by phonons. Inelastic scattering of neutrons by phonons. Inelastic scattering of X-Ray.

UNIT-V

Thermal properties and band theory of solids: Anharmonicity, thermal expansion, thermal conductivity, equation of state of solids, gruneisen constant. Band theory, classification of solids, concepts of effective mass. Fermi surfaces, anomalous skin effect, De Hass van alphen effect, cyclotron resonance, magneto resistance.

Suggested Readings :

1. Velma and Srivastava: Crystallography for solid State physics.
2. Azaroff: Elementary to Solids.
3. Omar: Introduction Solids state physics.
4. Kittle: Solids state physics

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**Nuclear and Particle
PHY302**

UNIT-I

Nuclear Interaction and Nuclear reaction: Nuclear forces, exchange and tensor forces, meson theory of nuclear forces, Low-energy n-p scattering and spin dependence of n-p forces. Direct and compound nuclear reaction mechanism, reciprocity theorem.

UNIT-II

Accelerators of charged particles: Study of cyclotron, phase stability, frequency modulated cyclotron (synchrocyclotron) magnetic induction accelerator (Betatron), Electron synchrotron and linear accelerator (Linac)

UNIT-III

Nuclear models: Liquid drop model, Bohr-wheeler's theory of nuclear fission, shell model, spin orbit interaction, magic number, spin and angular momenta of nuclear ground state, nuclear quadrupole moment.

UNIT-IV

Nuclear decay and elementary particles: α Decay, general features of γ ray spectrum, Fermi theory of β decay, selection rules, parity in β decay, multipole radiation, internal conversion, nuclear Isomerism.

UNIT-V

Elementary particles: Classification of elementary particles, fundamental interaction, parameters of elementary particles. Symmetry and conservation laws, symmetry schemes of elementary particles SU(3)

Suggested Readings :

1. Introduction to Nuclear physics : H.A. Enge
2. Nuclear radiation detectors : S.S. Kapoor and V.S.Ramamurthy
3. Atomic and Nuclear physics : S.N. Ghoshal
4. Nuclear and Particle physics : D.C. Taysl
5. Nuclear Physics : R.C. Sharma

Digital Electronics
PHY303

UNIT-I

Number system (Binary, Octal, Decimal, hexadecimal) and conversion between them. Boolean arithmetic, signed and unsigned binary numbers, 1's complement, 2's complement,

UNIT-II

Codes: BCD, Gray, ASCII, EBCDIC, Demorgans theorem, Gates: OR, AND, NOT, NOR, OR, NAND, XOR, XNOR, Boolean algebra, karnaugh map, adder and subtractor circuit design.

UNIT-III

Multiplexer, demultiplexer, encoder, decoder, parity checker and generator, Flip-Flops: R-S,D, J-k, J-k Master slave flip flop, race around condition registers, shift registers (left and right shift)

UNIT-IV

Counters-asynchronous (ripple) counter, synchronous (parallel) counter, MOD-5 counter and MOD-10 counter, BCD counter, Up-Down counter, Shift Register counter (Ring counter)

UNIT-V

Digital to analog conversion (Binary weighted register method, R-2R ladder network method, complete DAC structure. Analog to digital converters (Stair case or counter method, single slope, equal slope, successive approximation ADC)

Suggested Readings :

1. "Digital principles and applications" by A.P.Malvino and Donald P.Leach, Tata McGraw-Hill company, New Delhi, 1993.
2. "Microprocessor Architecture, Programming and Applications with 8085/8086 by Rames S. Gaonkar, Wiley-eastern Ltd. 1987 (for unit V)"
3. Digital electronics –S.N. All


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Atomic and Molecular
PHY304

UNIT-I

Nuclear Magnetic Resonance Spectroscopy: Concept of Nuclear Magnetic resonance spectroscopy, interaction between nuclear spin and magnetic field, population of energy level, relaxation processes, spin-spin interaction and spin-spin coupling between two and more nuclei (Qualitative)

UNIT-II

Electronic spectra of Diatomic Molecules: Franck Condon principles, dissociation and pre-dissociation, dissociation energy. Born-Oppenheimer-approximation, vibrational coarse structure of electronic spectra (bands progression and sequence).

UNIT-III

Raman Spectra Raman effect, quantum theory of Raman effect, Molecular polarisability in Raman effect, Vibrational Raman spectra, vibration-rotation Raman Spectra of diatomic molecules, application of Raman and infrared spectroscopy in the structure determination.

UNIT-IV

Mossbauer Spectroscopy: Mossbauer effect, principles of Mossbauer spectroscopy, recoil less emission of gamma emission, line width and resonance absorption, application of mossbauer spectroscopy (Isomer shift, Quadra pole splitting magnetic field effect).

UNIT-V

Electron Spin Resonance spectroscopy: Elementary idea about ESR, Principle of ESR, ESR spectrometer, splitting of electron energy levels by a magnetic field, G-Values, simple experimental setup of ESR. ESR spectra of free radicals in solution, An Isotropic system.

Suggested Readings :

1. Fundamentals of Molecular Spectroscopy-C.B. Barwell.
2. Spectra of Diatomic Molecules-Herzberg.
3. Mossbauer Spectroscopy-M.R.Bhide
4. NMR and Chemistry-J.W.Akitt 5. Modern Spectroscopy-I.M.Hollons



**MSC PHYSICS
FOURTH SEMESTER**

Code	Subject	CCE/INTERNAL		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
PHY401	Condensed Matter Physics II	30	11	70	25	-	-	100	36
PHY402	LASER PHYSICS	30	11	70	25	-	-	100	36
PHY403	COMPUTER PROGRAMMING AND INFORMATICS	30	11	70	25	-	-	100	36
PHY404	DIGITAL ELECTRONICS	30	11	70	25	-	-	100	36
PHY405	LAB A- GENERAL	-	-	-	-	50	18	50	18
PHY406	LAB B- ELECTRONIC	-	-	-	-	50	18	50	18


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Condensed Matter Physics II

PHY401

UNIT-I

SUPER CONDUCTIVITY :

Concept of super conducting state, Persistent current, Critical temperature , Meissner effect, THERMODYNAMICS OF THE SUPER CONDUCTING TRANSITIONS, London equation and penetration depth ,Coherence length, Type I and Type II superconductors , B.S.C. theory of superconductivity, AC and DC Josephson effects, Josephson Tunneling.

UNIT-II

MAGNETISM :

Weiss theory of ferromagnetic Heisenberg model and molecular field theory, Domain and Bloch wall energy , Spin waves and magnons, Curie Weiss law for susceptibility, Ferri and anti ferromagnetic.

UNIT-III

IMPERFECTION IN CRYSTALS :

Imperfection in atomic packing , point defects , interstitial Schottky and Frenkel defects, lattice vacancies colour centres, F centers ,F' centers, coagulation of F centers, production of colour centers and V centers, explanation of experimental facts , line defects, edge and screw dislocation, mechanism of plastic deformation , elastic energy of dislocation, slip and plastic deformation, shear strength of single crystal, Burgers vector stress fields around dislocation.

UNIT-IV

THIN FILM:

Study of surface topography by multiple beam interferometer, conditions for accurate determination of step height and film thickness (Fizeau fringes) , Electrical conductivity of thin films, expression for electrical conductivity of thin films, Hall-coefficient quantum size effect in thin film.

UNIT-V

NANO STRUCTURE:

Definition and properties of nano structured material, different method of preparation of nano materials , plasma enhanced chemical vapour deposition , electro deposition. Structure of single wall carbon nano tubes (classification, chiral vector C_n , Translational vector T , Symmetry vector R , Unit cell, Brillouin Zone) Electronic , mechanical, thermal and phonon properties.

Suggested Readings:

- Kittel : Solid State physics
- Huang : Theoretical solid state physics
- Thomas : Multiple electron microscopy
- Chopra : Physics of thin films

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LASER PHYSICS

PHY402

UNIT-I

Basic principles of LASER :

Introduction to LASER , Spontaneous and Stimulated emission, Einstein coefficients, Idea of light amplification, Population inversion , laser pumping schemes for two and three level system with threshold condition for laser oscillation.

UNIT-II

Properties of Laser Beams and Resonators:

Properties of Laser-Temporal coherence , spatial coherence, directionality and monochromatic of laser beam, resonators, vibrational mode of resonators, laser amplification, open resonator.

UNIT-III

Types of lasers :

Solid state lasers i.e. Ruby Laser, ND-Yag Laser, Semiconductor laser, Gas laser i.e. Carbon dioxide Laser, Basic idea about liquid laser, Dye laser and chemical laser i.e. HCL and HF lasers.

UNIT-IV

Application of lasers

Holography and principle, theory of holograms, reconstruction of Image, characteristics of Holographs, Application of lasers in chemistry and optics laser in Industry i.e. laser Belding, Hole drilling, laser cutting, application of lasers in Medicine.

UNIT-V

Basic idea about non-linear optics:

Harmonic generation, second and third harmonic generation , phase matching, optical mixing, parametric generation of light , self-focusing of light.

Suggested Readings:

- Laser : Syelo
- Optical electronics : Yarive
- Non linear optics : B.B. Loud



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COMPUTER PROGRAMMING AND INFORMATICS

PHY403

UNIT-I

Conceptual framework of computer languages (Algorithm, Flowchart) ,Need of structured programming , Top-down, bottom-up and modular programming design. Introduction to C languages –basic structure of C program. Character set, keyword and identifiers, relational, logical, assignment, conditional, increment and decrement operators. Evaluation of expression and operator precedence.

UNIT-II

Input and output statement, control statement (IF,IF-else, If nested if-else statements, switch ,while , Do....while and for statements) Simple C programs like search of prime number between given range of numbers, finding the smallest and largest of three numbers, sum of algebraic series, factorial of given number, roots of a quadratic equation , binary to decimal and decimal to binary conversion etc.

