# FACULTY OF EDUCATION
## SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
### Outcome based Curriculum for
### Undergraduate Degree Courses in Bachelor of Science
### Department of Mathematics

**Vision of the Departments:**

To establish a center of excellence in **Bachelor of Science (Mathematics)** such as Mathematics, Physics and Chemistry that provide foundation for also in communication skills that helps students to express themselves effectively who can be globally challenged in engineering fundamentals – experimental, analytical, computational and designing abilities.

**Mission of the Departments:**

Keeping the core objectives to create academic excellence in fundamental sciences, the Department of in **Bachelor of Science (Mathematics)** aims to encourage advanced teaching learning process and quality research at individual, department and institutional level. It also endeavours to build quality based knowledge.

Department of Mathematics focuses on the following:

- To provide necessary background
- For producing a meaningful career in Mathematics and related fields
- For acquiring, Mathematical skills and employability skills.
- Nurture and train students to develop skills, analysis, logical reasoning and problem solving.

- Create an ambience to inculcate the traits of professional competencies, such as accountability, ethics, common skills and lifelong learning.

**Programme Educational Objectives: Bachelor of Science (Mathematics)**

**PEO1.** To teach Physics, Chemistry and Mathematics for U.G. and P.G. programmes

**PEO2.** To inform and motivate students to study the fundamental aspects of science and its applications

**PEO3.** Graduates will develop the skill to write entrance exam conducted by IIT's/Universities to pursue PG and Integrated Ph.D and will shine as great Mathematicians

**PEO4.** Graduates to develop confidence to appear for SSC (CGL), IBPS, RRB and Civil services exam and will occupy higher posts in administrative level.

**PEO5.** Graduates will prepare in advance to appear for TRB after completing B.Ed and become a dedicated faculty.

**PEO6.** Graduates develop teaching skills, Subject knowledge in the course of their study which will help them to shine in various fields including Education, IT, etc.

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**PEO7.** Graduates will use their course as a training ground to develop their positive attitude, skills which will enable them to become a multi facet personality shining in any chosen field.

**POs of the Programme (PO's) :**

**PO-01: Disciplinary knowledge:** Capability of demonstrating comprehensive knowledge of basic concepts and ideas in mathematics and its subfields, and its applications to other disciplines.

**PO-02: Communications skills:** Ability to communicate various concepts of mathematics in effective and coherent manner both in writing and orally, ability to present the complex mathematical ideas in clear, precise and confident way, ability to explain the development and importance of mathematics and ability to express thoughts and views in mathematically or logically correct statements.

**PO-03: Critical thinking and analytical reasoning:** Ability to apply critical thinking in understanding the concepts in mathematics and allied areas; identify relevant assumptions, hypothesis, implications or conclusions; formulate mathematically correct arguments; ability to analyse and generalise specific arguments or empirical data to get broader concepts.

**PO-04: Problem solving:** Capacity to use the gained knowledge to solve different kinds of non-familiar problems and apply the learning to real world situations; Capability to solve problems in computer graphics using concepts of linear algebra; Capability to apply the knowledge gained in differential equations to solve specific problems or models in operations research, physics, chemistry, electronics, medicine, economics, finance etc.

**PO-05: Research-related skills:** Capability to ask and inquire about relevant/appropriate questions, ability to define problems, formulate hypotheses, test hypotheses, formulate mathematical arguments and proofs, draw conclusions; ability to write clearly the results obtained.

**PO-06: Information/digital literacy:** Capacity to use ICT tools in solving problems or gaining knowledge; capacity to use appropriate softwares and programming skills to solve problems in mathematics,

**PO-07: Self-directed learning:** Ability to work independently, ability to search relevant resources and e-content for self-learning and enhancing knowledge in mathematics.

**PO-08: Moral and ethical awareness/reasoning:** Ability to identify unethical behavior such as fabrication or misrepresentation of data, committing plagiarism, infringement of intellectual property rights.

**PO-09: Lifelong learning:** Ability to acquire knowledge and skills through self-learning that helps in personal development and skill development suitable for changing demands of workplace.

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**PROGRAM SPECIFIC OUTCOMES (PSOs) :**

**PSO1.** Different types of theories are studies in physics and with the help of Mathematics they are verified and proved, experimentally acknowledged. The students became aware about the secrets of nature. Their minds become analytic and problem solving.

**PSO2.** The students gain knowledge in Modern Algebra, Calculus, Complex analysis, Discrete Mathematics and many more.. They are equipped with moral ethics, have knowledge of Hindi and English Language, aware of Entrepreneurship techniques, environmentally conscious and skilled in computer applications.

**PSO3.** On the basis of theoretical knowledge of Chemistry and their critical thinking, they analyse the results of Chemical experiments and became aware of the impact of chemistry on environment and society. They became able to explain the structure, reactivity and chemical composition of the materials. There is great scope of such students in Industries. They can also join any service sector (Public or private) and deliver very efficiently. They can also join govt. jobs.

**PSO4.** Communicate mathematics effectively by written, computational and graphic means.

**PSO5.** Create mathematical ideas from basic axioms.

**PSO6.** Gauge the hypothesis, theories, techniques and proofs provisionally.

**PSO7.** Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.

**PSO8.** Identify applications of mathematics in other disciplines and in the real-world, leading to enhancement of career prospects in a plethora of fields and research

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## Programme PO's and PSO's Mapping:

| | | | PO 1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S. No** | **Program** | **Courses Category** | Disciplinary knowledge | Communications skills | Critical thinking and analytical reasoning | Problem solving | Research-related skills | Information/digital literacy | Self-directed learning | Moral and ethical awareness/reasoning | Lifelong learning | **PSO 1** | **PSO 2** |
| 1 | B.Sc (Mathematics ) | Chemistry | * | | * | * | | | | | | | |
| 2 | | Physics | * | | * | * | | | | | | * | |
| 3 | | Mathematics | * | * | * | * | | * | * | | | | * |
| 4 | | Foundation course | * | | * | | | | | * | | | * |

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### YEARLY wise PO's and SPO's Mapping:

| Semester | Name of the Courses/POs(Basic, Core Electives, Projects, Internships etc.) | PO 1 Disciplinary knowledge | PO2 Communications skills | PO3 Critical thinking and analytical reasoning | PO4 Problem solving | PO5 Research-related skills | PO6 Information/digital literacy | PO7 Self-directed learning | PO8 Moral and ethical awareness/reasoning | PO9 Lifelong learning | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I YEAR | Inorganic chemistry | * | * | * | * | | | | | | | |
| | Physical chemistry | * | * | * | * | | | | | | | |
| | Organic chemistry | * | * | * | * | | | | | | | |
| | Mathematical Physics, Mechanics and Properties of Matter | * | * | * | * | | | | | | * | |
| | Thermodynamics and Statistical Physics | * | * | * | * | | | | | | * | |
| | Algebra and Trigonometry | * | * | * | * | | * | * | | | | * |
| | Calculus and differential equations | * | * | * | * | | | * | | | | * |
| | Vector Analysis and Geometry | * | * | * | | | | * | | | | |
| | Moral value and language | * | * | * | | | | | * | | | * |
| | Devlepoment of Entrepreneurship | * | * | * | | | | | | | | * |
| | Chemistry: practical | | | | | | | | | | | |
| | Physics :practical | | | | | | | | | | * | |
| II YEAR | Physical chemistry | * | * | * | * | | | | | | | |
| | Inorganic chemistry | * | * | * | * | | | | | | | |
| | Organic chemistry | * | * | * | * | | | | | | | |
| | Optics | * | * | * | * | | | | | | * | |

