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

Part A Introduction

Program: Certificate	Class: B.Sc. 15cm	Year : 2022	Session: 2023

Subject: Botany

1	Course Code		S1-BOTA1T
2	Course Title		Applied Botany (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/ Life Sciences/ Agriculture in class/12th
5	Course Learning outcomes (CLO)		By the end of this course the student should have: - 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:	Min. Passing Marks:

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
1	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 theirapplications 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. 1.3Bioremediation: definition and types	12
III	1.1 Ancient agricultural practices. 1.2**Modern agriculture practices:** Polyhouse, Drip irrigation, hydroponics, computer-based agriculture,	12

	terrace farming, 1.3Organic farming: Introduction, objective and brief technique 1.4 Horticulture: Definition and role in human welfare 1.5Forestry: Definition, branches and role in human welfare 1.6 Silviculture: Definition and management practices	
IV	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, Kutaki, Sama, Kodo, Bathua, Sehjan, Jowar, Makka, Bajra, Jau)	12
V	1.1Plant tissue culture: Definition, types and Importance. 1.2DNA Recombinant technique: Introduction. tools and importance 1.3Role of recombination in present era 1.4Bioinformatics: Definition, concept and tools 1.5Introduction of bioinformatics software: Basic idea of BLAST and FASTA Importance of bioinformatics	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. Levetin E. and Mcmahon K. "Plants and Society" McGraw Hill Education. 2007
2. Matti 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 McGraw Hill Education. 2020

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

Part A Introduction			
Program: Certificate	Class: B.Sc. Piyear	Year: 2021	Session: 2021-22

Subject: Botany		
		SI-BOTAIP
1	Course Code	
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)	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.
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	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 h a r d e n i n g, 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

| | 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. | |

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 P ss. 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: Curre t 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

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

Part A Introduction			
Programm- CERTIFICATE	Class-B.Sc I SEM.	Year- First	Session- 2022-2023

Subject - Chemistry	
Course Code	S1-CHEM1T
Course Title	**Fundamentals of Chemistry (Paper-1)**
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. 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 - 40 University Exam (CE) - 60	Minimum Passing Marks: 35

Total No. of Lectures- Tutorials-Practical (in hours per week):		
L-T-P: 60-0-30		
Unit	Topic	No. of Lectures
1	**(a)** Chemical techniques in ancient India: General Introduction	2+4
	(b) Contribution of ancient Indian scientists in chemistry e.g. metallurgy, dyes, pigments, cosmetics, Ayurveda, Charak Sanhita. पार्ट I	
	Atomic Structure:	
	(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.	
	(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.	
	Electronic configurations if the atoms. Stability of half filled and completely filled orbital's, concepts of exchange energy. Relative energies of atomic orbital's, Anomalous electronic configurations.	
	Keywords/Tags: Metallurgy, Dyes, Cosmetics, Charak Sanhita Hydrogen spectrum, Hund's rule, Aufbau principle.	

2	Elementary idea of the following properties of the elements with references to s & p-block elements in periodic table.	6
	• Effective nuclear number (EAN), shielding or screening effect, Slater rules, variation of effective nuclear cgarfe ibn periodic table,	

- Atomic radii (van der Waals)
- Ionic and crystal radii.
- Covalent radii (octahedral and tetrahedral)

Detailed discussion of the dollwing properties of the elements, with reference to s & o-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.*

3	**Chemical Bonding**	20

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.

Statement of Born-Lande equation for calculation of lattice energy, Madelung constant, Born-Haber cycle and its applications. Covalent charcater in ionic compounds, polarizing power and polarizability. Fajan's rules.

ii. Covalent bonding: Lewis structure, Valence Bond theory (Heitler-London approach).
Hybridization-Concept, types (SP, SP^2, SP^3, dSP^2, d^2SP^3) with suitable examples of inorganic and organicmolecules.
Ionic character in covalent compounds – dipole moment and percentage ionic character.
Valence shell electron pair repulsion theory (VSEPR) theory: Assumptions, need of theory, application of theory to

explain geometries or shapes of some inorganic molecules and ions on the basis of VSEPR and hybrization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahdral arrangements such as: NH_3, H_2O, SF_4, CIF_3, PCl_5, SF_6, CIF_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 diotomic molecules: CO, NO, CN, HF.

Bond parameters:

Definition and factors affecting – bond orders, bind lengths, bond angles.

Keywords/Tags: *Ionic   Bonding,   Covalent   Bonding,*
Hybrigization, VSEPR Theory, LCAO, MO Diagrams, Bond
Parameters.

4	**Acid-Base concept**	4
	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.	
	Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.	
	Indicator, choice of indicators.	