UNIT-III

Functions: need of functions, calling the function by value and by reference, category of function: no argument no return, argument but not return , argument with return. Recursion. One and two dimensional arrays. String and string handling functions like sprintf (), strcpy () , sscanf () , strcmp() etc . Simple programs using user define functions, arrays and string functions.

UNIT-IV

Network:

Terminals- Dumb terminals , smart terminals, intelligent terminals.

Types of network: * According to range: LAN, MAN, WAN, CLIENT SERVER.

*According to topologies : BUS, RING, STAR, Mesh Network.

INTERNET : History of Internet , Service Provider (ISP) , introduction to type of internet account-shell/Ac, TCP/IP A/C. Types of connectivity- Dialup, Leased lines, Satellite. IP Address-Class A, Class B, Class C , Domain Name address. URL- absolute and relative.

UNIT-V

Web enabled technology (Email and HTML) :

Web Browser: Internet Explorer, Netscape Navigator , Station and Dynamic Web Page.

Introduction to HTML Tags :

- <HTML> , <TITLE> ,<HEAD> ,<BODY>
- <P> ,
 , <ALIGN> , <I> , , <DIV> , <PRE> , and their attributes.
- , <a> ,and their attributes.
- Ordered and Unordered list tags.
- Tables and associated tags and its properties.

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Creation of simple forms using text, Password, text area, radio, submit, Reset and Hidden. Brief idea about HTTP, Search engine, its working, types of working, types of search engines; sub directories

Suggested Readings:

- | | | |
|---|---|-------------------|
| Let us C | : | Yashwant Kanetkar |
| Programming with C | : | Balaguruswami |
| Internet and Web page 'o' level module M1.2 | : | V.K. Jain |


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DIGITAL ELECTRONICS

PHY404

UNIT-I

OP-AMP:

Differential amplifier circuit configurations : dual input balanced output dual input , single input unbalanced output (AC analysis) , symbol of an op-amp .

UNIT-II

OP-AMP PARAMETER:

Ideal op-amp , Op-amp parameters , input offset voltage , input offset current , input bias current , CMRR , SVRR , large signal voltage gain , Slew rate , Gain band width product , output resistance , supply currents power consumption , inverting and non- inverting inputs.

UNIT-III

APPLICATION OF OP-AMP :

Inverting and non-inverting amplifier , summing , scaling and averaging amplifier , integrator and differentiator , Oscillator Principles : oscillator types , frequency , stability response , the phase shift oscillator , Wein – bridge oscillator , L-C tunable oscillator , square wave generator.

UNIT-IV

MICROPROCESSORS AND MICRO COMPUTER

Microprocessor and Architecture : Intel 8086 , Microprocessor architecture modes of memory addressing , 8086/8088 Hardware specification : Pin-outs and pin functions, clock generator (8284A) , Bus buffering and latching , Bus timing , Ready and wait state , Minimum mode versus maximum mode.

UNIT-V

PROGRAMMING THE MICROPROCESSORS :

Addressing modes : Data addressing modes, program memory addressing modes, stack memory-addressing modes. Instruction set : data movement instruction , Arithmetic and logic instructions, program control instruction . Programming example : Simple assembly language programs table handling direct table addressing , searching a table sorting a table pseudo ops.

Suggested Readings:

Digital principles and application : AP Melvino & DP Leech

OP- Amps & Linear Integrated circuits : R.A. Gaykwad

Microprocessor Architecture, Programming

& Applications with 8085/8086 : R.S. Gaonker

Microprocessor & Digital System : D.V. Hall



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M.SC CHEMISTRY FIRST SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL		TOTAL	
			PAPER		CCE/ INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN
			MAX	MIN	MAX	MIN	MAX	MIN				
CHE-101	COMPULSORY	INORGANIC CHEMISTRY - I	70	25	30	10	100	35	33	12	133	47
CHE-102	COMPULSORY	ORGANIC CHEMISTRY - II	70	25	30	10	100	35	33	12	133	47
CHE-103	COMPULSORY	PHYSICAL CHEMISTRY - I	70	25	30	10	100	35	33	12	133	47
CHE-104	COMPULSORY	GROUP THEORY & SPECTROSCOPY - I	70	25	30	10	100	35				

OPTIONAL PAPER SELECTED ANY ONE

CHE-105 A	OPTIONAL	MATHEMATICS OF CHEMISTS (FOR STUDENTS WITHOUT MATHEMATICS IN B.SC)	70	25	30	10	100	35	0	0	100	35
CHE-105 B	OPTIONAL	BIOLOGY FOR CHEMIST (FOR STUDENTS WITHOUT BIOLOGY IN B.SC)	70	25	30	10	100	35	0	0	100	35


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**Inorganic Chemistry
CHE101**

Unit-I

Stereochemistry and Bonding in Main Group Compounds

Valence shell electron pair repulsion (VSEPR) theory and its applications, Walsh diagram (triatomic molecules), $d\pi-p\pi$ bond, Bent rule and energetic of hybridization, some simple reactions of covalently bonded molecules such as Atomic inversion, Berry pseudorotation, Nucleophilic displacement, free radical mechanisms.

Unit - II

Metal Ligand bonding

Limitation of crystal field Theory, Jahn -Teller effect, molecular orbital theory for bonding in octahedral, tetrahedral and square planar complexes

Unit - III

Metal -Ligand Equilibrium in Solution

Stepwise and overall formation constants and their relationship, trends in stepwise constant, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand. Chelate effect and its thermodynamic origin, determination of binary formation constants by pH metry and Spectrometry.

Unit - IV

Reaction Mechanism of Transition Metal Complexes - I

Energy Profile of a reaction, reactivity of metal complex, inert and labile complexes, Kinetic application of valence bond and crystal field theories. Kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, direct and

indirect evidences in favour of conjugate mechanism, anion reactions, reactions without metal ligand bond cleavage. Substitution reaction in square planer complexes, the trans effect, Mechanism of substitution reactions.

Unit-V

Reaction Mechanism of Transition Metal Complexes - II and HSAB theory

Redox reaction, Electron transfer reaction, mechanism of one electron transfer reaction, outer and inner sphere type reactions, cross reactions and Marcus - Hush theory, HSAB principle, Theoretical basis of hardness and softness, Lewis - acid base reactivity approximation; donar acceptor numbers, E and C equation : applications of HSAB concept.

Books suggested

1. Advanced Inorganic Chemistry, F. A. Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harpes & Row.
3. Chemistry of Elements. N. N. Greenwood and A. Earnshaw, Pergamon
4. Inorganic Electronic Spectroscopy, A.B. P. Lever, Elsevier.
5. Comprehensive Co-ordination Chemistry eds., G. Wilkinson, R.D. Gillars and J. A. Mc cleverty, Pergamon.
6. Inorganic Chemistry, D. F. Shriver & P.W. Atkins, Oxford University Press 3rd 1999.
7. Inorganic Chemistry by A.G.Sharpe. Addition Wesley England 3rd 1992
8. Inorganic Chemistry G.L.Misseler and D. A. Tarr Pearson Education, 2009.

**Organic Chemistry
CHE102**

Unit-I

Nature of Bonding in Organic Molecules

Delocalized chemical bonding: conjugation, cross conjugation, resonance, hyperconjugation, bonding in fullerenes, tautomerism. Aromaticity in benzenoid and non-benzenoid compounds, alternate and non-alternate hydrocarbons. Huckel's rule, Energy level of π -molecular orbitals, annulenes, anti-aromaticity, homo-aromaticity, PMO approach. Bonds weaker than covalent-addition compounds, crown ether complexes and cryptands, inclusion compounds, catenanes and rotaxanes.

Unit - II

Stereochemistry

Strain due to unavoidable crowding. Elements of symmetry, chirality, molecules with more than one chiral center, threo and erythro isomers, methods of resolution, optical purity, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective synthesis, Asymmetric synthesis. Optical activity in absence of chiral carbon in biphenyls, allenes and spiranes, Chirality due to helical shape. Stereochemistry of the compounds containing nitrogen, sulphur and phosphorus.

Unit - III

Conformational analysis and Linear free energy relationship

Conformational analysis of cycloalkanes, decalines, effect of conformation on reactivity, conformation of sugars. Generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes and nitrenes. The Hammett equation and Linear free energy relationship, substituents and reaction constants, Taft equation.



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Unit - IV

Reaction Mechanism : Structure and Reactivity

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Types of mechanism, types of reactions, thermodynamic and kinetic requirements, Kinetic and thermodynamic control, Hammond's Postulate, Curtin-hammett principle, Potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotopic effects.

Unit - V

Aliphatic Nucleophilic Substitution

The SN₂, SN₁, mixed SN₁ and SN₂ and SEI mechanism. The neighbouring group mechanism. neighbouring group participation by pi and sigma bonds, anchimeric assistance. Classical and non classical carbocations, phenonium ions, norbornyl systems, common carbocation rearrangements. Application of NMR spectroscopy in the detection of

carbocations. The S_Ni mechanism. Nucleophilic substitution at an allylic, trigonal and a vinylic carbon. Reactivity effects of substrate structure, attacking nucleophile, leaving group and reaction medium, phase transfer catalysis and ultrasound, ambident nucleophiles, regioselectivity.

Book Suggested

1. Advanced Organic Chemistry - Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
4. Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press.
5. Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice - Hall.
6. Modern Organic Reactions, H.O. House, Benjamin.
7. Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic & Professionals.

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Physical Chemistry - I
CHE103

Unit - I

Introduction to Exact Quantum Mechanical Results

Schrodinger equation and the postulates of quantum mechanics. Discussion of solutions of the schrodinger equation to some model systems viz., particle in a box, the harmonic oscillator, the rigid rotor, the hydrogen atom and helium atom.