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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Electro-statics, magneto statics and electrodynamics | * | * | * | * | | | | | | * | |
| | Abstract algebra | * | * | * | * | | | * | | | | * |
| | Advanced calculus | * | * | * | | | | * | | | | * |
| | Differential equation | * | * | * | * | | | * | | | | |
| | Moral value and LANGUAGE-II | * | * | * | | | | | * | | | * |
| | Environmental studies | * | * | * | | | | | | | | * |
| | Chemistry: practical | | * | * | | | | | | | | |
| | Physics :practical | | * | * | | | | | | | * | |
| **III YEAR** | Chemistry paper-i(physical chemistry) | * | * | * | * | | | | | | | |
| | Chemistry paper-ii(inorganic chemistry) | * | * | * | * | | | | | | | |
| | Chemistry paper-iii(organic chemistry) | * | * | * | * | | | | | | | |
| | Physics Paper-I(Quantum Mechanics and Spectroscopy) | * | * | * | * | | | | | | * | |
| | Physics Paper-II(Solid State Physics and Devices) | * | * | * | * | | | | | | * | |
| | Mathematics paper-i(linear algebra and numerical analysis) | * | * | * | * | | | * | | | | * |
| | Mathematics Paper-II(Real and Complex Analysis | * | * | * | | | | * | | | | * |
| | Mathematics paper-iii(statistical methods) | * | * | * | | | | * | | | | |
| | Foundation Course Paper-I(Moral Value and Language-III) | * | * | * | | | | | * | | | * |

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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Foundation Course Paper-II(Basics of Computer App.Information Technology) | * | * | * | * | | | | | | | * |
| | Chemistry: practical | | | | | | | | | | | |
| | Physics :practical | | | | | | | | | | * | |
| | Project/internship | | | | | | | | | * | | |

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**Structure of Programme:** To fulfill the need of development of all the POs/ GAs, as per above mapping, the following semester wise programme structure are as under.

**[L= Lecture, T = Tutorials, P = Practical's & C = Credits]**

**Total Credits*= 160**

**Structure of Undergraduate Engineering program:**

| S. No. | Course Category | Credits of the EE Curriculum |
|---|---|---|
| 1. | Humanities and Social Sciences including Management | 11 |
| 2. | Basic Sciences | 24 |
| 3. | Engineering Sciences including workshop, drawing, basics of electrical/mechanical/computer etc. | 19 |
| 4. | Professional Core Subjects | 52 |
| 5. | Professional Subjects: Subjects relevant to chosen specialization/branch | 18 |
| 6. | Open Subjects: Electives from other technical and/or emerging subjects | 18 |
| 7. | Project work, seminar and internship in industry or elsewhere | 18 |
| 8. | Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition] | Non-credit |
| | **Total** | **160** |

***Definition of Credit:**

| | |
|---|---|
| 1 Hr. Lecture (L) per week | 1 Credit |
| 1 Hr. Tutorial (T) per week | 1 Credit |
| 1 Hr. Practical (P) per week | 0.5 Credit |
| 2 Hours Practical (Lab)/week | 1 Credit |

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**Structure of Undergraduate Bachelor of Science (Mathematics) program:**

| year | Group | paper | Subject code | Name of subject | Maximum marks |
|---|---|---|---|---|---|
| First | Chemistry | I | BSCM(Y-101A) | Inorganic chemistry | 33 |
| | | II | BSCM(Y-101B) | Physical chemistry | 34 |
| | | III | BSCM(Y-101C) | Organic chemistry | 33 |
| | Physics | I | BSCM(Y-102A) | Mathematical Physics, Mechanics and Properties of Matter | 50 |
| | | II | BSCM(Y-102B) | Thermodynamics and Statistical Physics | 50 |
| | Mathematics | I | BSCM(Y-103A) | Algebra and Trigonometry | 50 |
| | | II | BSCM(Y-103B) | Calculus and differential equations | 50 |
| | | III | BSCM(Y-103C) | Vector Analysis and Geometry | 50 |
| | Foundation Course | I | FC(Y-104A) | Moral value and language | 100 |
| | | II | FC(Y-104B) | Devlepoment of Entrepreneurship | 100 |
| | Practical | I | BSCM(Y-101D) | Chemistry: practical | 50 |
| | | II | BSCM(Y-102C) | Physics :practical | 50 |
| Second | Chemistry | I | BSCM(Y-201A) | Physical chemistry | 33 |
| | | II | BSCM(Y-201B) | Inorganic chemistry | 34 |
| | | III | BSCM(Y-201C) | Organic chemistry | 33 |
| | Physics | I | BSCM(Y-202A) | Optics | 50 |
| | | II | BSCM(Y-202B) | Electro-statics, magneto statics and electrodynamics | 50 |
| | Mathematics | I | BSCM(Y-203A) | Abstract algebra | 50 |
| | | II | BSCM(Y-203B) | Advanced calculus | 50 |
| | | III | BSCM(Y-203C) | Differential equation | 50 |
| | Foundation Course | I | FC(Y-204A) | Moral value and LANGUAGE-II | 100 |
| | | II | FC(Y-204B) | Environmental studies | 100 |
| | Practical | I | BSCM(Y-201D) | Chemistry: practical | 50 |
| | | II | BSCM(Y-202C) | Physics :practical | 50 |
| Third | Chemistry | I | BSCM(Y-301) | Chemistry paper-i(physical | 33 |

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| | | | | | |
|---|---|---|---|---|---|
| | | | | chemistry) | |
| | | II | | Chemistry paper-ii(inorganic chemistry) | 34 |
| | | III | | Chemistry paper-iii(organic chemistry) | 33 |
| | Physics | I | BSCM(Y-302) | Physics Paper-I(Quantum Mechanics and Spectroscopy) | 50 |
| | | II | | Physics Paper-II(Solid State Physics and Devices) | 50 |
| | Mathematics | I | BSCM(Y-303) | Mathematics paper-i(linear algebra and numerical analysis) | 50 |
| | | II | | Mathematics Paper-II(Real and Complex Analysis | 50 |
| | | III | | Mathematics paper-iii(statistical methods) | 50 |
| | Foundation Course | I | FC(Y-304A) | Foundation Course Paper-I(Moral Value and Language-III) | 100 |
| | | II | FC(Y-304B) | Foundation Course Paper-II(Basics of Computer App.Information Technology) | 100 |
| | Practical | I | BSCM(Y-301D) | Chemistry: practical | 50 |
| | | II | BSCM(Y-302C) | Physics :practical | 50 |
| | Project/internship | - | BSCM(Y-305) | Project/internship | 100 |

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**Scheme of Exanimation Bachelor of Science (MATHEMATICS) Academic Year 2019-20**

**BSC MATHEMATICS - I YEAR**

| 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 | BSCM(Y-101A) | Chemistry | Paper-i | Inorganic chemistry | 29 | 10 | 5 | 2 | 34 | 12 | 50 | 17 | 150 | 50 |
| | BSCM(Y-101B) | | Paper-II | Physical Chemistry | 28 | 10 | 5 | 2 | 33 | 12 | | | | |
| | BSCM(Y-101C) | | Paper-III | Organic Chemistry | 28 | 10 | 5 | 2 | 33 | 12 | | | | |
| | BSCM(Y-102A) | Physics | Paper-i | Mathematical physics, mechanics and properties of matter | 40 | 13 | 10 | 4 | 50 | 17 | 50 | 17 | 150 | 50 |
| | BSCM(Y-102B) | | Paper-II | Thermodynamics and Statistical Physics | 40 | 13 | 10 | 4 | 50 | 17 | | | | |
| | BSCM(Y-103A) | Mathematics | Paper-i | Algebra and trigonometry | 40 | 13 | 10 | 4 | 50 | 17 | - | - | 150 | 50 |
| | BSCM(Y-103B) | | Paper-II | Calculus and differential equations | 40 | 13 | 10 | 4 | 50 | 17 | | | | |
| | BSCM(Y-103C) | | Paper-III | Vector Analysis and Geometry | 40 | 13 | 10 | 4 | 50 | 17 | | | | |
| | FC(Y-104A) | Foundation course | Paper-i | Moral value and language | 80 | 26 | 20 | 8 | 100 | 33 | - | - | 100 | 33 |
| | FC(Y-104B) | | Paper-II | Devlepoment of Entrepreneurship | 80 | 26 | 20 | 8 | 100 | 33 | - | - | 100 | 33 |