5	(a) **Fundamentals of Organic Chemistry**	12

(a)   Fundamentals of Organic Chemistry

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, enantimoers & their properties, stereogeniccentre, optical activity of enantionmers. Concept of chirality (up to two carbon atoms): chiral and achiral molecules with two stereogeniccentres, dieastereomers, threo and erythroisomers, meso iosmer, resolution of enantiomers, inversion, retension 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, Nucleaphiles, Electrophiles, Isomerism, Molecular Chirality, Enantiomers,
Sequence Rules, Conformation.

6	**Chemical Kinetics:**	12
	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.	

Ionic Equilibria:

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.

Keywords/Tags: Order of Reaction, Molecularity of Reaction, Arrhenius Equation, Activation Energy, Electrolytes, Salt Hydrolysis, Solubility Product.

Text Books:

1. Lee, J.D., Concise Inorganic Chemistry, ELBS, 1991
2. Khera, H.S., Gurtu, 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. Gurtu, J.N., Gurtu 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. 1&11). 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:

	PRACTICAL			
Program- Certificate	Class- B.Sc. I S I= IV)	Year-i 2022	Session-. 2022 - 23	

Subject –Chemistry

1	Course Code	S1-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: 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: 60 University Exam (UE)-. CCE-. 40	Minimum Passing Marks:- 35	

		External Assessment	
1		Experiments to be performed in laboratory	

Qualitative inorganic analysis

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
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

Ionic Equilibria

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

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

program - Cerificate   BOC - I SEM   SESSion - 2022-23

Subject : Computer Science

1.	**Course Code**	SI-COSC1T
2.	**Course Title**	Computer System Architecture (Paper 1)
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 12th class .
5.	Course Learning Outcomes(CLO)	On the Completion of this course ,learners will be able to: 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. Undersatand 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 : __ 40+60	Min. Passing Marks : __ 35

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 Devise ,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- Co –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

ANUPAM,FLOSOLVER,CHIPPS
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=4TzMvXmzlL8M
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/courses/106/105/106105163/

Part D : Assessment and Evaluation

Program : Certificate		Class: B.Sc.		Session: 202_ 202_
			I SEM	

	Subject : Computer Science	
1.	Course Code	U-COC19
2.	Course Title	Computer Architecture Lab (Paper 1)
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- 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 : 60 + 40	Min. Passing Marks : 35

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 Practicals

List of Practical

1. To study basic gates (AND ,OR, NOT) and verify their truth table.
2. To convert a given binary number to Gray code using IC 7486 .
3. To study and verify NAND as Universal gates using IC 7400 .
4. To study half adder suing basic gates and verify its truth table .
5. To study full adder suing 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'sTheorem .

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)

Part A- Introduction			
Program: Certificate	**Class**: B.Sc. I SEM	**Year**: 2022	**Session**: 2022-23
Subject: Mathematics			
Course Code	S1-MATH1T		
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)	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 Varahamihira 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 amatrix. 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
	 3.5 Directional derivatives
		18

	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

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.

Part C-Learning Resources
Text Books, Reference Books, Other resources

Suggested Readings:

Text Books:

1. K. B. Datta: 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. Jocobson: 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
hnps://freevideolectures.com/university/iit-roorkee
https://www.highereducation.mp.gov.in/?page=xhzlQmpZwkylQo2b%2Fy5G7w%3D%3D
https://www.bhojvirtualuniversity.com

Suggested Equivalent online courses:

https://nptel.ac.in/courses/111105122/
https://nptel.ac.in/courses/1111071 12/
https://nptel.ac.in/courses/111/101/111101080/

Program Certificate Course		Class: B.SC.	Year : FIRST SEM	Session :2022 2023 onwards
			Subject : Microbiology	
1	Course Code		S1-MBI01T	
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. • 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: 60 + 40		Minimum Passing Marks: 35
		Part B- Content of the Course		
	Total no of Lectures –60 Lectures- Tutorials- practical (in hours per week) L-T-P:4-0-0			
Unit	Topics			No. of Lectures

I	**The Microbial World**
	1.1 Indian traditional knowledge and global historical background of Microbiology.
	1.2 Theory of Biogenesis, Germ theory of disease, Fermentation.
	1.3 Significance of Microbiology-
	    (a) Branches of microbiology
	    (b) Thrust area of microbiology- Genetic engineering and Biotechnology.
	1.4 Contribution of following scientists in the field of microbiology-
	Louis Pasteur, Robert Koch, Edward Jenner, Alexander Fleming, Joseph Lister, serge N. Winogradsky, Marti us beijernik, Dmitri Ivanowsky, and Hans Christian Gram.
	