Unit - II

Approximate methods

The variation theorem, linear variation principle. Perturbation theory (First order and nondegenerate). Applications of variation method and perturbation theory to the Helium atom.

Molecular Orbital Theory

Huckel theory of conjugated systems bond and charge density calculation. Applications to ethylene, butadiene, cyclopropenyl radical cyclobutadiene etc. Introduction to extended Huckel theory.

Unit - III

Angular Momentum

Ordinary Angular Momentum, generalized angular momentum, eigen functions for Angular Momentum, eigenvalues of Angular Momentum, operator using ladder operators addition of angular momenta, spin, antisymmetry and Pauli exclusion principle.

Unit - IV

Classical Thermodynamics

Brief resume of concepts of laws of thermodynamics, free energy, chemical potential and entropies. Partial molar free energy, Partial molar volume and Partial

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molar heat content and their significance, Determinations of their quantities.
Concets of fugacity and determination of fugacity. Non-ideal

Msc (Chemistry)


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systems : Excess functions for non-ideal solutions. Activity, activity coefficient, Debye Huckel theory for activity coefficient of electrolytic solutions; determination of activity and activity coefficients; ionic strength. Application of phase rule to three component systems; second order phase transition.

Unit - V

Statistical Thermodynamics

Concept of distribution, thermodynamics probability and most probable distribution. Ensemble averaging, postulates of ensemble averaging, Canonical, grand canonical and micro-canonical ensembles. Corresponding distribution laws (using Lagrange's method of undetermined multipliers). Partition functions- translation, rotational, vibrational and electronic partition functions. Calculation of thermodynamics probability in terms of partition. Application of partition functions. Fermi-Dirac Statistics, distribution law and application to metal. Bose-Einstein statistics distribution Law and application to helium.

Books Suggested

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistry, A.K. Chandra. Tata Mc Graw Hill.
3. Quantum Chemistry, Ira N. Levine, Prentice Hall.
4. Coulson's Valence, R. Mc Weezy, ELBS.
5. Chemical Kinetic. K. J. Laidler, McGraw-Hill.
6. Kinetics and Mechanism of Chemical Transformation J. Rajaraman and J. Kurincose, Mc Millan.
7. Micelles, Theoretical and Applied Aspects V.MOraoi, Plenum.
8. Modern Electrochemistry Vol. 1 and Vol. II J.O.M Bockris and A.K.N. Reddy, Plenum.
9. Introduction to Polymer Science V.R. Gowariker, N.V. Vishwanathan and J. Sridhar, Wiley Basem.
10. Introduction to Quamum Chemistry-R.K. Prasad New Age Publication.

Unit-IV

**Group Theory and Spectroscopy
CHE104**

Unit - I

Symmetry and Group theory in Chemistry

Symmetry elements and symmetry operation, definition of group, subgroup. Conjugacy relation and classes. Point symmetry group. Schoenflies symbols, representations of groups by matrices (representation for the C_n, C_m, C_{nh} , and D_{nh} group to be worked out explicitly). Character of a representation. The great orthogonality theorem (without proof) and its importance. Character tables and their use; spectroscopy. Derivation of character table for C_{2v} and C_{3v} point group. Symmetry aspects of molecular vibrations of H_2O molecule.

Unit - II

Microwave Spectroscopy

Electromagnetic spectrum, Quantization of energy, Interaction of electromagnetic radiation with molecular system, Doppler broadening. Pure rotational Spectra: Instrumentation, rigid rotator model, effect of isotopic substitution on the transition frequencies, non-rigid rotator model, Stark effect, Application of rotational spectra to the calculation of bond length of diatomic molecules.

Unit - III

Infrared-Spectroscopy

Review of linear harmonic oscillator, Vibrational energies of diatomic molecules, zero point energy, force constant and bond strengths; anharmonicity, Morse potential energy diagram, vibration-rotation spectroscopy. P.Q.R. branches, Breakdown of Oppenheimer approximation; vibrations of polyatomic molecules. Selection rules, normal modes of vibration, group frequencies, overtones, hot bands, factors affecting the band positions and intensities, far IR region, metal ligand vibration, normal co-ordination analysis.

Books suggested

1. Modern Spectroscopy, .I.M. Hollas, John Wiley.
2. Applied Electron Spectroscopy for chemical analysis d. H. Windawi and FL. Ho, Wiley Interscience.
3. NMR, NQR, EPr and Mossbauer Spectroscopy in Inorganic Chemistry, R.V. Parish, Ellis Harwood.
4. Physical Methods in Chemistry, R.S. Drago, Saunders College.
5. Chemical Applications of Group Theory, F .A. Cotton.



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CHE105

(For students without Mathematics in B.Sc.)

Unit -I

Vectors

Vectors, dot, cross and triple products etc. gradient, divergence and curl, vector Calculus.

Matrix Algebra

Addition and multiplication; inverse, adjoint and transpose of matrices.

Unit -II

Differential Calculus

Functions, continuity and differentiability, rules for differentiation, application of differential calculus including maxima and minima (examples related to maximally populated rotational energy levels, Bohr's radius and most probable velocity from Maxwell's distribution etc)

Unit-III

Integral calculus

Basic rules for integration, integration by parts, partial fractions and substitution, Reduction formulae, application of integral calculus, Functions of several variables, partial differentiation, co-ordinate transformation (e.g. Cartesian to Spherical polar).

Unit-IV

Elementary Differential equations

First-order and first degree differential equations, homogenous, exact and linear equations Applications to chemical kinetics, Secular equilibria, quantum chemistry etc, second order differential equation and their solutions.

Unit-V

Permutation and Probability

Permutation and combinations, probability and probability theorems average, variance root means square deviation examples from the Kinetic theory of gases etc. fitting (including least squares fit etc with a general polynomial fit).

Book Suggested

Msc (Chemistry)

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1. The Chemistry Mathematics Book, E. Steiner, Oxford University press.
2. Mathematics for chemistry, Doggett and Suicliffe, Logman,
3. Mathematics for physical Chemistry: Daniels, Mc. Graw Hill.

Msc (Chemistry)

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BIOLOGY FOR CHEMISTS (Optional)
CHE104B

(For students without Biology in B.Sc.)

Unit -I

Cell Structure and functions

Structure prokaryotic and eukaryotic cells, intracellular organelles and their functions, comparison of plant and animals cells. Overview of metabolic processes- catabolism and anabolism. ATP- the biological energy currency. Origin of life-unique properties of carbon chemical evolution and rise of living systems. Introduction to bio-molecules, building of bio-macromolecules.

Unit- II

Carbohydrates

Conformation of monosaccharide's structure and functions of important derivatives of mono-saccharides like glycosides, deoxy sugars, myoinositol, amino sugars, N- acetylmuramic acid, sialic acid disaccharides and polysaccharides. Structural polysaccharides cellulose and chitin. Storage polysaccharides-starch and glycogen. Structure and biological functions of glucosaminoglycans of mucopolysaccharides Carbohydrates of glycoproteins and glycolipids. Role of sugars in biological recognition, Blood group substance. Ascorbic acid.

Unit-III

Lipid

Fatty acids, essential fatty acids, structure and functions of triacylglycerols, glycerophospholipids, Spingolipids, cholesterol, bile acids, prostaglandins. Lipoproteins-composition and function, role in atherosclerosis. Properties of lipid aggregates-micelles, bilayers, liposomes and their possible biological functions. Biological membrane. Fluid mosaic model of membrane structure . lipid metabolism β -oxidation of fatty acids.

Unit-IV

Amino- acids, peptides and proteins

Chemical and enzymatic hydrolysis of proteins to peptides, amino acid sequencing.

Secondary



Structure of proteins. Force responsible for holding of secondary structures. α -helix, β -sheets in super secondary structure, triple helix structure of collagen. Tertiary structure of protein-folding and domain structure, quaternary structure. Amino acid metabolism-degradation and biosynthesis of amino acids, sequence determination : chemical/enzymatic/mass spectral, racemization/detection. Chemistry of oxytocin and tryptophan releasing hormone (TRH)

Unit V

Nucleic Acids

Purine and pyrimidine bases of nucleic acids, base pairing via H-bonding Structure of ribonucleic acids (RNA) and deoxyribonucleic acid (DNA), double helix model of DNA and forces responsible for holding it, Chemical and enzymatic hydrolysis of nucleic acids . The chemical basis for heredity, and overview of replication of DNA, transcription, translation and genetic code, chemical synthesis of mono and trinucleoside

Book Suggested

1. Principles of Biochemistry , A.L. Lehninger, Worth Publisher.
2. Biochemistry, L. Stryer, W.H. Freeman,
3. Biochemistry, J. David Rawan Neli. Patterson.
4. Biochemistry, Voet and Voet, John Wiley \
5. Outlines of Biochemistry E.E. Conn and P.K. Srumpf, John Wiley







**MSc CHEMISTRY
SECOND SEMESTER**

SUBJECT CODE	SUBJECT NAME	THEORY		CCE / INTERNAL		PRACTICAL		Total	
		MAX	MIN	MAX	MIN	MAX	MIN	Max	Min
CHE201	INORGANIC CHEMISTRY II	70	25	30	11	-	-	100	36
CHE202	ORGANIC CHEMISTRY II	70	25	30	11	-	-	100	36
CHE203	PHYSICAL CHEMISTRY II	70	25	30	11	-	-	100	36
CHE204	SPECTROSCOPY II & DIFFRACTION METHODS	70	25	30	11	-	-	100	36
CHE205	COMPUTERS FOR CHEMISTS	70	25	30	11	-	-	100	36
CHE 206	Lab (INORGANIC CHEMISTRY II+ ORGANIC CHEMISTRY II+ PHYSICAL CHEMISTRY II)	-	-	-	-	100	36	100	36

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**CHE- 201
INORGANIC CHEMISTRY II**

Unit-1

Electronic Spectral Studies of Transition Metal Complexes : Spectroscopic ground states, correlation, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d1-d9 states), Selection rule for electronic spectroscopy. Intensity of various type electronic transitions. Calculations of $10Dq$, B and β parameters, charge transfer spectra.