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**BSC MATHEMATICS - II YEAR**

| 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 |
| II Year | BSCM(Y-201A) | Chemistry | Paper-I | Inorganic Chemistry | 29 | 10 | 5 | 2 | 34 | 12 | 50 | 17 | 150 | 50 |
| | BSCM(Y-201B) | | Paper-II | Physical chemistry | 28 | 10 | 5 | 2 | 33 | 12 | | | | |
| | BSCM(Y-201C) | | Paper-III | Organic chemistry | 28 | 10 | 5 | 2 | 33 | 12 | | | | |
| | BSCM(Y-202A) | Physics | Paper-I | Optics | 40 | 13 | 10 | 4 | 50 | 17 | 50 | 17 | 150 | 50 |
| | BSCM(Y-202B) | | Paper-II | Electro-statics, magneto Statics and Electrodynamics | 40 | 13 | 10 | 4 | 50 | 17 | | | | |
| | BSCM(Y-203A) | Mathematics | Paper-I | Abstract Algebra | 40 | 13 | 10 | 4 | 50 | 17 | - | - | 150 | 50 |
| | BSCM(Y-203B) | | Paper-II | Advanced calculus | 40 | 13 | 10 | 4 | 50 | 17 | | | | |
| | BSCM(Y-203C) | | Paper-III | Differential equation | 40 | 13 | 10 | 4 | 50 | 17 | | | | |
| | FC(Y-204A) | Foundation Course | Paper-I | Moral value and Language-ii | 80 | 26 | 20 | 8 | 100 | 33 | - | - | 100 | 33 |
| | FC(Y-204B) | | PAPER-II | Environmental studies | 80 | 26 | 20 | 8 | 100 | 33 | - | - | 100 | 33 |

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### BSC MATHEMATICS - III YEAR

| Year | Paper Code | Subject Name | Paper No. | Paper Name | Theory | | CCE/Internal | | Total | | Practical | | Project /internship | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | |
| III Year | BSCM(Y-301A) | CHEMISTRY | Paper-I | Physical Chemistry | 29 | 10 | 5 | 2 | 34 | 12 | | | | | 100 |
| | BSCM(Y-301B) | | Paper-II | Inorganic chemistry | 28 | 10 | 5 | 2 | 33 | 12 | | | | | |
| | BSCM(Y-301C) | | Paper-III | Organic Chemistry | 28 | 10 | 5 | 2 | 33 | 12 | | | | | |
| | BSCM(Y-302A) | PHYSICS | Paper-I | Quantum Mechanics and Spectroscopy | 40 | 13 | 10 | 4 | 50 | 17 | | | | | 100 |
| | BSCM(Y-302B) | | Paper-II | Solid State Physics and Devices | 40 | 13 | 10 | 4 | 50 | 17 | | | | | |
| | BSCM(Y-303A) | MATHEMATICS | Paper-I | Linear Algebra And Numerical Analysis | 40 | 13 | 10 | 4 | 50 | 17 | - | - | | | 150 |
| | BSCM(Y-303B) | | Paper-II | Real and Complex Analysis | 40 | 13 | 10 | 4 | 50 | 17 | | | | | |
| | BSCM(Y-303C) | | Paper-III | Statistical Methods | 40 | 13 | 10 | 4 | 50 | 17 | | | | | |
| | FC(Y-304A) | FOUNDATION COURSE | Paper-I | Moral value and language | 80 | 26 | 20 | 8 | 100 | 33 | - | - | | | 100 |
| | FC(Y-304B) | | Paper-II | Development of Entrepreneurship | 80 | 26 | 20 | 8 | 100 | 33 | - | - | | | 100 |
| | BSCM(Y-101D) | CHEMISTRY | Practical | | | | | | | | 50 | 17 | | | 50 |
| | BSCM(Y-102C) | PHYSICS | Practical | | | | | | | | 50 | 17 | | | 50 |
| | BSCM(Y-305) | Project / internship | | | | | | | | | | | 100 | 33 | 100 |

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**Course Content**

**Year-wise Courses Details**

**B.SC Mathematics Ist year**

### BSCM(Y-101A) Inorganic Chemistry

| | | | | | |
|---|---|---|---|---|---|
| **BSCM(Y-101A)** | **PAPER- I** | **Inorganic Chemistry** | **4L:0T:0P** | **29+05 Marks** | **4 Hrs/Week** |

**Unit – I Atomic Structure:**
Dual Nature of matter idea of de Broglic matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of Y and Y, 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 convalent bond. Various types of hybridization and shapes of simple inorganic molecules ions. Valence shell electron pair repulsion (VSEPR) theory to $NH_3$, $H_3O$, $SF_4$, $CIF_3$, and $H_2O$, MO theory, homonuclear and heteronuclear (CO and NO)4 diatomic molecules, multicenter bonding in election deficient molecules, bond strength and bond energy.

**Unit III Chemical Bonding Part II:**
Ionic Solids- lonic 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 Polaris ability of ions. Fajan's rule. Metallic bond- free election, 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 AI (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, boroydrides. , Fullerenes, fluorocarbons, silicates (structural principle), tetrassulphurtertantride, 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**

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## BSCM(Y-101B) Physical Chemistry

| | | | | | |
|---|---|---|---|---|---|
| **BSCM(Y-101B)** | **PAPER- II** | **Physical Chemistry** | **4L:0T:0P** | **28+05 Marks** | **4 Hrs/Week** |

**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 cholestic 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**

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## BSCM(Y-101C) Organic Chemistry

| | | | | | |
|---|---|---|---|---|---|
| **BSCM(Y-101C)** | **PAPER- III** | **Organic Chemistry** | **4L:0T:0P** | **28+05 Marks** | **4 Hrs/Week** |

**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, BischlerNapiaralsky 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, johin Wiley**

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## BSCM(Y-101P) Chemistry

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| **BSCM(Y-101P)** | **Practical** | **Chemistry** | **0L:0T:1P** | **50 Marks** | **1Hrs/Week** |

**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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### BSCM(Y-102A) Mathematical Physics, Mechanics and Properties of Matter

| BSCM(Y-102A) | PAPER- I | Mathematical Physics, Mechanics and Properties of Matter | 4L:0T:0P | 40+10 Marks | 4 Hrs/Week |
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**Course Objectives:** The emphasis of course is to equip students with the mathematical and critical skills required in solving problems of interest to physicists. The course will also expose students to fundamental computational physics skills enabling them to solve a wide range of physics problems. The skills developed during course will prepare them not only for doing fundamental and applied research but also for a wide variety of careers.

**Course Learning Outcomes** : After completing this course, student will be able to
- Draw and interpret graphs of various functions.
- Solve first and second order differential equations and apply these to physics problems.
- Understand the concept of gradient of scalar field and divergence and curl of vector fields
- Perform line, surface and volume integration and apply Green's, Stokes' and Gauss's Theorems to compute these integrals.
- Apply curvilinear coordinates to problems with spherical and cylindrical symmetries.
- Understand elementary probability theory and the properties of discrete and continuous distribution functions.
- In the laboratory course, the students will be able to design, code and test simple programs in C++ in the process of solving various problems.

