**ANNAMALAI UNIVERSITY**

**(Affiliated Colleges)**

**201 - B.Sc. Mathematics**

Programme Structure and Scheme of Examination (under CBCS)

(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

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| Part | Course Code | Study Components & Course Title | Credit | Hours/Week | Maximum Marks | | |
| CIA | ESE | Total |
|  |  | SEMESTER – I |  |  |  |  |  |
| I | 23UTAML11/  23UHINL11/  23UFREL11 | Language – I:  பொது தமிழ்– I/  Hindi-I/  French-I | 3 | 6 | 25 | 75 | 100 |
| II | 23UENGL12 | General English – I | 3 | 6 | 25 | 75 | 100 |
| III | 23UMATC13 | Core – I : Algebra & Trigonometry | 5 | 5 | 25 | 75 | 100 |
| 23UMATC14 | Core –II : Differential Calculus | 5 | 4 | 25 | 75 | 100 |
| 23UPYPE15  23UCHEE15  23UPHYE15 | Elective - I (Generic / Discipline Specific)  Python Programming (or)  Chemistry for Physical Sciences**–**I (or)  Physics - I | 3/2 | 5/3 | 25 | 75 | 100 |
|  | 23UCHEEP1  23UPHYEP1 | Chemistry for Physical Sciences Practical **–**I  Physics Practical - I | 1 | 2 | 25 | 75 | 100 |
| IV | 23UTAMB16  23UTAMA16 | Skill Enhancement Course – 1 (NME-I) /\*  Basic Tamil – I /  Advanced Tamil - I | 2 | 2 | 25 | 75 | 100 |
| 23UMATF17 | Foundation Course**:**  Bridge Mathematics | 2 | 2 | 25 | 75 | 100 |
|  |  | Total | 23 | 30 |  |  | 700/800 |
|  |  | SEMESTER – II |  |  |  |  |  |
| I | 23UTAML21/  23UHINL21/  23UFREL21 | Language – II  பொதுதமிழ்– II/  Hindi-II/  French-II | 3 | 6 | 25 | 75 | 100 |
| II | 23UENGL22 | General English – II | 3 | 6 | 25 | 75 | 100 |
| III | 23UMATC23 | Core – III:Analytical Geometry of Three Dimension | 5 | 5 | 25 | 75 | 100 |
| 23UMATC24 | Core –IV: Integral Calculus | 5 | 4 | 25 | 75 | 100 |
| 23UPYPEP15  23UCHEE25  23UPHYE25 | Elective - II (Generic / Discipline Specific)  Python Programming Lab  Chemistry for Physical Sciences**–**II  Physics - II | 3/2 | 5/3 | 25 | 75 | 100 |
|  | 23UCHEEP2  23UPHYEP2 | Chemistry for Physical Sciences Practical **–**II  Physics Practical - II | 1 | 2 | 25 | 75 | 100 |
| IV | 23UTAMB26  23UTAMA26 | Skill Enhancement Course – 2 (NME-II) /\*  Basic Tamil – II /  Advanced Tamil - II | 2 | 2 | 25 | 75 | 100 |
| 23USECG27 | Skill Enhancement Course – 3  Internet and its Applications (Common Paper) | 2 | 2 | 25 | 75 | 100 |
|  |  | Total | 23 | 30 |  |  | 700/800 |

**Non-major (NME) Electives offered to other Departments**

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| IV | 23UMATN16 | Basic Mathematics - I | 2 | 2 | 25 | 75 | 100 |
| 23UMATN26 | Basic Mathematics - II | 2 | 2 | 25 | 75 | 100 |

\* PART-IV: NME / Basic Tamil / Advanced Tamil (Any one)

Students who have not studied Tamil upto 12th Standardand have taken any Language other than Tamil in Part-I, must choose Basic Tamil-I in First Semester & Basic Tamil-II in Second Semester.

Students who have studied Tamil upto 10th & 12th Standardand have taken any Language other than Tamil in Part-I, must choose Advanced Tamil-I in First Semester and Advanced Tamil-II in Second Semester.