Unit-2

Magnetic Properties of Transition Metal Complexes

Types of magnetic bodies, two sources of paramagnetism, orbital and spin effect, Curie equation and Curie-weiss law, Determination of magnetic susceptibility, Quenching of orbital contribution, Anomalous magnetic moments. Spin-Cross over and magnetic exchange coupling.

Unit-3

Metal [I] Complexes

Metal carbonyl, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding, structure and important reaction of transition metal nitrosyl, dinitrogen and dioxygen complexes; tertiary phosphine as ligand.

Unit-4

Metal Clusters

Higher boranes, carboranes, metalloboranes and metallo-carboranes compounds dinuclear, trinuclear, tetranuclear, hexanuclear clusters with metal metal multiple bonds.

Unit-5

Optical Rotatory Dispersion and Circular Dichroism

Linearly and circularly polarized lights; optical rotatory power and circular birefringence, ellipticity and circular dichroism; ORD and Cotton effect, Faraday and Kerr effects; Assignment of electronic transitions; Applications of ORD and CD for the determination of (i) absolute configuration of complexes and (ii) isomerism due to non-planarity of chelate rings.

Reference Book :-

Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
Inorganic Chemistry, J.E. Huhey, Harpes & Row.
Chemistry of the Elements, N.N. Greenwood and A. Earnshaw, Pergamon.
Inorganic Electronic Spectroscopy, A.B.P. Lever, Elsevier.
Magnetochemistry, R.I. Carlin, Springer Verlag.


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**CHE-202
ORGANIC CHEMISTRY II**

Unit-1

Aromatic Electrophilic Substitution The arenium ion mechanism, orientation and reactivity, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in other ring systems. Quantitative treatment of reactivity in substrates and electrophiles. Diazonium coupling, Vilsmeier reaction, Gatterman-Koch reaction.
Aromatic Nucleophilic Substitution The S_NAr S_N1, benzyne and S_N1 mechanism, Reactivity effect of substrate structure, leaving group and attacking nucleophile. The Von Richter, Sommelet-Hauser, and Smiles rearrangements.

Unit-2

Free Radical Reactions

Types of free radical reactions, free radical substitution mechanism, mechanism at an aromatic substrate, neighbouring group assistance. Reactivity for aliphatic and aromatic substrates at a bridgehead. Reactivity in the attacking radicals. The effect of solvents on reactivity. Allylic halogenation (NBS), oxidation of aldehydes to carboxylic acids, auto-oxidation, coupling of alkynes and arylation of aromatic compounds by diazonium salts, Sandmeyer reaction. Free radical rearrangement. Hunsdiecker reaction.

Unit-3

Addition Reactions

Mechanism and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radicals, regio- and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings. Hydroboration, Michael reaction, sharpless asymmetric epoxidation.

Unit-4

Addition to Carbon-Hetero Multiple bonds

Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, acid esters and nitriles. Addition of Grignard reagent, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides, ammonolysis of esters.

Elimination Reactions

The E₂, E₁ and E_{1cB} mechanisms and their spectrum. Orientation of the double bond. Reactivity-effects of substrate structures, attacking base, the leaving group and the medium. Mechanism and orientation in pyrolytic elimination.

Unit-5

Pericyclic Reactions Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene and allyl system. Classification of pericyclic reactions. Woodward-Hoffmann correlation diagrams. FMO and PMO approach. Electrocyclic reactions-conrotatory and disrotatory motions, 4n 4n+2 and allyl systems. Cycloadditions-antarafacial and suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes, 1,3 dipolar cycloadditions and cheletropic reactions. Sigmatropic rearrangements-suprafacial and antarafacial

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shifts of H, sigmatropic involving carbon moieties, 3,3- and 5,5 sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements. Fluxional tautomerism, Ene reaction.

Reference Book :-

Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.

Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.

A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.

Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press.

Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice-Hall.

Modern Organic Reactions, H.O. House, Benjamin.

Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic 84th Professions!



**CHE-203
PHYSICAL CHEMISTRY II**

Unit-1

Chemical Dynamics

Methods of determining rate laws, collision theory of reaction rates, steric factor, activated complex theory, Arrhenius equation and the activated complex theory; ionic reactions, kinetic salt effects, steady state kinetics, kinetic and thermodynamic control of reactions, treatment of unimolecular reactions. Dynamic chain (hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane), photochemical (hydrogen-bromine and hydrogen-chlorine reactions) and homogenous catalysis. kinetics of enzyme reactions, general features for fast reactions, study of fast reactions by flow method, relaxation method, flash photolysis and the nuclear magnetic resonance method, dynamics of unimolecular reactions (Lindemann Hinshelwood and Rice-Ramsperger-Kassel-Marcus (RRKM) theories for unimolecular reactions).

Unit-2

Surface Chemistry :-

Adsorption Surface tension, capillary action, pressure difference across curved surface (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, estimation of surface area (BET equation), Surface films on liquids (Electro-kinetic phenomenon).

Micelles Surface active agents, classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization-phase separation and mass action models, solubilization, micro emulsion, reverse micelles.

Unit-3

Macromolecules:

Polymer-definition, types of polymers, electrically conducting, fire resistant, liquid crystal polymers, kinetics of polymerization, mechanism of polymerization. Molecular mass, number and mass average molecular mass, molecular mass determination (Osmometry, viscometry, diffusion and light scattering methods), sedimentation, chain configuration of macromolecules, calculation of average dimension of various chain structures.

Unit-4

Non Equilibrium Thermodynamics

Thermodynamic criteria for non-equilibrium states, entropy production and entropy flow, entropy balance equations for different irreversible processes (e.g., heat flow, chemical reaction etc.) transformations of the generalized fluxes and forces, non equilibrium stationary states, phenomenological equations, microscopic reversibility and Onsager's reciprocity relations, electrokinetic phenomena, diffusion, electric conduction.

Unit-5

Electrochemistry

Electrochemistry of solutions, Debye-Huckel-Onsager treatment and its extension, ion solvent interactions. Debye-Huckel-Jernum mode. Thermodynamics of electrified interface equations. Derivation of electrocapillarity, Lippmann equations (surface excess), methods of determination. Structure of electrified interfaces. Overpotentials, exchange current density, derivation of Butler Volmer equation, Tafel plot. Quantum aspects of charge transfer at electrodes-solution interfaces, quantization of charge transfer, tunneling. Semiconductor interfaces-theory of double layer at semiconductor, electrolyte solution interfaces, structure of double layer

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interfaces. Effect of light at semiconductor solution interface. Polarography theory, Ilkovic equation: half wave potential and its significance.

Reference Book :-

Physical Chemistry, P.W. Atkins, ELBS.

Introduction to Quantum Chemistry, A.K. Chandra, Tata Mc Graw Hill.

Quantum Chemistry, Ira N. Levine, Prentice Hall. 14. Coulson's Valence, R. Mc Weeny, ELBS.

Chemical Kinetics. K.J. Laidler, McGraw-Hill.

Kinetics and Mechanism of Chemical Transformation J. Rajaraman and J. Kurincose, Mc Millan.

Micelles, Theoretical and Applied Aspects, V. M. Rao, Plenum.



CHE- 204
Spectroscopy II and Diffraction Methods

Unit-1

Nuclear Magnetic Resonance Spectroscopy

Nuclear spin, nuclear resonance, saturation, shielding of magnetic nuclei, chemical shift and its measurements, factors, influencing chemical shift, deshielding, spin-spin interactions, factors influencing coupling constant "J" Classification (AXB, AMX, ABC, A2B2 etc.), spin decoupling; basic ideas about instrument, NMR studies of nuclei other than proton-¹³C, ¹⁹F and ³¹P. FT NMR, advantages of FT NMR.

Unit-2

Nuclear Quadrupole Resonance Spectroscopy

Quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant, splitting. Applications.

Unit-3

Electron Spin Resonance Spectroscopy

Basic principles, zero field splitting and Kramer's degeneracy, factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants, spin Hamiltonian, spin densities and Mc Connell relationship, measurement techniques, applications.

Unit-4

X-ray Diffraction

Bragg condition, Miller indices, Laue Method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals, index reflections, identification of unit cells from systematic absences in diffraction pattern, Structure of simple lattices and X-ray intensities, structure factor and its relation to intensity and electron density, phase problem. Description of the procedure for an X-ray structure analysis, absolute configuration of molecules.

Unit-5

Electron Diffraction

Scattering intensity vs. scattering angle, Wierl equation, measurement technique, elucidation of structure of simple gas phase molecules. Low energy electron diffraction and structure of surfaces.

Neutron Diffraction

Scattering of neutrons by solids measurement techniques, Elucidation of structure of magnetically ordered unit cells.



**CHE- 205
COMPUTERS FOR CHEMISTS**

This is a theory cum-laboratory co use with more emphasis on laboratory work.

Unit-1

Introduction to computers and Computing Basic structure and functioning of computer with a PC as illustrative example. Memory I/O devices, Secondary storage Computer languages, Operating systems with DOS as an example Introduction to UNIX and WINDOWS. Principles of programming Algorithms and flow-charts.