Contents:

**Unit – I Mathematical Physics** **Total- 6 Hours**

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** **Total- 5 Hours**

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'slaws.Gravitional law and field.Potential due to a spherical body.Gauss &Poisson sequation of Gravitational Self- energy.System of particles. Centre of mass and reduced Mass. Elastic and inelastic collisions.

**Unit-III General Properties of Matter** **Total- 8 Hours**

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: Jeager'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) Venturiemeter (iii) Aspirator Pump (iv) Change of Plane of Motion of a spinning ball.

**Unit IV: Oscillations** **Total- 5 Hours**

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:** **Total- 6 Hours**

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.

Ealier Development in Physics up to 18th Century: Contribution of Aryabhatt. Archimedes, Nicolus Copernicus. Galileo Galilei, Huygens. Robert Hooke.

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

**Reference Books:**


- University Physics: Sears and Zeemansky. XIth edition. Pearson Education
- Concept of Physics: H.C. Varma. BharatiBhavan Publishers
- Problems in Physics: P.K. Srivastava, Willey Eastern Ltd.

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## BSCM (Y- 102B) Thermodynamics and Statistical Physics

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| **BSCM (Y- 102B)** | **Paper-II** | **Thermodynamics and Statistical Physics** | **6L:0T:2P** | **40+10 Marks** | **4 Hrs/Week** |

**Course Objectives**

This course deals with the relationship between the macroscopic properties of physical systems in equilibrium. It reviews the concepts of thermodynamics learnt at school from a more advanced perspective and develops them further. The primary goal is to understand the fundamental laws of thermodynamics and their applications to various systems and processes. In addition, it will also give exposure to students about the Kinetic theory of gases, transport phenomena involved in ideal gases, phase transitions and behavior of real gases.

**Course Learning Outcomes:**

- Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics.
- Understand the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.
- Know about reversible and Irreversible processes.
- Learn about Maxwell's relations and use them for solving many problems in Thermodynamics
- Understand the concept and behavior of ideal and real gases.
- Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.
- In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determination of Mechanical Equivalent of Heat (J), coefficient of thermal conductivity of good and bad conductor, temperature coefficient of resistance, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a thermocouple.

**Unit- I:** **Total- 7 Hours**

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** **Total- 7 Hours**

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 (Maxwll's relations).

**Unit- III: Statistical Physics – I** **Total- 9 Hours**

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** **Total- 8 Hours**

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.sand 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** **Total- 4 Hours**

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

**Text and Reference Books:**

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

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## BSCM(Y-102P) Physics

| | | | | | |
|---|---|---|---|---|---|
| **BSCM(Y-102P)** | **PRACTICAL** | **Physics** | **0L:0T:1P** | **50 Marks** | **1 Hrs/Week** |

**List of Practical's**

- To verify laws of parallel and perpendicular axes for moment of inertia
- To determine acceleration due to gravity using compound pendulum.
- To determine damping coefficient using a bar pendulum.
- To determine Young's Modulus by bending of beam method.
- To determine Young's Modulus using Cantilever Method.
- To determine coefficient or rigidity by state method.
- To determine coefficient or rigidity by dynamic method.
- To determine Surface Tension by Jaegar's method.
- To determine Surface Tension of a liquid by capillary rise method.
- To determine Viscosity of fluid using Poisellie' method.
- To study conversion of mechanical energy into heat using calendar &Barne's method.
- To determine heating efficiency of electrical kettle with various voltages.
- To determine heating temperature coefficient of resistance using platinum resistance thermometer.
- To determine thermo electromotive force by a thermocouple method.
- To determine heating efficiency of electrical kettle with various voltages.
- To determine heat conductivity of bad conductors of different geometry by Lee's method.
- To verify Newton's Laws of cooling.
- To determine specific heat of Coefficient of thermal conductivity by Searl's method.
- To determine specific heat of a liquid.
- To compare Maxwell- Boltzmann, Bose Einstein and Eermi-Dirac Distribution Function vs temperature using M.S. Excel, C++
- To Plot equation of state and Vander-wall equation with temperature using M.S. Excel/C++

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## BSCM(Y-103A) Algebra and Trigonometry

| BSCM(Y-103A) | PAPER- I | Algebra and Trigonometry | 4L:0T:0P | 40+10 Marks | 4 Hrs/Week |
|---|---|---|---|---|---|

**Course Objective:**
The primary objective of this course is to introduce the Rank Of matrix, Relation between the roots and coefficients. De-Moivre'stheorem and its application. Switching circuits and its applications.Logic gates and circuits.

**Course Learning Outcomes:**
This course will enable the students to:
**CO1**. Employ De Moivre's theorem in a number of applications to solve numerical problems.
**CO2**. TO Explain Boolean Algebra-definition and properties. Switching circuits and its applications
**CO3**. To Explain Application of matrix to solve a system of linear (homogenous and non-homogeneous) equations.
**CO4**. Find eigenvalues and corresponding eigenvectors for a square matrix.

**Unit –I** **Total -07 Hours**
Rank Of matrix, Normal & Echelon from of a matrix. Characterstic equation of a matrix. Eigen values. Eigen vectors. Linear Independence of row and column matrix.

**Unit-II** **Total -10 Hours**
Cayley Hamilton theorem and its use in finding inverse of a matrix.Application of matrix to solve a system of linear (homogenous and non-homogeneous) equations. Theorems on consistency and inconsistency of a system of linear equations. Solving linear equation up to three unknowns.

**Unit – III** **Total -06 Hours**
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** **Total -10 Hours**
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** **Total -10 Hours**
De-Moivre'stheorem 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. Chandraika Prasad - A Text Book on Algebra and theory of Equations, Pothishala Pvt. Ltd. Aabad.
4. C. L. Liu-Eliments 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.Jocobson-Basic Algebra Vol. I and II. W.H Freeman.
3. N.Saran and R.S. Gupta- Analytica; Geometry of three Dimension. PothishalaPvt.Ltd.Allahabad

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Rank Of matrix, Eigen values. Eigen vectors. Cayley Hamilton theorem and its use in finding inverse of a matrix. Relation between the roots and coefficients of a general polynomial equation in one variable. Logic-Logical connectives. Boolean Algebra-definition and properties. De-Moivre'stheorem and its application.

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## BSCM(Y-103B) Calculus and Differential Equations

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| **BSCM(Y-103B)** | **PAPER- II** | **Calculus and Differential Equations** | **4L:0T:0P** | **40+10 Marks** | **4 Hrs/Week** |

**Course Objectives:**
This course helps the students to develop skills and knowledge of standard concepts in ordinary and partial differential equations and also provide the standard methods for solving differential equations. Successive Differentiation, Curvature, tests for concavity and convexity. Linear differential equation with constant coefficients

**Course Learning Outcomes:** The student will be able to:
**CO1**. Learn about Maclaurin's series expansion of elementary functions.
**CO2**. Apply the method of Linear differential equations and equations reducible to the linear form
**CO3**. Formulate and solve various types of first and second order partial differential equations.

**Unit –I** **Total -06 Hours**
Successive Differentiation, Leibnitz theorem. Maclaurin's and Taylor's series expansions. Asymptotes.

**Unit -II** **Total -07 Hours**
Curvature, tests for concavity and convexity. Points of inflexion.Multiple points.Tracing of curves in Cartesian and polar coordinates.