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| **Title of the Course** | | **ALGEBRA & TRIGONOMETRY** | | | | | | | | |
| **Paper Number** | | **CORE I** | | | | | | | | |
| **Category** | Core | **Year** | I | | **Credits** | | 5 | **Course Code** | | **23UMATC13** |
| **Semester** | I | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| 5 | |  | | -- | | | 5 | |
| **Pre-requisite** | | 12th Standard Mathematics | | | | | | | | |
| **Objectives of the Course** | | * Basic ideas on the Theory of Equations, Matrices and Number Theory. * Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems. | | | | | | | | |
| **Course Outline** | | **Unit I:** Reciprocal Equations-Standard form–Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner’s method – related problems. | | | | | | | | |
| **Unit II:** Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems. | | | | | | | | |
| **Unit III:** Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems. | | | | | | | | |
| **Unit IV:** Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tannθ in terms of tan θ, Expansions of cosnθ, sinnθ, cosmθsinnθ –Expansions of tan(θ1+θ2+,…,+θn)-Expansions of sinθ, cosθ and tanθ in terms of θ - related problems. | | | | | | | | |
| **Unit V:** Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems. | | | | | | | | |
| **Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)** | | Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved  (To be discussed during the Tutorial hour) | | | | | | | | |
| **Skills acquired from this course** | | Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill. | | | | | | | | |
| **Recommended Text** | | 1. T. K. Manickavasagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra Volume I, S. Viswanathan (Printers & Publishers) Pvt. Ltd., Reprint 2011 (Unit I ).  UNIT I: Chapter-VI: Sec (16-19;30)  UNIT II: Chapter-III and IV  2. T. K. Manickavasagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra Volume II, S. Viswanathan (Printers & Publishers) Pvt. Ltd., Reprint 2011 (Unit I ).  UNIT III: Chapter-II  3. S. Narayanan, T. K. Manickavasagam Pillay, Trigonometry, S. Viswanathan (Printers and Publishers) Pvt. Ltd., Reprint 2009  UNIT IV: Chapter- 3: Sec(1-5)  UNIT V: Chapter- 3: Sec(2-2.3; 5-5.5)  4. S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Dr. P. Kandaswamy, Ancillary Mathematics, Volume-I, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 2009.  5. S.Arumugam & others, Trigonometry and Fourier series, New Gamma Publications -1999 | | | | | | | | |
| **Books for Reference** | | 1. W.S. Burnstine and A.W. Panton, Theory of equations 2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007 3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005 4. C. V. Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003 5. J. Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012. 6. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010. | | | | | | | | |
| **Website and**  **e-Learning Source** | | <https://nptel.ac.in> | | | | | | | | |

**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

**CLO 1:** Classify and Solve reciprocal equations

**CLO 2:** Find the sum of binomial, exponential and logarithmic series

**CLO 3:** Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix

**CLO 4:** Expand the powers and multiples of trigonometric functions in terms of sine and cosine

**CLO 5:** Determine relationship between circular and hyperbolic functions and the summation of trigonometric series

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|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO2 | 2 | 1 | 3 | 1 | - | - | 3 | 2 | 1 |
| CLO3 | 3 | 1 | 3 | 1 | - | - | 3 | 2 | 1 |
| CLO4 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO5 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |

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| **Title of the Course** | | **DIFFERENTIAL CALCULUS** | | | | | | | | |
| **Paper Number** | | **CORE II** | | | | | | | | |
| **Category** | Core | **Year** | I | | **Credits** | | 5 | **Course Code** | | **23UMATC14** |
| **Semester** | I | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| 4 | |  | | -- | | | 4 | |
| **Pre-requisite** | | 12th Standard Mathematics | | | | | | | | |
| **Objectives of the Course** | | * The basic skills of differentiation, successive differentiation, and their applications. * Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems. | | | | | | | | |
| **Course Outline** | | **UNIT-I: Successive Differentiation**: Introduction (Review of basic concepts) – The derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the derivative of a product  Chapter – III: Section – 1.1 to 1.6 and 2.1 to 2.2 | | | | | | | | |
| **UNIT-II: Partial Differentiation**: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions.  Chapter – VIII : Section – 1.1 to 1.5 | | | | | | | | |
| **UNIT-III: Partial Differentiation (Continued)**: Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers.  Chapter – VIII : Section –1.7, Section 4, Section 5. | | | | | | | | |
| **UNIT-IV: Envelope:** Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter.  Chapter – X : Section – 1.1 to 1.3 | | | | | | | | |
| **UNIT-V:** **Curvature:** Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates.  Chapter – X : Section – 2.1 to 2.6 | | | | | | | | |
| Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) | | Questions related to the above topics, from various competitive examinations UPSC / / TNPSC / others to be solved  (To be discussed during the Tutorial hour) | | | | | | | | |
| Skills acquired from this course | | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | | | | | | |
| **Recommended Text** | | 1. S.Narayanan and T.K.Manicavachagom Pillai, Calculus Volume I, S.Viswanathan (Printers&Publishers) Pvt Limited , 1987. | | | | | | | | |
| **Reference Books** | | 1. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989. 2. T. Apostol, Calculus, Volumes I and II. 3. S. Goldberg, Calculus and mathematical analysis. 4. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002. 5. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010. 6. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007 | | | | | | | | |
| **Website and**  **e-Learning Source** | | [https://nptel.ac.in](file:///C:\Users\JSC\Downloads\%0bhttps:\nptel.ac.in%0d) | | | | | | | | |