Unit-2

Computer Programming in FORTRAN/C/BASIC (the language features are listed here with reference to FORTRAN. The instructor may choose another language such as BASIC or C the features may be replaced appropriately). Elements of the compute language. Constants and variables, Operations and symbols Expressions, Arithmetic assignment statement, Input and output Format statement, Termination statements, Branching statements as IF or GO TO statement, LOGICAL variables, Double precision variables, Subscripted variables and DIMENSION, DO statement FUNCTION AND SUBROUTINE, COMMON and DATA statement (Student learn the programming logic and these language feature by hands on experience on a personal computer from the beginning of this topic.)

Unit-3

Programming in Chemistry

Developing of small computer codes using any one of the languages FORTRAN/C/BASIC involving simple formulae in Chemistry, such as Van der Waals equation, Chemical kinetics (determination of Rate constant) Radioactive decay (Half Life and Average Life), Determination Normality, Molarity and Molality of solutions, Evaluation Electronegativity of atom and Lattice Energy from experimental determination of molecular weight and percentage of element organic compounds using data from experimental metal representation of molecules in terms of elementary structural features such as bond lengths, bond angles.

Unit-4

Use of Computer programmes

Operation of PC, Data Processing, Running of standard Programs and Packages such as MS WORD, MS EXCEL -special -emphasis on calculations and chart formations, X-Y plot, Simpson's Numerical Integration method, Programmes with data preferably from physical chemistry laboratory.

Unit-5

Internet

Application of Internet for Chemistry with search engines, various types of files like PDF, JPG, RTF and Bitmap, Scanning, OMR, Web camera.

Book Suggested :

**Fundamentals of Computer : V. Rajaraman (Prentice Hall)
Computers in Chemistry : K.V. Raman (Tata Mc Graw Hill)
Computer Programming in FORTRAN IV V Rajaraman (Prentice Hall)**

Professor
Sri Satya Sai University of Technology & Medical Sciences
Sehore, Madhya Pradesh



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COURSEWISE SCHEME 2015-16 MSC CHEMISTRY 3rd SEMESTER

SUBJECT CODE	COMPULSORY/ OPTIONAL	SUBJECT NAME	THEORY						PRACTICAL			TOTAL		
			PAPER		CCE / INTERNAL		TOTAL MARKS		MAX	MIN	MAX	MIN		
			MAX	MIN	MAX	MIN	MAX	MIN						
CHE301	COMPULSORY	APPLICATION OF SPECTROSCOPY - I	70	28	30	10	100	38	0	100	38	0	100	38
CHE302	COMPULSORY	PHOTOCHEMISTRY	70	28	30	10	100	38	0	100	38	0	100	38
CHE303	COMPULSORY	ENVIRONMENTAL	70	28	30	10	100	38	0	100	38	0	100	38
CHE304	COMPULSORY	Polymers	70	28	30	10	100	38	0	100	38	0	100	38
CHE305	COMPULSORY	Industrial Chemistry-(Heavy Chemicals & Petroleum)	70	28	30	10	100	38	0	100	38	0	100	38
CHE306	COMPULSORY	INTERNSHIP	0	0	0	0	0	0	100	36	100	36	100	36
CHE307	COMPULSORY	LAB (Inorganic Chemistry)	0	0	0	0	0	0	33	12	33	12	33	12
CHE308	COMPULSORY	LAB (organic Chemistry)	0	0	0	0	0	0	33	12	33	12	33	12
CHE309	COMPULSORY	LAB (Physical Chemistry)	0	0	0	0	0	0	34	12	34	12	34	12


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APPLICATION OF SPECTROSCOPY

CHE301

UNIT-I

Vibrational Spectroscopy

Symmetry and shapes of AB₂, AB₃, AB₄, AB₅ and AB₆, mode of bonding of ambidentate ligands, nitrosyl, ethylenediamine and diketonato complexes, application of resonance Raman spectroscopy particularly for the study of active sites of metalloprotein.

UNIT- II

Electron Spin Resonance Spectroscopy

Hyperfine coupling, spin polarization for atoms and transition metal ions, spin-orbit coupling and significance of g- tensors, application to transition metal complexes (having one unpaired electron) including biology systems and to inorganic free radicals.

UNIT-III

Nuclear Magnetic Resonance Of Paramagnetic Substances in Solution

Properties of paramagnetic compound, The contact and Pseudo contact shifts. Factors affecting nuclear relaxation. Contrast agents, shifts reagent, some applications including biochemical systems on overview of NMR of metal nuclide with emphasis on ¹⁹⁵Pt and ¹¹⁹Sn NMR.

UNIT-IV

Mossbauer Spectroscopy

Basic principles, instrumentation, chemical shift, spectral display, Application of the technique to the studies of (1) bonding and structures of Fe⁺² and Fe⁺³ compounds including those of intermediate spin, (2) Sn⁺² and Sn⁺⁴ compounds nature of M-L bond, coordination number, structure and (3) detection of oxidation state and inequivalent MB atoms.

UNIT- V

Electron Spectroscopy

Electronic Spectral Studies for d¹- d⁹ systems in octahedral, tetrahedral and square planar complexes.



Suggested Readings :

1. Physical Methods for Chemistry, R.S. Drago, Saunders Compnay.
2. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Craddock, ELBS.
3. Infrared and Raman Spectral : Inorganic and Coordination Compounds K. Nakamoto, Wiley.
4. Progress in Inorganic Chemistry vol., 8, ed., F.A. Cotton, vol., 15 ed. S.J. Lippard, Wiley.



PHOTOCHEMISTRY

CHE302

UNIT-I

Photochemical Reactions

Interaction of electromagnetic radiation with matter, types of excitations, fate of excited molecule, quantum yield, transfer of excitation energy, actinometry.

UNIT-II

Determination of Reaction Mechanism

Classification, rate constants and life times of reactive energy state, determination of rate constants of reactions. Effect of light intensity on the rate of photochemical reactions. Types of photochemical reactions-photo dissociation, gas-phase photolysis. A.I.

UNIT-III

Photochemistry of Alkenes

Intramolecular reactions of the olefinic bond-geometrical isomerism, cyclisation reactions, rearrangement of 1,4- and 1,5-dienes.

Photochemistry of Aromatic Compounds

Isomerisations, additions and substitutions.

UNIT-IV

Photochemistry of Carbonyl Compounds

Intramolecular reactions of carbonyl compounds-saturated, cyclic and acyclic, α,β unsaturated and α,β unsaturated compounds, cyclohexadienones. Intermolecular cycloaddition reactions-dimerisations and oxetane formation.

UNIT-V

Miscellaneous Photochemical Reactions Photo-Fries reactions of anilid's, Photo-Fries rearrangement. Barton reaction. Singlet molecular oxygen reactions. Photochemical formation of smog. Photodegradation of polymers. Photochemistry of vision.



Suggested Readings :

1. Physical Methods for Chemistry, R.S. Drago, Saunders Compnay.
2. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Craddock, ELBS.
3. Infrared and Raman Spectral : Inorganic and Coordination Compounds K. Nakamoto, Wiley.
4. Progress in Inorganic Chemistry vol., 8, ed., F.A. Cotton, vol., 15 ed. S.J. Lippard, Wiley.



ENVIRONMENTAL

CHE303

UNIT-I

Atmosphere

Atmospheric layers, Vertical temperature profile, heat/radiation budget of the earth atmosphere systems. Properties of troposphere, thermodynamic derivation of lapse rate. Temperature inversion. Calculation of Global mean temperature of the atmosphere. Pressure variation in atmosphere and scale height. Biogeochemical cycles of carbon, nitrogen, sulphur, phosphorus, oxygen. Residence times.

Atmospheric Chemistry

Sources of trace atmospheric constituents : nitrogen oxides, sulphurdioxide and other sulphur compounds, carbon oxides, chlorofluorocarbons and other halogen compounds, methane and other hydrocarbons.

Tropospheric Photochemistry

Mechanism of Photochemical decomposition of NO_2 and formation of ozone. Formation of oxygen atoms, hydroxyl, hydroperoxy and organic radicals and hydrogen peroxide. Reactions of hydroxyl radicals with methane and other organic compounds. Reaction of OH radicals with SO_2 and NO_2 . Formation of Nitrate radical and its reactions. Photochemical smog meteorological conditions and chemistry of its formation.

UNIT-II

Air Pollution Air pollutants and their classifications. Aerosols-sources, size distribution and effect on visibility, climate and health.

Acid Rain

Definition, Acid rain precursors and their aqueous and gas phase atmospheric oxidation reactions. Damaging effects on aquatic life, plants, buildings and health. Monitoring of SO_2 and NO_2 . Acid rain control strategies.

Stratospheric Ozone Depletion

Mechanism of Ozone formation, Mechanism of catalytic ozone depletion, Discovery of Antarctic Ozone hole and Role of chemistry and meteorology. Control Strategies.

Green House Effect

Terrestrial and solar radiation Spectra, Major green house gases and their sources and Global warming potentials. Climate change and consequences.

Urban Air Pollution Exhaust emissions, damaging effects of carbon monoxide. Monitoring of CO. Control strategies.

UNIT-III

Aquatic Chemistry and Water Pollution

Redox chemistry in natural waters. Dissolved oxygen, biological oxygen demand, chemical oxygen demand, determination of DO, BOD and COD. Aerobic and anaerobic reactions of organic sulphur and nitrogen compounds in water acid-base chemistry of fresh water and sea water. Aluminium, nitrate and fluoride in water. Petrification. Sources of water pollution. Treatment of waste and sewage. Purification of drinking water, techniques of purification and disinfection.

UNIT-IV

Environmental Toxicology

Toxic heavy metals : Mercury, lead, arsenic and cadmium. Causes of toxicity. Bioaccumulation, sources of heavy metals. Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects.