**Unit -III** **Total -08 Hours**
Integration of transcendental function, Definite Integrals. Reduction Formulae, Quadrature, Rectification.

**Unit - IV** **Total -10 Hours**
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** **Total -10 Hours**
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. Orintlongman (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 defferntial 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

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Leibnitz theorem. Maclaurin's and Taylor's series. Curvature, tests for concavity and convexity. Tracing of curves in Cartesian. Linear differential equations. Reduction Formulae, Quadrature, Rectification. First order and Linear differential equations of second order, Linear differential equation with constant coefficients, Homogeneous Linear ordinary differential equations.

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## BSCM(Y-103C) Vector Analysis and Geometry

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| **BSCM(Y-103C)** | **PAPER- III** | **Vector Analysis and Geometry** | **4L:0T:0P** | **40+10 Marks** | **4 Hrs/Week** |

**Course Objective**

The objectives of this course are to Vector differentiation.Gradient, Divergence and curl. Vector Integration.Theorms of Gauss. Tracing of conies. Right circular cone, equation of cylinder and its properties. conicoids, Paraboloids,

**Course Learning Outcomes:** This course will enable the students to:

**CO1**. Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference.

**CO2**. find Scalar and vector product of three vectors, product of four vectors.

**CO3**. iii) To explain Be well-versed with conics and quadric surfaces so that they should able to relate the shape of real-life objects with the curves/conics.

**CO4**. verify Condition for three mutually perpendicular generators.Right circular cone, equation of cylinder and its properties.

**Course Contents**

**Unit- I** **Total -10 Hours**

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

**Unit -II** **Total -06 Hours**

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

**Unit-III** **Total -07 Hours**

General equation of second defrees. Tracing of conies.System of conics, polar equation of a conic.

**Unit-IV** **Total -10 Hours**

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** **Total -08 Hours**

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

**Text Books:**


1. N. Saran 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. Saran 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.

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**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Scalar and vector product of three vectors, Gradient, Divergence and curl. Vector Integration. Theorems of Gauss.Green. Tracing of conies.System of conics, polar equation of a conic. Generators of cone. Right circular cone, Central conicoids, Paraboloids, Generating lines.

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### FC(Y-104A) Moral Value& Language

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|---|---|---|---|---|---|
| **FC(Y-104A)** | **PAPER- I** | **Moral Value& Language** | **4L:0T:0P** | **80+20 Marks** | **4 Hrs/Week** |

**UNIT I**

**हिन्दी भाषा**

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

**UNIT II**

**हिन्दी भाषा**

1. नमक का दरोगा (कहानी)- प्रेमचंद
2. एक थे राजा भोज (निबंध) – डॉ. त्रिभुवननाथ 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 सभ्यता (निबंध –सरदार पूर्णसिंह
3. अंतर्ज्ञान और नैतिक जीवन (लेख) –डॉ. सर्वपल्ली राधाकृष्णन
4. अप्प दीपो भव (लेख) – स्वाम 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,Wordformation,Prefixes,Suffixes.
2. BasicLanguageSkills: UncountableNoun,Verbs,Tenses,Adverbs.
3. Comprehension/UnseenPassage.
4. CompositionandParagraphWriting

**Suggested Readings:**

मध्यप्रदेश हिन्दी ग्रंथ आकादमी द्वारा प्रकाशित पुस्तकें

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## FC(Y-104B) DEVELOPMENT OF ENTREPRENEURSHIP

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|---|---|---|---|---|---|
| **FC(Y-104B)** | **PAPER- II** | DEVELOPMENT **OF ENTREPRENEURSHIP** | **3L:0T:0P** | **80+20 Marks** | **3 Hrs/Week** |

**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**

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## BSCM(Y- 201A) PHYSICAL CHEMISTRY

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|---|---|---|---|---|---|
| **BSCM(Y- 201A)** | **PAPER- I** | **PHYSICAL CHEMISTRY** | **3L:0T:0P** | | **3 Hrs/Week** |

### UNIT-I

**Thermodynamics:** Definition of thermodynamics, First Law of Thermodynamics, Seconds 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 ofone 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 coductance 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. Calcuation of thermodynamic quantities of cell reactions (DG, DH 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 usinghydrogen, 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 EDUCATION
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## BSCM(Y- 201B) INORGANIC CHEMISTRY

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| **BSCM(Y- 201B)** | **PAPER- II** | **INORGANIC CHEMISTRY** | **3L:0T:0P** | | **3 Hrs/Week** |

**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:** Warner'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 com pounds.

**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 toliquid 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 Büchner**

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## BSCM(Y- 201C) ORGANIC CHEMISTRY

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| **BSCM(Y- 201C)** | **PAPER- III** | **ORGANIC CHEMISTRY** | **3L:0T:0P** | | **3 Hrs/Week** |

### 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)4and HlO4] 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, Gaterman 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. Witting 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 $\alpha$, $\beta$ unsaturated aldehydes and ketones.

**UNIT-IV**

**Carboxylic Acids :** Nomenclature, structure and bonding, physical prop erties, 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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## BSCM(Y- 201P) CHEMISTRY PRACTICAL

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| **BSCM(Y- 201P)** | **PRACTICAL** | **CHEMISTRY PRACTICAL** | **3L:0T:0P** | | **3 Hrs/Week** |

## CHEMISTRY (PRACTICAL)

**Inorganic Chemistry**

- Analysis of inorganic mixture containing five radicals with at least on 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 R1 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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## BSCM(Y- 202A) OPTICS

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| **BSCM(Y- 202A)** | **PAPER-I** | **OPTICS** | **3L:0T:0P** | | **3 Hrs/Week** |

**Course Objectives** This course reviews the concepts of waves and optics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

**Course Learning Outcomes** On successfully completing the requirements of this course, the students will have the skill and knowledge to: 38
- Understand Simple harmonic oscillation and superposition principle.
- Understand different types of waves and their velocities: Plane, Spherical, Transverse, Longitudinal.
- Understand Concept of normal modes in transverse and longitudinal waves: their frequencies and configurations.
- Understand Interference as superposition of waves from coherent sources derived from same parent source.
- Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from aperture, understand Fraunhoffer and Fresnel Diffraction.
- In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. Resolving power of optical equipment can be learnt first hand. The motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves can be learnt in this laboratory course.

**Contents:**

**UNIT I** **Total- 6 Hours**

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** **Total- 6 Hours**

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 non0 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** **Total- 8 Hours**

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 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 parot etalon.

**UNIT IV** **Total- 8 Hours**

Polarizations: Transverse nature of light waves, Polarization of electromagnetic waves, Plane polarized light – production and analysis, Description of linear, circular and elliptical polarization Propagation ofelectromagnetic waves in anisotropic media, uniaxial and biaxial crystals, and symmetric nature ofdielectric 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 andelliptically polarized light, Babinet compensator and applications, optical rotation, optical rotation inliquids and its measurement through polarimeter.

**UNIT V :** **Total- 6 Hours**

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 READIING;**

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

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## BSCM (Y- 202B) (ELECTRO-STATICS, MAGNETO STATICS AND ELECTRODYNAMICS)

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| **BSCM (Y- 202B)** | **Paper-II** | **ELECTRO-STATICS, MAGNETO STATICS AND ELECTRODYNAMICS** | **6L:0T:2P** | **40+10 Marks** | **4 Hrs/Week** |

**Course Objectives** This course reviews the concepts of electromagnetism learnt at school from a more advanced perspective and goes on to build new concepts. The course covers static and dynamic electric and magnetic fields, and the principles of electromagnetic induction. It also includes analysis of electrical circuits and introduction of network theorems. The students will be able to apply the concepts learnt to several real world problems.