	Keywords: History of Microbiology, Renowned microbiologists, Genetic Engineering, Biotechnology.
		15

II	**2. Acellular and Prokaryotic Microorganisms** **2.1 Virus- General characters of following viruses- Bacteriophage (T4 phage), plant viruses (TMV), Prions and Viroid.** **2.2 Whittaker's System- of Five kingdom Classification: Mon era, Protista, fungi, Plantae and Animal a.** **2.3 Carl Weser's Three Domain system of classification:** **Achaea andEubacteria.** **2.4 Bacteria- Study of Spirochete, Rickettsia, Chlamydia, Mycoplasma, and Actinomycetes.** **2.5 Cyanobacteria- Study of anabaenas and spiraling.** **Keywords: Prokaryotes, Whittaker, Carl Whose** **, Bacteria, cyanobacteria.**	15

III	**Eukaryotic Microorganisms** 3.1 Basic Knowledge of Eukaryotic organisms and their evolutionary pattern. 3.2 Fungi- Study of Saccharomyces cerevisiae, Mucor, Aspergillus, Rhizopus and Penicillium. 3.3 Protozoa- Study of Euglena, Trypanosome, Leishmania, Amoeba, Entamoeba and Plasmodium. Key words: Eukaryotes, Fungi, Protozoa	15
IV	**4. Introduction to Microbial Cell Structure** 4.1 Study of Bacteria- Size, shape, and arrangement of bacterial cells. 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.. 4.3 Structures internal to cell wall- Cell membrane, cytoplasm, cytoplasmic inclusions, genome, spores and cysts. 4.4 Reproduction in bacteria- Binary fission, budding and fragmentation. Keywords: Bacterial cells, Gram positive Bacteria, Gram negative Bacteria, Binary fission.	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 McGraw- 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", 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. AgathaNarayan, 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". Kalian Publishers, New Delhi. (2007)
10. Shimmy, Q.J., "Microbiology"-I". Kailās 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-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=microbiolog

8.

Part-D Assessment and evaluation

Part A Introduction

Program Certificate Course	Class: B.SC.	Year : FIRST SEM	Session 2022-23 onwards

Subject : Microbiology

1	Course Code	S1-MBIO1P
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: • 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 60 + 40 Minimum Passing Marks: Marks: 35

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 edition .Pearson Eduction Limited .(2010).

2.Dubey , R.C. and Maheswari, D.K. , "Practical Microbiology" ,.S. Chand &Co.Ltd.,New Delhi

3.M. Gopoal 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

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 sugggestions:Nil

Part A- Introduction			
Program: Certificate	Class: B.Sc. I Sem	Year: 202	Session: 202 -23
Subject: Physics			
Course Code	S1-PHYS1T		
. Course Title	Thermodynamics and Statistical Physics (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 Physics in 12" class.		
Course Learning Outcomes (CLO)	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 andthe 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: 60 + 40		Min passing Marks : 35

Part B- Content of the Course		
Total numbers of Lectures(in hours):60		
Unit	Topics	Numbers of Lectures

1	**Historical background &Laws of thermodynamics**
	1.Historical background:
	   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.
	
	2.Laws of thermodynamics:
	   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.
	   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.
	   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.
	
	Keywords / Tags: Thermodynamics, Internal energy, Heat engine, Absolute scale
		12

II	**Entropy**	12

1. Concept of entropy, Claudius 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.

Keywords/Tags: Reversible process, Entropy, Ideal gas.

III	**Thermodynamic potentials and kinetic theory of gases.**	12

1. Thermodynamic potential and its application:
1.1 Thermodynamic potentials, Thermal equilibrium, Internal energy, Helmholtz free energy, Enthalpy and Gibbs free energy.
1.2 Derivation of Maxwell's relations from thermodynamic potentials. Gibbs- Helmotz equation, Thermodynamic energy equation for ideal and van der Waal gas.
1.3 Tds equation, Derivation of expressions for Cp-Cv and their special cases for ideal and van der Waal gases, Derivation of the expression Es/Et=Cp/ Cv.
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.

2. Kinetic theory of gases:
2.1 Behavior of a real gas and its deviation from an ideal gas, Virial equation, Andrews experiment on CO_2 gas.
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.

Keywords/Tags: Potential, Enthalpy, Adiabatic, Real gas, Critical constant.

IV	Classical Statistics	12

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 prior 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.

Keywords/Tags: Probability, Microstate, Ensemble theory, Partition function.

V	Quantum Statistics	

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'sdisplacement 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

Keywords/Tags: Indistinguishability, Velocity distribution, Fermi level.

Part C-Learning Resources

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

Text Books, Reference Books, Other resources
Suggested Readings: 1. Zemansky M. W. &Ditman R., "Heat and Thermodynamics", Tata McGraw- Hill 2. Sears and Salinger, "Themodynamics, Kinetic Theory & Statistical Thermodynamics",Narosa. 3. Garg S. C. &Ghosh C. K., "Thermal Physics", Tata McGraw-Hill. 4. Subrahmanyam N., BrijLal, Hemne P.S., " Heat Thermodynamics and statistical", S Chand, 2012.
Suggested equivalent online courses: 1. https://www.edx.org/course/thermodynamics Thermodynamics course.