Toxic Organic Compound : Pesticides, classification, properties and uses of organochlorine and ionospheres pesticides detection and damaging effects. Polychlorinated biphenyls : Properties, use and environmental continuation and effects.

Polynuclear Aromatic Hydrocarbons : Source, structures and as pollutants.

UNIT-V

Soil and Environmental Disasters

Soil composition, micro and macronutrients, soil pollution by fertilizers, plastic and metals. Methods of re-mediation of soil. Bhopal gas tragedy, Chernobyl, three mile island, Minimata Disease, Seveso (Italy), London smog.

Suggested Readings :

1. Environmental Chemistry, Colin Baird, W.H. Freeman Co. New York, 1998.
2. Chemistry of Atmospheres, R.P. Wayne, Oxford.
3. Environment Chemistry, A.K. De, Wiley Eastern, 2004.
4. Environmental Chemistry, S.E. Manahan, Lewis Publishers.
5. Introduction to atmospheric Chemistry, P.V. Hobbs, Cambridge..

POLYMERS

CHE304

UNIT-I

Basics

Importance of polymers. Basic concepts: Monomers, repeat units, degree of polymerization Linear, branched and network polymers. Classification of polymers. Polymerization: condensation, addition/radical chain-ionic and co-ordination and copolymerization. Polymerization conditions and polymer reactions. Polymerization in homogeneous and heterogeneous systems.

UNIT-II

Polymer Characterization

Poly dispersion -average molecular weight concept. Number, weight and viscosity average molecular weights. Polydispersity an molecular weight distribution. The practical significance of molecular weight. Measurement of molecular-weights. End-group, viscosity, light scattering, osmotic and ultracentrifugation methods.

UNIT-III

Analysis and testing of polymers

Chemical analysis of polymers, spectroscopic methods, X-ray diffraction study. Microscopy. Thermal analysis and physical testing-tensile strength. fatigue, impact, Tear resistance, Hardness and abrasion resistance.

UNIT-IV Inorganic Polymers

A general survey and scope of Inorganic Polymers special characteristics, classification, homo and hetero atomic polymers.

Structure, Properties and Applications of

- a. Polymers based on boron-borazines, boranes and carboranes.
- b. Polymers based on Silicon, silicone's polymetalloxanes and polymetallosiloxanes, silazanes.

UNIT-V

Structure, Properties and Application of Polymers

- a. Polymers based on Phosphorous-Phosphazenes, Polyphosphates
- b. Polymers based on Sulphur-Tetrathur tetranitride and related compounds.

c. Co-ordination and metal chelate polymers.

Suggested Readings :

1. Inorganic Chemistry, J.E. Huheey, Harper Row.
2. Developments in Inorganic polymer Chemistry, M.F. Lappert and G.J. Leigh.
3. Inorganic polymers- N.H. Ray.
4. Inorganic polymers, Graham and Stone.




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2015-16

INDUSTRIAL CHEMISTRY- (HEAVY CHEMICALS & PETROLEUM)

CHE305

UNIT-I

Water, Gases and Heavy Chemicals Water : Water Pollutants, their classes with examples, Biochemical oxygen demand, thermal pollution, pollution by fertilizers, detergents, pesticides and industrial wastes. .

Water Purification : Classical and modern Methods - Ion exchange, electro dialysis, Reverse osmosis. Softening of Hard water. Chlorination and fluoridation.

UNIT-II

Gases : Chemistly Large-scale production storage, hazards and uses of the following industrial gases: Hydrogen, oxygen, nitrogen, carbon dioxide, chlorine, fluorine, sulphur dioxide, phosgene, acetylene, argon, neon and helium.

Heavy Chemicals : Manufacture, Physical properties, Analysis, Hazards and applications of the following chemicals : HCL, H₂SO₄, HNO₃, H₃FO₄, poly phosphoric acid, NaHCO₃, Na₂CO₃, NaOH, NaCl, Na₂S₂O₃, Bleaching Powder, Bromine.

UNIT-III

Coal & Petroleum Coal : Origin and economic importance of coal. Coal composition, Coal carbonization, Coal gasification, Coal Gas, Water Gas, Producer gas, coal tar industry and manufacture of coal tar based chemicals and their importance. Role as carcinogens, Non-fuel uses of coal, and Cl Chemistry based on MeCOOH, CH₄ and CHO

UNIT-IV

Petroleum : Origin and composition, Refining, Reforming Fractionation; Cracking; knocking and Octane number, Kerosene and Napthene; Liquified petroleum gas (L.P.G.) Synthetic Gas, Synthetic Petrol, Petrochemicals, manufacture of ethylene propylene. Burethane, xylenes, etc. Economic importance with particular reference to India.

UNIT-V

Fats & Oils Fats & Oil Natural Fats, Edible and Industrial Oils of vegetable origin, common fatty acids and glyceride. Hydrogenation of Unsaturated oils, manufacture of Vanaspati and margarine.

Suggested Readings :

Industrial Chemistry J.S Jangwan, A. S Mathuria

**MSC CHEMISTRY
FOURTH SEMESTER**

Code	Subject	CCE/INTERNAL		Theory		Practical		Total	
		Max	Min	Max	Min	Max	Min	Max	Min
CHE401	APPLICATION OF SPECTROSCOPY-II (COMPULSORY)	30	11	70	25	-	-	100	36
CHE402	SOLID STATE CHEMISTRY (COMPULSORY)	30	11	70	25	-	-	100	36
CHE403	BIOCHEMISTRY (COMPULSORY)	30	11	70	25	-	-	100	36
Choose any one from code 404									
CHE404 (A)	MEDICINAL CHEMISTRY	30	11	70	25	-	-	100	36
CHE404 (B)	ELECTROCHEMISTRY								
Choose any one from code 405									
CHE405 (A)	INDUSTRIAL CHEMISTRY - PESTICIDES & GLASS INDUSTRIES	30	11	70	25	-	-	100	36
CHE405 (B)	CHEMISTRY OF NATURAL PRODUCTS								
CHE406	PRACTICAL - INORGANIC CHEMISTRY	-	-	-	-	33	12	33	12
CHE407	PRACTICAL - ORGANIC CHEMISTRY	-	-	-	-	33	12	33	12
CHE408	PRACTICAL - PHYSICAL CHEMISTRY	-	-	-	-	34	12	34	12



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APPLICATION OF SPECTROSCOPY-II (Compulsory)

CHE401

UNIT-I

Ultraviolet and Visible spectroscopy

Various electronic transitions (185-800 nm) Beer-Lambert law, Effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes, Fieser Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds, Steric effect in biphenyls.

UNIT-II

Infrared Spectroscopy

Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance.

UNIT-III

Nuclear Magnetic Resonance of Paramagnetic Substances in Solution

The contact and Pseudo contact shifts, factors affecting nuclear relaxation, some applications including biochemical systems, an overview of NMR of metal nuclide with emphasis on ^{195}Pt and ^{119}Sn NMR.

UNIT-IV

Carbon-13 NMR Spectroscopy

General considerations, chemical shift (aliphatic olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimension NMR spectroscopy-COSY, NOESY, DEPT, HMBC and HMQC techniques.

UNIT-V

Mass Spectrometry

Introduction ion production EI, CI FD, ESI and FAB, factors affecting fragmentation, ion analysis, ion abundance Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak. Mc Lafferty rearrangement, Nitrogen rule. High resolution mass spectrometry. Structure elucidation of simple molecules using UV - Visible, IR, NMR and mass Spectral techniques.



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Sehore

Suggested Readings:

1. Physical Methods for Chemistry, R.S. Drago, Saunders Company.
2. Structural Methods In Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Craddock, ELBS.
3. Infrared and Raman Spectral : Inorganic and Coordination Compounds R. Nakamoto, Wiley.
4. Progress in Inorganic Chemistry vol., 8, ed., F.A. Cotton, vol., 15 ed. S.J. Lippard, Wiley.
5. Transition Metal Chemistry ed. R.L. Carlin vol. 3 dekker.
6. Inorganic Electronic Spectroscopy, A.P.B. Lever, Elsevier.
7. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, .V. Parish, Ellis Haywood.




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Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)

SOLID STATE CHEMISTRY (Compulsory)

CHE402

UNIT-I

Solid State Reactions

General principles, experimental procedure, co-precipitation as a precursory to solid state reactions, kinetics of solid state reactions.

UNIT-II

Crystal Defects and Non-Stoichiometry

Perfect and imperfect crystals, intrinsic and extrinsic defects-point defects, line and plane defects, vacancies-Schottky defects and Frenkel defects. Thermodynamics of Schottky and Frenkel defect formation, colourcentres, non-stoichiometry and defects.

UNIT-III

Electronic Properties and Band Theory

Metals insulators and semiconductors, electronic structure of solidsband theory band structure of metals, insulators and semiconductors, Intrinsic and extrinsic semiconductors, doping semiconductors, p-n junctions, super conductors. Optical properties-Application of optical and electron microscopy. Magnetic Properties-Classification of materials : Effect of temperature calculation of magnetic moment, mechanism of ferro and anti ferromagnetic ordering super exchange.

UNIT-IV

Organic Solids

Electrically conducting solids. organic charge transfer complex, organic metals, new superconductors.

UNIT-V

Liquid Crystals:

Types of liquid crystals; Nematic, Smectic, Ferroelectric, Antiferroelectric, Various theories of LC, Liquid crystal display, New materials.

Suggested Readings:

1. Solid state chemistry and its applications, A.R. West, Peenum.
2. Principles of the Solid State, H.V. Keer, Wiley Eastern.
3. Solid State Chemistry, N.B. Hannay.
4. Solid State Chemistry, D.K. Chakrabarty, New Wiley Eastern.