**Course Learning Outcomes** At the end of this course the student will be able to

- Demonstrate the application of Coulomb's law for the electric field, and also apply it to systems of point charges as well as line, surface, and volume distributions of charges.
- Demonstrate an understanding of the relation between electric field and potential, exploit the potential to solve a variety of problems, and relate it to the potential energy of a charge distribution.
- Apply Gauss's law of electrostatics to solve a variety of problems.
- Calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot-Savart and Ampere laws)
- Understand the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws.
- Understand the basics of electrical circuits and analyze circuits using Network Theorems.
- In the laboratory course the student will get an opportunity to verify network theorems and study different circuits such as RC circuit, LCR circuit. Also, different methods to measure low and high resistance, capacitance, self-inductance, mutual inductance, strength of a magnetic field and its variation in space will be learnt

**Contents:**

**UNIT I** **Total- 8 Hours**

Electrostatics: Coulombs law in vacuum expressed in vector forms. Calculations of electric field E forsimple distributions of charge at rest, dipole and quadruple fields. Work done on a charge in anelectrostatic 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 diploe 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 agrounded 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** **Total- 7 Hours**

Magneto statics: Force on a moving charge. Lorentz foree equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field. Torque on a current loop, magnetic dipolemoment, 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, $\nabla \times V = \mu$ J, $\nabla.B = 0$. 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** **Total- 6 Hours**

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 $\Delta$ networks and transmission of electric power, Electricity observed in living systems, origin of bioelectricity.

**UNIT IV** **Total- 6 Hours**

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).

**UNIT V** **Total- 7 Hours**

**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 vcctor, 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 EDITIN

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## BSCM(Y- 202P)

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| **BSCM(Y- 202P)** | **PRACTICAL** | | **3L:0T:0P** | **40 Hrs** | **3 Hrs/Week** |

## PHYSICS

## PRACTICAL

**List of Practicals :**

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Use of plane diffraction grating to determine D1, D2 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 lense by newton's rings.
12. Characteristics of Ballistic galvanometer.
13. Setting up and using an electroscope 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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## BSCM(Y-203A) ABSTRACT ALGEBRA

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| **BSCM(Y-203A)** | **PAPER- I** | **ABSTRACT ALGEBRA** | **4L:0T:0P** | **40 Hrs** | **4 Hrs/Week** |

**Course Objectives:** The objective of the course is to introduce the fundamental theory of groups and their homomorphisms. Symmetric groups and group of symmetries are also studied in detail. basic properties of groups. Fermats theorem as a consequence of the Lagrange's theorem on finite groups.

**Course Learning Outcomes:** The course will enable the students to:
**CO1**. Recognize the mathematical objects that are groups, and classify them as abelian,cyclic and permutation groups, etc.
**CO2**. Link the fundamental concepts of groups and symmetrical figures.
**CO3**. Cauchy's theorem for finite abelian groups and non- abelian groups.
**CO4**. Explain the significance of the notion of cosets, normal subgroups and factor groups.
**CO5**. Learn about Lagrange's theorem and Fermat,s theorem.
**CO6**. Know about group homomorphisms and group isomorphisms.

**Unit – I** **Total -08 Hours**

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

**Unit-II** **Total -07 Hours**

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

**Unit –III** **Total -10 Hours**

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

**Unit – IV** **Total -10 Hours**

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** **Total -09 Hours**

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

**Text Books:**

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.
3. N. Jacobson- Basic Algebra. Vol. I and II. W. II. Freeman.
4. I.S. Luther and I.B.S Passi- Algebra. Vol I and II, Narosa Publishing House.

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keyword**

Definition and basic properties of groups. Subgroups. Cyclic groups. Coset decomposition. Lagrange's theorem. Fermat's theorem. Normal subgroups. Quotient groups. Homomorphism and Isomorphism of groups. Fundamental theorem of homomorphism. Group Automorphism. Inner Automorphism. Normaliser. Cauchy's theorem for finite abelian groups and non- abelian groups. rings. Ring homomorphism subrings. Integral domain and Field. Quotient rings.

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## BSCM(Y-203B) ADVANCED CALCULUS

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| **BSCM(Y-203B)** | **PAPER- II** | **ADVANCED CALCULUS** | **4L:0T:0P** | **40 Hrs** | **8 Hrs/Week** |

**Course Objective :** The primary objective of this course is to introduce the basic tools of calculus Theorem on limits of sequence. Bounded and monotonic sequences. Cauchy's convergence criterion. Partial differentiation, Change of variables. Euler's theorem on homogeneous functions. Maxima and Minima of functions of two variables.

**Course Learning Outcomes**

The students who take this course will be able to:

**CO1**. Understand continuity and differentiability in terms of limits.

**CO2**. Describe Comparison test. Cauchy's integral test. Cauchy's root test. Ratio tests, Raabe's tests. Logarithmic test. Alternating series. Leibnitz's test.

**CO3**. Understand the importance of mean value theorems.

**CO4**. Describe the Maxima and Minima of functions of two variables.

**Unit- I** **Total -10 Hours**

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** **Total -10 Hours**

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** **Total -07 Hours**

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** **Total -08 Hours**

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

**Unit – V** **Total -09 Hours**

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

**Text Books:**

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. Gabreil Klaumber – Mathematical Analysis. Marcel Dekkar. Inc.New York.1975
2. T.M. Apostol- Mathematical Analysis. Narosa Publishing House. New Delhi. 1985
3. D. Soma Sundaram and B. Choudhary – A first Course in mathematical Analysis. Narosa Publishing, House. New Delhi. 1997.
4. Murray R. Spiegel- Theory and problems of advance Calculus. Schauma Publishing Co. New York
5. O.E. Stranaitis- An Introduction to Sequences. Series and improper Integrals.
6. **Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Theorem on limits of sequence. Cauchy's convergence criterion. Comparison test. Continuity of function of single variable. Mean value theorems. Limit and continuity of functions of two variables. Euler's theorem on homogeneous functions. Jacobians. Maxima and Minima of functions of two variables. Beta and Gamma Functions. Double and triple integrals. Dirichlet's integrals.

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**Department of Mathematics**

## BSCM(Y-203C) DIFFERENTIAL EQUATION

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| **BSCM(Y-203C)** | **PAPER- III** | **DIFFERENTIAL EQUATION** | **4L:0T:0P** | **40 Hrs** | **4 Hrs/Week** |

**Course Objective :** The main objectives of this course are to teach students to form Laplace Transformation. Inverse Laplace transforms. Power series method. Bessel and Legendre equations and solve partial differential equations and use them in solving some physical problems.

**Course Learning Outcomes:**
The course will enable the students to:
**CO1.** Know about power series solution of a differential equation and learn about Legendre's and Bessel's equations.
**CO2.**Use of Laplace transform and inverse transform for solving initial value problems.
**CO3.** Learn about method of characteristics and separation of variables to solve first order PDE's.
**CO4.**Classify and solve second order linear PDEs.
**CO5.**Learn about Cauchy problem for second order PDE and homogeneous and nonhomogeneous wave equations.

**Unit- I** **Total -10 Hours**

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** **Total -10 Hours**

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

**Unit-III** **Total -07 Hours**

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

**Unit-IV** **Total -08 Hours**

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** **Total -10 Hours**

Partial differential equations of second and higher orders. Classification of partial differential equations of second order. Homogeneous and non-homogeneous equations with constant 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. Raysinghania-Differential Equation. Pragati. Prakashan Meerut.