**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

**CLO 1:** Find the nth derivative, form equations involving derivatives and apply Leibnitz formula

**CLO 2:** Find the partial derivative and total derivative coefficient

**CLO 3:** Determine maxima and minima of functions of two variables and to use the Lagrange’s method of undetermined multipliers

**CLO 4:** Find the envelope of a given family of curves

**CLO 5:** Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates

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|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO2 | 2 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO3 | 3 | 2 | 3 | 2 | - | - | 3 | 2 | 1 |
| CLO4 | 3 | 2 | 3 | 2 | 1 | - | 3 | 2 | 1 |
| CLO5 | 3 | 2 | 3 | 2 | 1 | - | 3 | 2 | 1 |

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| **Title of the Course** | | **PYTHON PROGRAMMING** | | | | | | | | |
| **Paper Number** | | **Elective - I** | | | | | | | | |
| **Category** |  | **Year** | I | | **Credits** | | 3 | **Course Code** | | **23UPYPE15** |
| **Semester** | I | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| 4 | |  | | -- | | | 4 | |
| **Pre-requisite** | | Basic Knowledge of Programming concept | | | | | | | | |
| **Objectives of the Course** | | * Describe the core syntax and semantics of Python programming language. * Discover the need for working with the strings and functions. * Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. * Understand the usage of packages and Dictionaries | | | | | | | | |
| **Course Outline** | | **UNIT-I:** Introduction -Python Overview - Getting Started with Python - Comments -Python Identifiers - Reserved Keywords - Variables - Standard Data Types - Operators - Statement and Expression - String Operations - Boolean Expressions  (Sec. 3.1–3.12) | | | | | | | | |
| **UNIT-II:** Control Statements -Iteration – while Statement - Input from Keyboard (3.13 – 3.15) | | | | | | | | |
| **UNIT-III:** Introduction - Built-in Functions - Composition of Functions - Parameters and Arguments - Function Calls - The return Statement - Python Recursive Function - The Anonymous Functions (Sec. 4.1 – 4.9) | | | | | | | | |
| **UNIT-IV:** Text Files- Directories (Sec. 7.1 and 7.2) | | | | | | | | |
| **UNIT-V:** Overview of OOP- Class Definition- Creating Objects- Objects as Arguments- Objects as Return Values- Built-in Class Attributes- Inheritance- Method Overriding- Data Encapsulation- Data Hiding (Sec. 8.1 – 8.10) | | | | | | | | |
| Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) | | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC –  CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) | | | | | | | | |
| Skills acquired from this course | | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | | | | | | |
| **Recommended Text** | | E Balagurusamy, "Introduction to Computing and Problem Solving Using Python",1st Edition, McGraw Hill India; 2016 | | | | | | | | |
| **Reference Books** | | 1. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015. 2. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016 3. Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition. 4. Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1 st Edition. 5. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410 6. Michel Dawson, “Python Programming for Absolute Beginers” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009 | | | | | | | | |
| **Website and**  **e-Learning Source** | | [https://onlinecourses.swayam2.ac.in/cec22\_cs20/preview](https://nptel.ac.in) | | | | | | | | |

**Course Learning Outcome (for Mapping with POs and PSOs)**

**Students will be able to**

**CLO1:** Develop and execute simple Python programs

**CLO2:** Write simple Python programs using conditionals and looping for solving problems

**CLO3:** Decompose a Python program into functions

**CLO4:** Read and write data from/to files in Python programs

**CLO5:** Usage of Classes and Objects in python

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|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO2 | 2 | 1 | 3 | 1 | - | - | 3 | 2 | 1 |
| CLO3 | 3 | 1 | 3 | 1 | - | - | 3 | 2 | 1 |
| CLO4 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO5 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |

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| **SEMESTER: I**  **Part: III** | **23UCHEE15**  **Chemistry for Physical Science– I** | **Credit : 2**  **Hours : 3** |

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| **Objectives of the course** | This course aim state provide knowledge on the   * Basics of atomic orbitals, chemical bonds, hybridization * Concepts of thermodynamics and its applications. * Concepts of nuclear chemistry * Importance of chemical industries * Qualitative and analytical methods. |
| **Course Outline** | **UNIT-I**  **Chemical Bonding and Nuclear Chemistry**  Chemical Bonding**:** Molecular Orbital Theory-bonding, anti – bonding |