Part A- Introduction			
Program: Certificate	**Class:** B.Sc. I SEM	Year: 2022	Session: 2022-23
		Subject: Physics	
Course Code		SI-PHYS1P	
Course Title		**Thermodynamics and Statistical Physics (Paper1)**	
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" class.
Course Learning Outcomes (CLO	1. The students would gain practical knowledgeabout heat and radiation by performing variousExperiments. 2. The students will acquire knowledge about thedifferent forms of distribution of subatomicparticles in the system using statistical methods. 3. The students will be able to use various themodynamical instruments in daily life.
Credit Value	2
Total Marks	Max. Marks: 60 +40 Min passing Marks : 35

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 voltages.	
3	Determination of temperature coefficient of a resistance usingplatinum resistance thermometer.	
4	Determination of electromotive force of a thermocouple.	
5	Determination of thermal conductivity of a bad conductor by Lee's disc method.	
6	Verification of Newton's law of cooling.	

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 bySearl'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", KitabMahal, 2011, 11/e.
2. Squires G. L., "Practical Physics", Cambridge University Press, 2015, 4/e.
3. Flint B. L. and Worsnop H. T., "Advanced Practical Physics for students, AsiaPublishing House, 197.
4. Chattopadhyay D. &Rakshit P. C., "An Advanced Course in Practical Physics", NewCentral Book Agency.

Suggestive digital platforms web links
1. https//www.vlab.co.in/broad-area-physical-sciences
2. https.//storage.aoogleapis.com/unique courses/online.html

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks

	Part A Introduction			
Program : Certificate/Diploma/Degree	Class : I SEM	Year : 2022	Session : 2022-23	
	Subject:Zoology			
1	Course Code		S1-ZOOL1T	
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 12th Class	
5	Course Learning outcomes (CLO)		Upon completion of the course student should be able to	

Upon completion of the course student should be able to

• Learn about the importance of systemic, taxonomy and phylogeny to get a concrete idea of evolution of non-chordate phyla.

			• 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: 60 + 40	Min.Passing Marks : 35

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	**Taxonomy ,Phylogeny and Protozoa** **1.Taxonomy** 1.1 Elementary knowledge of Zoology Nomenclature and International Code 1.2 Classification of Animal Kingdom upto Phylum of acoelomate and coelomate non-chordates according to parker and haswell 7thedition **2. Phylogeny** 2.1 Definition and Examples **3. Protozoa** 3.1 Phylum Protozoa :General characters of the phylum and outline classification up to classes with distinctive characters and suitables examples 3.2 Structure,Life history and pathogenicity of material parasite(Plasmodium Vivax) 3.3 Protozoa and disease **Keywords/Tags** : ICZN ,Classification ,Protozoa , Plasmodium	11
II	**Porifera , Coelenterata** **1.Porifera** 1.1 Phylum Porifera : General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 1.2 Type study of Sycon 1.3 Canal system of Sponges **2. Coelenterata** 2.1 Phylum Coelenterata :General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 2.2 Type study of Obelia 2.3 Corals and Coral reef formation **Keywords/Tags** :Classification ,Porifera ,Sycon ,Coelenterata ,Obelia Coral reefs	11

III	**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 PhylumAnnelida : 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.	14
IV	**Arthopoda ,Mollusca** **1. Arthopoda** 1.1 Phylum Arthopoda :General Characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 1.2 Types study of Prawn 1.3Larval 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 , Arthopoda Prawn ,Crustacea Larva,Insects ,Mollusca ,Pila ,Glochidium.	12
V	**Echinodermata ,Hemichordata** **Echinodermata** 1.1 Phylum Echinodermata :General Characters of the phylum and outline classification up to classes with distinctive characters and suitable examples 1.2External features and water vascular system of Starfish (Asterias) 1.3 Larval forms of Echinodermata **2. Hemichordata** 2.1 Phylum Hemichordata : General Characters of	12

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

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.
- Dhami and Dhami ,"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:

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

Program : Certificate/Diploma/Degree	Class : I SI≥m	Year : 202. 2	Session : _ 2022-23

		Subject:Zoology	
1	Course Code	S1-ZOOL1 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 12thClass	
5	Course Learning outcomes (CLO)	Upon completion of the course student should be able to • 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: 60 +40	Min.Passing Marks . 35

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)
	  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
	  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 :

- Arunuam, 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,CK," Laboratary Animals",Anmol Publications,New Delhi, 1998
- Verma,PS," A Manual of practical Zoology-Invertebrates",S.Chand & Co,2013

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

Part A Introduction

Program: Certificate	Class: BSc-I SEM	Year:2022	Session: 2022-23

Subject: Botany

1	Course Code	S1-BOTA2T
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)	• 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: 60 + 40 Min. Passing Marks: 35

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