**Reference Book:**

**1.** D.A. Murray- Introductory course in differential equation. Orient Longman. India 1967
**2.** G.F. Simnons – Differential Equations.Tata Megraw Hill. 1972.
**3.** E.A.Codington – An introduction to Ordinary differential equations . Prentice Hall of India. 1961
**4.** H.T.H. Piaggio – Elementary Treatise on Differential equations and their applications. C.B.S Publisher and Distributors. Delhi.1985.
**5.** E.D. Rainville – Special Functions . The Macmillan Company. New York.

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Power series method. Bessel and Legendre equations. Laplace Transformation. Existence theorem for Laplace transforms. Inverse Laplace transforms. Convolution theorem. Partial differential equations of the first order and second and higher orders.Lagrange's solution. Charpit's general method. Homogeneous and non-homogeneous equations with constant constant coefficients

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## FC(Y-204A) MORAL VALUE AND LANGUAGE-II

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| **FC(Y-204A)** | **PAPER- I** | **MORAL VALUE AND LANGUAGE-II** | **3L:0T:0P** | **40 Hrs** | **3Hrs/Week** |

**UNIT-I**

**हिन्दी भाषा:**

1. वह तोड़ती पत्थर ) कविता - (सूर्यकांत त्रिपाठी निराला
2. दिमागी गुलामी ) निबंध - (राहुल साक्रांत यायन
3. वर्ण विचार ) स्वर –व्यंजन, वर्गीकरण, उच्चारण स्थान

**UNIT-II**

**हिन्दी भाषा:**

1. नारीत्व का अभिशाप )निबंध - (महादेवी

वर्मा)

2. चीफ की दावत )कहानी - (भीष्म साहनी
3. विराम चिन्ह ) –संकलित (

**UNIT-III**

**हिन्दी भाषा का मूल्य**

1. शिकागो व्याख्यान ) व्याख्यान - (स्वामीविवेकानन्द
2. धर्म और राष्ट्रवाद ) -लेख महार्षि अरविंद
3. सादगी ) आत्मकथा -(महात्मा गांधी
4. चिंत जहां भय शून्य )कविता -(रवीद्रनाथ 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. Swanteh (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.**

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## FC(Y-204B) ENVIRONMENTAL STUDIES

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| **FC(Y-204B)** | **PAPER- II** | **ENVIRONMENTAL STUDIES** | **3L:0T:0P** | **40 Hrs** | **3Hrs/Week** |

**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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**B.SC Mathematics III year**

### BSCM(Y-301A) Physical Chemistry

| BSCM(Y-301A) | PAPER- I | Physical Chemistry | 3L:0T:0P | 40 Hrs | 3Hrs/Week |
|---|---|---|---|---|---|

**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 uncertainly 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*, Л, Л* 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, Л 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 $\lambda_{max}$ 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 (Clausis – Mossotti equation), orientation of diploes in an electric field, diploe moment, induced diploe moment measurement of diploe 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 Albetry, Willey Eastern Limited
- Physical Chemistry Through problems, S K Dogra and S Dogra, Wiley Easter.

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## BSCM(Y-301B) Inorganic Chemistry

| BSCM(Y-301B) | PAPER- II | Inorganic Chemistry | 3L:0T:0P | 40 Hrs | 3Hrs/Week |
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**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, Ꙥ- 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 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 $\mu_s$ and $\mu_{eff}$ 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: Alky1 and ary1 organometallic compounds of Lithium- preparation, Properties, Bond nature and application; organometallic compounds of A1, 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 Ca2=; 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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## BSCM(Y-301C) Organic Chemistry

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| **BSCM(Y-301C)** | **PAPER- III** | **Organic Chemistry** | **3L:0T:0P** | **40 Hrs** | **3Hrs/Week** |

**UNIT –I**

**Structure and Bonding**
Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond inclusion compounds, clatherates, 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 or organic reaction, energy consideration.
Reactive intermediates (carbonations, carbanions, free radicals, arynes and nitrnewith 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, Cycloalkanes, Dienes**

Nomenclature of alkenes, methods of formation mechanism of dehydration of alcohols and dehydrohalgenation 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 cycloalkanes, 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 nucleophillic addition

reaction, hydroboration oxidation, metal-ammonia reduction, oxidation and polymerization Nomenclature and classification of alkyl halides, methods of formation; chemical reactions, Mechanisms of nucleophillic substitution reaction of reaction of alky1 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 diasteromers, 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 streitwiesser, Healthcock 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. Khoper, New age International Publishers

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## BSCM(Y-301D) PRACTICAL Chemistry

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| **BSCM(Y-301D)** | **PRACTICAL** | **Organic Chemistry** | **3L:0T:0P** | **40 Hrs** | **3Hrs/Week** |

**Inorganic Chemistry:**

I. Gravimetric analysis:

Barium as Barium sulphate, Copper as cuprous-thiocynate.

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. Benzolylation
   c. Meta dinitro benzene
   d. Picric acid

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## BSCM(Y-302A) Quantum Mechanics and Spectroscopy

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| **BSCM(Y-302A)** | **PAPER-I** | **Quantum Mechanics and Spectroscopy** | **3L:0T:0P** | **40 Hrs** | **3Hrs/Week** |

**Course Objectives** After learning the elements of modern physics, in this course students would be exposed to more advanced concepts in quantum physics and their applications to problems of the sub atomic world.

**Course Learning Outcomes** The Students will be able to learn the following from this course:

- Methods to solve time-dependent and time-independent Schrodinger equation.
- Quantum mechanics of simple harmonic oscillator.
- Non-relativistic hydrogen atom: spectrum and Eigen functions. 64
- Angular momentum: Orbital angular momentum and spin angular momentum.
- Bosons and fermions - symmetric and anti-symmetric wave functions.
- Application to atomic systems
- In the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one-dimensional and three dimensional potentials.

**Contents:**

**Unit-I** **Total- 8 Hours**

**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** **Total- 9 Hours**

**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 atm.

**Unit-III** **Total- 8 Hours**

**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** **Total- 6 Hours**

**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.

**Unit-V** **Total- 9 Hours**

**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-Nuttal 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)

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## BSCM (Y- 302B) Solid State Physics and Devices

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| **BSCM(Y- 302B)** | **Paper-II** | **Solid State Physics and Devices)** | **6L:0T:2P** | **40 Hrs** | **4 Hrs/Week** |

**Course Objectives :**

This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids. It enables the students to appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents. The gained knowledge helps to solve problems in solid state physics using relevant mathematical tools. It also communicates the importance of solid state physics in modern society.

**Course Learning Outcomes** :

On successful completion of the module students should be able to

- Elucidate the concept of lattice, crystals and symmetry operations.
- Understand the elementary lattice dynamics and its influence on the properties of materials. 68
- Describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behavior.
- Explain the origin of dia-, para-, and ferro-magnetic properties of solids.
- Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability.
- Understand the basics of phase transitions and the preliminary concept and experiments related to superconductivity in solid.
- In the laboratory students will carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.

**Unit-1** **Total- 7 Hours**

**Solid state physics-I** Crystal structure and bonding: crystalline and amorphoussolids.translational symmetry.Tattice and basis. Unit cell. Reciprocal lattice.Foundamental types of lattices (Bravias 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 spectroment.lonic, covalent, metallic, Vander walls and hydrogen bonding. Bond theory of solids. Periodic potential and Bloch theorem.kronig-penny model (Qualitative).

**Unit-II** **Total- 7 Hours**

**Solid state physics-2** Lattice structure and properties: dulong petit. Einstein and Debye theories of specific heats of solids. Elastic and atomic force cinstants.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, diapara 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** **Total- 8 Hours**

**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** **Total- 7 Hours**

**Semiconductor devices-2**Amplifiers (only bipolar junction transistor).CB, CE and CCconfiguration. 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 nois.Principle of an Oscillator, Barkhausen criterion, Colpitts, RC phase shift oscillators. Basic concepts of amplitude, frequency and phase modulations and demodulation.