BIOCHEMISTRY (Compulsory)

CHE403

UNIT-I

Metal Ions in Biological Systems

Bulk and trace metals with special reference to Na, K, Mg, Ca, Fe, Cu, Zn, Co, and K⁺/Na⁺ pump. Bioenergetics and ATP Cycle.

DNA polymerisation, glucose storage, metal complexes in transmission of energy, chlorophyll's, photosystem I and photosystem II in cleavage of water.

Transport and Storage of Dioxygen Hem proteins and oxygen uptake structure and function of haemoglobin's, myoglobin, haemocyanins and hemerythrin, model synthetic complexes of iron, cobalt and copper.

UNIT-II

Electron Transfer in Biology

Structure and function of metal of proteins in electron transport processes cytochrome's and iron-sulphure proteins, synthetic models, Nitrogen fixation Biological nitrogen fixation, and its mechanism, nitrogenase, Chemical nitrogen fixation.

UNIT-III

Enzymes

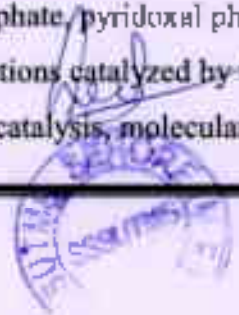
Introduction and historical perspective, chemical and biological catalysis, remarkable properties of enzymes like catalytic power, specificity and regulation. Nomenclature and classification, extraction and purification. Fischer's lock and key and Koshland's induced fit hypothesis, concept and identification of active site by the use of inhibitors, affinity labeling and enzyme modification by site-directed mutagenesis. Enzyme kinetics, Michael's-Menten and Lineweaver Burk plots, reversible and irreversible inhibition. Mechanism of Enzyme Action Transition-state theory, orientation and Steric effect, acid-base catalysis, covalent catalysis, strain or distortion. Examples of some typical enzyme mechanisms for chymotrypsin, ribonuclease, lysozyme and carboxypeptidase.

Kinds of Reactions Catalysed by Enzymes Nucleophilic displacement on a phosphorus atom, multiple displacement reactions and the coupling of ATP cleavage to endergonic processes. Transfer of sulphate, addition and elimination reactions, enolic intermediates in Isomerisations reactions, β -Cleavage and condensation, some isomerization and rearrangement reactions. Enzyme catalyzed carboxylation and decarboxylation.

UNIT-IV

Co-Enzyme Chemistry

Cofactors as derived from vitamins, coenzymes, prosthetic groups, apoenzymes. Structure and biological functions of coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD⁺, NADP⁺, FMN, FAD, lipoic acid, vitamin B12. Mechanisms of reactions catalyzed by the above cofactors. **Enzyme Models** Host-guest chemistry, chiral recognition and catalysis, molecular recognition, molecular asymmetry and



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prochirality Biometric chemistry, crown ether, cryptates. Cyclodextrins, cyclodextrin-based enzyme models, clixarenes, ionospheres, micelles synthetic enzymes or synzymes.

Biotechnological Applications of Enzymes

large-scale production and purification of enzymes, techniques and methods of immobilization of enzymes, effect of immobilization on enzyme activity, application of immobilized enzymes, use of enzymes in food and drink industry-brewing and cheese-making, syrups from corn starch, enzymes as targets for drug design. Clinical uses of enzymes, enzyme therapy, enzymes and recombinant DNA Technology.

UNIT-V

Biological Cell and Its Constituents

Biological cell, structure and functions of proteins, enzymes, DNA and RNA in living systems. Helix coils transition.

Bioenergetics

Standard free energy change in biochemical reactions, exergonic, endergonic. Hydrolysis of ATP, synthesis of ATP from ADP.

Biopolymer Interactions

Forces involved in biopolymer interactions. Electrostatic charges and molecular expansion, hydrophobic forces, dispersion force interactions. Multiple equilibrium and various types of binding processes in biological systems. Hydrogen ion titration curves.

Cell Membrane and Transport of Ions

Structure and functions of cell membrane, ion transport through cell membrane, irreversible thermodynamic treatment of membrane transport. Nerve conduction.

Suggested Readings:

1. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
2. Bioinorganic Chemistry, 1, Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, University Science Books.
3. Inorganic biochemistry vol. I and II ed. G.L. Elchhorn, Elsever.
4. Progress in Inorganic Chemistry, Vol 10 and 30 ed J.J. Lippard, Wiley.
5. Bioorganic Chemistry : A chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer Verlag.



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6. Understanding Enzymes, Trevor Palmer, Prentice Hall.
7. Enzyme Chemistry : Impact and applications, Ed. Collin J suckling, chemistry.
8. Enzyme Mechanisms Ed. M.I. Page and A Williams, Royal Society of Chemistry.
9. Fundamentals of Enzymology, N.C. Price and L. Stevens. Oxford University Press.



MEDICINAL CHEMISTRY (OPTIONAL)

CHE404 (A)

UNIT-I

Structure and activity : Relationship between chemical structure and biological activity (SAR), Receptor Site Theory, Approaches to drug design, Introduction to combinatorial synthesis in drug discovery, Factors affecting bioactivity, QSAR-Free-Wilson analysis, Hansch analysis, relationship between Free-Wilson analysis and Hansch analysis.

UNIT-II

Pharmacodynamics:

Introduction, elementary treatment of enzymes stimulation, enzyme inhibition, sulfonamides, membrane active drugs, drug metabolism, xenobiotics, biotransformation, significance of drug metabolism in medicinal chemistry.

UNIT-III

Antibiotics and antibacterials

Introduction, Antibiotic β -Lactam type - Penicillins, Cephalosporins, Anti-tubercular – Streptomycin, Broad spectrum antibiotics – Tetracyclines, Anticancer - Dactinomycin (Actinomycin D)

UNIT-IV

Antifungal –

polyenes, Antibacterial – Ciprofloxacin, Norfloxacin, Antiviral – Acyclovir

Antimalarials: Chemotherapy of malaria, SAR, Chloroquine, Chloroguanide and Mefloquine

UNIT-V

Non-steroidal Anti-inflammatory Drugs :

Diclofenac Sodium, Ibuprofen and Netopam

Antihistaminic and antiasthmatic agents :



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Terfenadine, Cinnarizine, Salbutamol and Beclomethasone dipropionate.

Suggested Readings:

1. Introduction to medicinal chemistry, A. Gringuage, Wiley-VCH.
2. Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry, Ed Robert F Dorge.
3. An Introduction to Drug Design, S.S. Pandeya and J.R. Dimmock, New Age International.
4. Burger's Medicinal Chemistry and Drug Discovery, Vol-4 (Chapter 9 and Chapter 14), Ed. M.E. Wolff, John Wiley.
5. Goodman and Gilman's Pharmacological Basis of Therapeutics, Mc Graw-Hill.






ELECTROCHEMISTRY

CHE-404 (B)

UNIT-I

1. Conversion and Storage of Electrochemical Energy Present status of energy consumption :

Pollution problem. History of fuel cells, Direct energy conversion by electrochemical means. Maximum intrinsic efficiency of an electrochemical converter. Physical interpretation of the Carnot efficiency factor in electrochemical energy converters. Power outputs.

electrochemical Generators (Fuel Cells) : Hydrogen oxygen cells, Hydrogen Air cell, Hydrocarbon air cell, Alkane fuel cell, Phosphoric acid fuel cell, direct NaOH fuel cells. applications of fuel cells.

2. Electrochemical Energy Storage :

Properties of Electrochemical energy storage : Measure of battery performance, Charging and discharging of a battery, Storage Density, Energy Density. Classical Batteries : (i) Lead Acid (ii) Nickel-Cadmium, (iii) Zinc manganese dioxide. Modern Batteries : (i) Zinc-Air (ii) Nickel-Metal Hydride, (iii) Lithium Battery, Future Electricity storers : Storage in (i) Hydrogen, (ii) Alkali Metals, (iii) Non aqueous solutions.

UNIT-II

Corrosion and Stability of Metals :

Civilization and Surface mechanism of the corrosion of the metals; Thermodynamics and the stability of metals, Potential -pH (or Pourbaix) Diagrams; uses and abuses, Corrosion current and corrosion potential -Evans diagrams. Measurement of corrosion rate : (i) Weight Loss method, (ii) Electrochemical Method.

Inhibiting Corrosion :

Cathodic and Anodic Protection. (i) Inhibition by addition of substrates to the electrolyte environment, (ii) by charging the corroding method from external source, anodic Protection, Organic inhibitors, The fuller Story Green inhibitors.

Passivation :

Structure of Passivation films, Mechanism of Passivation, Spontaneous Passivation Nature's method for stabilizing surfaces.

UNIT-III

Bioelectrochemistry :

bioelectrodics, Membrane Potentials, Simplistic theory, Modern theory, Electrical conductance in biological organism; Electronic, Protonic electrochemical mechanism of nervous systems, enzymes as electrodes.

Kinetic of Electrode Process :

Essentials of Electrode reaction. Current Density, Overpotential, Tafel Equation, Butler Volmer equation. Standard rate constant (K_0) and Transfer coefficient (α), Exchange Current.

Irreversible Electrode processes : Criteria of irreversibility, information from irreversible wave.

UNIT-IV

Methods of determining kinetic parameters for quasi-reversible and irreversible waves : Koutecky's method, Meites Israel Method, Gellings method

Electrocatalysis :

Chemical catalysts and Electrochemical catalysis with special reference to porphyrins, porphyrin oxides of rare earths. Electrocatalysis in simple redox reactions, in reaction involving adsorbed species. Influence of various parameters.

UNIT-V

Potential Sweep Method :

Linear sweep Voltammetry, Cyclic Voltammetry, theory and applications. Diagnostic criteria of cyclic voltammetry. Controlled current microelectrode techniques : comparison with controlled potentials methods, chronopotentiometry, theory and applications.