**Unit-V** **Total- 8 Hours**

**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, Animalu, and Prentice-Hall of

India private Limited, New Delhi 1977

3. Solid state Electronic devices.B.G.Steetman, 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.

# FACULTY OF EDUCATION
## SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
### Outcome based Curriculum for
### Undergraduate Degree Courses in Bachelor of Science
### Department of Mathematics

## BSCM(Y-302B) PHYSICS PRACTICAL

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|---|---|---|---|---|---|
| **BSCM(Y-302C)** | **PRACTICAL** | | **3L:0T:0P** | **40 Hrs** | **3Hrs/Week** |

PRACTICAL- PHYSICS

**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.

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## BSCM(Y-303A) Linear Algebra and Numerical Analysis

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|---|---|---|---|---|---|
| **BSCM(Y-303A)** | **PAPER- I** | **Linear Algebra and Numerical Analysis** | **4L:0T:0P** | **40 Hrs** | **4 Hrs/Week** |

**Course Objectives:**
This course introduces the basic concepts of Linear span. Linear dependence. Independence and their basic properties. Basis. Existence Theorem for basis. Extension Theorem. Algebra of linear transformations. Rank-Nullity theorem. Gauss elimination. LU decomposition. Cholesky decomposition Bisection. Secant. Regula Falsi. Newton's Methods

**Course Learning Outcomes:** The course will enable the students to:
**CO1**. Compute the characteristic polynomial, eigenvalues, eigenvectors, as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result.
**CO2.**Compute inner products and determine orthogonality on vector spaces, including Gram - Schmidt orthogonalization to obtain orthonormal basis.
**CO3.**Find the adjoint, normal, unitary and orthogonal operators.
**CO4.**Know about methods to solve system of linear equations, such as Runge- Kutta's method

**Unit – I** **Total -10 Hours**

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** **Total -10 Hours**

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

**Unit –III** **Total -07 Hours**

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** **Total -08 Hours**

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** **Total -10 Hours**

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, Runge- Kutta's method, Multistep methods. Milne Simpson methods based on Numerical integration , Methods based on numerical differentiation

**Text Books :-**

1. K.B. Datta- Matrix and Linear Algebra, Pretice 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.Hoffiman 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. Kumarsaran- Linear Algebra. A Bermetric Apprae Prentice-Hall of india.200
4. Balaguruswamy – Numerical Methods. Tata Me Graw Hill Publication. New York

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**
Vector spaces, subspaces. Linear span. Linear dependence. Extension Theorem. Quotient space and its dimension. Algebra of linear transformations. Rank-Nullity theorem. Eigen values an Eigen vectors of a linear transformation. Bisection. Secant. Regula Falsi. Newton's Methods. Newton-Cote's formulae Gauss Quadrature formulae. Gauss elimination. LU decomposition. Cholesky decomposition. Runge- Kutta's method,

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## BSCM(Y-303B) Real and Complex Analysis

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|---|---|---|---|---|---|
| **BSCM(Y-303B)** | **PAPER- II** | **Real and Complex Analysis** | **4L:0T:0P** | **40 Hrs** | **4 Hrs/Week** |

**Course Objective**

Up to this stage, students do study the concepts of analysis Riemann integral, Integrability of continuous and monotonic functions. Implicit function theorem. Continuity. Derivability and integrability of an integral of a function of a parameter. Neighborhoods. Limit points. Interior points.

**Course Learning Outcomes**

The course will enable the students to:

**CO1.** Find Schwarz's and Young's theorem. Implicit function theorem.

**CO2.**Find Fourier series of half and full intervals.

**CO3.**Find Cauchy sequences. Completeness, Cantor's intersection theorem, Contraction principle, Real number as a complete ordered field.

**CO4.**Find Extension theorem. Uniform continuity. Compactness, Sequential compactness.

**CO5.**To Explain Analytic functions. Cauchy- Riemann equations. Harmonic functions. Mobius transformations

**Unit- I** **Total -10 Hours**

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** **Total -10 Hours**

Improper integrals and their convergence . Comparisn 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** **Total -10 Hours**

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** **Total -08 Hours**

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

**Unit-V** **Total -07 Hours**

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. Me Graw Hill. New York 1963
3. L.V. Alhfors. Complex Analysis Me Graw Hill. New York

**Recommend Books**

1. Walter Rudin-Real and Comples Analysis. Me Graw 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

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Riemann integral, fundamental theorem of integral calculus. Mean value theorems of integral calculus, . Schwarz's and Young's theorem. Implicit function theorem. Continuity. Derivability and integrability of an integral of a function of a parameter. Fourier series of half and full intervals. metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets closure and interior . Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Analytic functions. Cauchy-Riemann equations. Harmonic functions. Mobius transformations.

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## BSCM(Y-303C) Statistical Methods

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| **BSCM(Y-303C)** | **PAPER- III** | **Statistical Methods** | **4L:0T:0P** | **40 Hrs** | **4 Hrs/Week** |

**Course Objective**

The course aims at building a strong foundation of theory of statistical distributions as well as understanding some of the most commonly used distributions. The course also aims to equip the students to analyze, interpret and draw conclusions from the given data.

**Course Learning Outcomes**

The course will enable the students to:

**CO1.** Determine Frequency Distribution - Measures of central tendency.

**CO2.** To Explain Continuous probability- probability density function and its applications for finding the mean, mode.

**CO3.** Know about correlation and regression for two variables,

**CO4.** Test validity of hypothesis, using Chi-square, F and t-tests, respectively in sampling distributions.

**Unit-I** **Total -08 Hours**

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** **Total -10 Hours**

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** **Total -07 Hours**

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

**Unit- IV** **Total -06 Hours**

Methods of least squares. Curve fitting. Co-relation and regression. partial and multiple correlations(upto three variables only )

**Unit-V** **Total -10 Hours**

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.

**Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

**Assessment Methods**

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

**Keywords**

Probability-Event, Sample space. Probability of an event. Addition and multiplication theorems, Baye's theorem, Mean, Median, Mode, Theoretical Distribution – Binomial- Poisson. Co-relation and regression. . Tests of significance based on chi- square.t.F and Z- statistics. Null and alternative hypothesis.

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### FC(Y-304A) Moral Value and Language-III

| FC(Y-304A) | PAPER- I | Moral Value and Language-III | 3L:0T:0P | 40 Hrs | 3 Hrs/Week |
|---|---|---|---|---|---|

**इकाई -1**

हिन्दी भाषा

1. मेरे सियात्री (यात्रा व्रतांत ) –अम्रतलाल बेगड
2. मध्यप्रदेश की लोक कलाएं (संकलित )
3. लोकोक्तियां एवं मुहावरे (संकलित )

**इकाई -2**

हिन्दी भाषा

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

**इकाई -3**

नैतिक मूल्य

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

**UNIT – 4** **Total -06 Hours**

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** **Total -06 Hours**

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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### FC(Y-304B) Basics of Computer App. & Information Technology

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|---|---|---|---|---|---|
| **FC(Y-304B)** | **PAPER- II** | **Basics of Computer App. & Information Technology** | **3L:0T:0P** | **40 Hrs** | **3 Hrs/Week** |

**Unit-I** **Total -06 Hours**

**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** **Total -06 Hours**

**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** **Total -06 Hours**

**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** **Total -06 Hours**

**Internet & Web Services** Internet: World Wide Web, Dial-up connectivity, l eased 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** **Total -06 Hours**

**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