Bulk Electrolysis Methods :

Controlled potential coulometry, Controlled Coulometry, Electroorganic synthesis and its important applications. Stripping analysis : anodic and Cathodic modes, Pre electrolysis and Stripping steps, applications of Stripping Analysis.

SUGGESTED READINGS:

1. Polarographic Techniques by L. Meites, Interscience.
2. "Fuel Cells : Their electrochemistry". McGraw Hill Book Company, New York.
3. Modern Polarographic Methods by A.M. Bond, Marcell Dekker.
4. Polarography and allied techniques by K. Zutshi, New age International publication. New Delhi.



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UNIT-I

Cleaning Agents

Cleaning Agents : Toilet and washing soaps; preparation and uses, Synthetic detergents; alkyl aryl sulfonates, fatty alcohol surfaces, ethanolamines, nonionic detergents.

UNIT-II

Fertilizers and Inorganic Materials :

Fertilizers : Fertilizers Industries in India, Manufacture of Ammonium salts. Urea, Nitrates, Phosphates and Supphosphates, Nitrogen fixation.

Glass: Types, their composition and properties testing glass, Manufacture of Glass Fibres. Optical Glass, Coloured Glasses, Lead Glass and Neutron Absorbing Glass.

Ceramics: Important clays and feldspar. Glazing and vitrification, Glass ceramics.

UNIT-III

Cement : Types and their manufacture, setting process.

Ferrous Industry: Manufacture of steel and other important alloys.

Silicon : Pre silicon, Electronics Industry.

UNIT-IV

Pesticies and Food additives

Pesticies and Food additives : Classification, important categories of insecticides, fungicides, herbicides and rodenticies; Mode of action.

UNIT-V

Chemistry and synthcals of common pestickides : Such and Tabun, Sarin, Daygon, DDYP paraquat.

Suggested Readings:

Industrial Chemistry J.S Jangwan, A. S Mathuria



CHEMISTRY OF NATURAL PRODUCTS

CHE-405 (B)

UNIT-I

Terpenoids and Carotenoids

Classification, nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry, biosynthesis and synthesis of the following representative molecules : Citral, Geraniol β -Terpeneol, Menthol, Farnesol, Zingiberene, Santonin, Phytol, Abietic acid and -Carotene.

UNIT-II

Alkaloids

Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on nitrogen heterocyclic ring, role of alkaloids in plants. Structure, stereochemistry, synthesis and biosynthesis of the following : Ephedrine , (+)- Conine, Nicotine, Atropine, Quinine and Morphine.

UNIT-III

Steroids

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry, Isolation, Structure determination and synthesis of Cholesterol, Bile acids, Androsterone, Testosterone, Estrone, Progesterone, Aldosterone, Biosynthesis of Steroids.

UNIT-IV

Plant Pigments

Occurrence, nomenclature and general methods of structure determination. Isolation and synthesis of Apigenin, Luteolin Quercetin, Myricetin, Quercetin 3-glucoside, Vitexin, Diadzein, Aureusin, Cyanidin-7-arabinoside, Cyanidin, Hirsutidin, Biosynthesis of Flavonoids: Acetate pathway and Shikimic acid pathway.

Prophyrins

Structure and synthesis of Haemoglobin and Chlorophyll.



UNIT-V

Prostaglandin

Occurrence, nomenclature, classification, biogenesis and physiological effects. Synthesis of PGE₂ and PGF_{2a}.

Pyrethroids and Rotenones

Synthesis and reactions of Pyrethroids and Rotenones. (For structure elucidation, emphasis is to be placed on the use of spectral parameters wherever possible).

SUGGESTED READINGS:

1. Introduction to Flavonoids, B.A. Bohm. Harwood Academic Publishers.
2. New Trends in Natural Product chemistry, Ataur Rahman and M.L. Choudhary, Harwood Academic Publishers.
3. Rodd's Chemistry of Carbon Compounds, Ed. S. Coffey, Elsevier.
4. Chemistry, Biological and Pharmacological Properties of Medicinal Plants from the Americas, Ed. Kurt Hostertmann, M.P. Gupta and A. Marston. Harwood Academic Publishers.
5. Insecticides of Natural Origin, Sukh Dev, Harwood Academic Publishers.

Chemistry

Practical

(Duration: 6-8 hrs in each branch)

Practical examination shall be conducted separately for each branch.

Inorganic Chemistry	Max Marks - 33
Preparation	12
Spectrophotometric Determinations	
Flame Photometric Determinations	12
Record	04
Viva Voice	05
Total	33

Preparation

Preparation of selected inorganic compounds and their study by IR, UV-Vis spectra, and magnetic



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susceptibility measurements. Handling of air and moisture sensitive compounds involving vacuum lines. Selection can be made from the following :

1. Sodium amide. Inorg. Synth., 1946, 2, 128.
2. Atomic absorption analysis of Mg and Ca.
3. Synthesis of trichlorodiphenylammonium (V) hydrate. Inorg. Synth., 1985, 23, 194
4. Sodium tetrathionate $\text{Na}_2\text{S}_4\text{O}_6$.
5. Metal complex of dimethyl sulfoxide : $\text{CuCl}_2 \cdot 2\text{DMSO}$ J.Chem. Educ., 1982, 59, 57.
6. Synthesis of metal acetylacetonate : Inorg. Synth., 1957, 5, 130, 1963, 1, 183.
7. Cis and Trans $[\text{Co}(\text{en})_2\text{Cl}_2]^+$.
8. Determination of Cr (III) complex, $[\text{Cr}(\text{H}_2\text{O})_6]\text{NO}_3 \cdot 3\text{H}_2\text{O}$. Inorg. synth., 1972, 13, 184.
9. Preparation and use of Ferrocene. J. Chem. Edu. 1966, 43, 73; 1976, 53, 730.
10. Preparation of $[\text{Co}(\text{phenanthroline-5,6 quinone})]$.

Spectrophotometric Determinations / Spectroscopic Identification of recorded spectra like IR, NMR, ESR and Mass

- a. Manganese/Chromium in steel sample.
- b. Nickel by extractive spectrophotometric method.
- c. Fluoride/nitrite/phosphate.
- d. Copper-Ethylene diamine complex : Slope-ratio method.

Flame Photometric Determinations

- a. Sodium and potassium when present together.
- b. Lithium/calcium/barium/strontium.
- c. Cadmium and magnesium in tap water.

Organic Chemistry

Max Marks - 33

Multi-step Synthesis of Organic Compounds

12

Spectroscopy/Spectrophotometric Determinations

12

Record

04

Viva Voce

05

Total

33

Multi-step Synthesis of Organic Compounds

The exercise should illustrate the use of organic reagents and may involve purification of the products by chromatographic techniques. Photochemical reaction Benzophenone \rightarrow Benzpinacol \rightarrow Benzpinacolone
 Beckmann rearrangement : Benzanilide from benzene Benzene \rightarrow Benzophenone \rightarrow Benzophenoneoxime \rightarrow Benzanilide
 Benzilic acid rearrangement : Benzilic acid from benzoin Benzoin \rightarrow Benzil \rightarrow Benzilic acid
 Synthesis of heterocyclic compounds Skraup synthesis : Preparation of quinoline from aniline Fisher
 Indole synthesis : Preparation of 2-phenylindole from phenylhydrazine Enzymatic synthesis Enzymatic



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synthesis Enzymatic reduction : reduction of ethyl acetoacetate using Baker's yeast to yield enantiomeric excess of S (+) ethyl-3-hydroxybutanoate and determine its optical purity. Biosynthesis of ethanol from sucrose. Synthesis using microwave Alkylation of diethyl malonate with benzyl chloride. Synthesis using phase transfer catalyst. Alkylation of diethyl malonate or ethyl acetoacetate with an alkylhalide.

Spectroscopy

Identification of organic compounds by the analysis of their spectral data (UV, IR, PMR, CMR & MS)

Spectrophotometric (UV/VIS) Estimations/isolation of the following (any one compound)

Spectroscopic estimation

1. Amino acids
2. Proteins
3. Carbohydrates
4. Ascorbic acid
5. Aspirin
6. Caffeine

Isolation

1. Casein from milk
2. Lycopine from tomato
3. Piperine from black pepper
4. Caffeine from tea leaves
5. Lactose from milk

Physical Chemistry

Max Marks - 34

Experiment No. 1

13

Experiment No. 2

12

Record

04

Viva Voce

05

Total

34

Spectroscopy

- i. Determination of PK_a of an indicator (e.g. methyl red) in (a) aqueous and (b) micellar media.
- ii. Determination of stoichiometry and stability constant of Ferricisothiocyanate complex ion in solution.



- iii. Determination of rate constant of alkaline bleaching of Malachite green and effect of ionic strength on the rate of reaction.

Chemical Kinetics

- i. Determination of rate constant and formation constant of an intermediate complex in the reaction of Ce(IV) and Hypophosphorous acid at ambient temperature.
- ii. Determination of energy and enthalpy of activation in the reaction of $KMnO_4$ and benzyl alcohol in acid medium.
- iii. Determination of energy of activation and entropy of activation from a single kinetic run.
- iv. Kinetics of an enzyme catalyzed reaction.

Thermodynamics

- i. Determination of partial molar volume of solute (e.g. KCl) and solvent in a binary mixture.
- ii. Determination of the temperature dependence of the solubility of a compound in two solvents having similar intramolecular interactions (benzoic acid in water and in DMSO water mixture) and calculate the partial molar heat of solution.
- iii. **Polarography**
 - i. Identification and estimation of metal ions such as Cd^{+2} , Pb^{+2} , Zn^{+2} , and i^{+2} etc. polarographically.
 - ii. Study of a metal ligand complex polarographically (using Lingane's Method).