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|  | And non-bonding orbitals. Molecular orbital diagrams for Hydrogen, |
| Helium, Nitrogen; discussion of bond order and magnetic properties. |
| Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, |
| Isotones and Isomers-Differences between chemical reactions and |
| Nuclear reactions-group displacement law. Nuclear binding energy- |
| Mass defect-calculations. Nuclear fission and nuclear fusion- |
| differences–Stellar energy. Applications of radioisotopes–carbon |
| dating, rock dating and medicinal applications. |
| **Unit-II** |
| **Industrial Chemistry** |
| Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted |
| Water gas, producer gas, CNG, LPG and oil gas (manufacturing |
| Details not required). Silicones**:** Synthesis, properties and uses of |
| silicones. |
| Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK |
| fertilizer, superphosphate, triple super phosphate. |
| **UNIT-III**  **Fundamental Concepts in Organic Chemistry**  Hybridization: Orbital overlap, hybridization and geometry ofCH4, C2H4, C2H2 and C6H6. Electronic effects: Inductive effect and consequences on Ka and Kb of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric-examples.  Reaction mechanisms: Types of reactions–aromaticity (Huckel’srule)  – aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft’salkylationandacylation.Heterocycliccompounds:Preparation,propertiesofpyrroleandpyridine. |
| **UNIT-IV** |
| **Thermodynamics and Phase Equilibria** |
| Thermodynamics: Types of systems, reversible and irreversible |
| processes, isothermal and adiabatic processes and spontaneous |
| processes. Statements of first law and second law of thermodynamics. |
| Carnot’s cycle and efficiency of heat engine. Entropy and its |

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|  | significance. Free energy change and its importance (noderivation). |
| Conditions for spontaneity in terms of entropy and Gibbs free energy. |
| Relation ship between Gibbs free energy and entropy. |
| Phase Equilibria**:** Phaserule – definition of termsinit. Applicationsof |
| Phase rule to water system. Two component system-Reduced phase |
| Rule and its application to asimple eutectic system (Pb-Ag). |
| **UNIT-V**  **Analytical Chemistry**  Introductiontoqualitativeandquantitativeanalysis.Principlesofvolumetricanalysis.Separationandpurificationtechniques–extraction,distillationand crystallization.  Chromatography: principle and application of column, paper and thin  Layer chromatography. |
| Extended | Questions related to the above topics, from various competitive |
| Professional | Examinations UPSC/JAM/TNPSC others to be solved |
| Component(isa | (To be discussed during the Tutorial hours) |
| Part of internal |  |
| Component only, |  |
| Not to be included |  |
| In the external |  |
| examination |  |
| Question paper) |  |
| Skills acquired  From this course | Knowledge, Problem solving, Analytical ability, Professional  Competency, Professional Communication and Transferable skills. |
| **Recommended Text** | 1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house,Chennai,firstedition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. S.ArunBahl,B.S.Bahl, Advanced Organic Chemistry; S.Chandand Company, NewDelhi, twentythirdedition,2012. 4. P.L.Soni,H.M.Chawla, Text Book of Organic Chemistry; Sultan   Chand&sons,NewDelhi, twentyninth edition,2007. |
| **Reference Books** | 1. P.L.Soni,Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, NewDelhi, twentieth edition,2007. 2. B.R.Puri,L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co.,NewDelhi, forty seventh edition,2018. 3. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut,   sixteenth edition,2014. |
| **Website and e-learning source** | 1. <https://byjus.com/jee/chemical-bonding/> 2. <https://en.wikipedia.org/wiki/Fuel> 3. <https://www.brainkart.com/article/Fundamentals-of-Organic-Chemistry_36450/> 4. <https://chem.libretexts.org/Courses/BethuneCookman_University/B-CU%3A_CH-345_Quantitative_Analysis/Book%3A_Analytical_Chemistry_2.1_(Harvey)/06%3A_Equilibrium_Chemistry/6.02%3A_Thermodynamics_and_Equilibrium_Chemistry> 5. <https://en.wikipedia.org/wiki/Chromatography> |
| **Course Learning Outcomes (for Mapping with Pos and PSOs)**  **On completion of the course the students should be able to** | |

CO1: Gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications.

CO2: Evaluate the efficiencies and uses of various fuels and fertilizers

CO3: Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.

CO4: Apply various thermodynamic principles, systems and phase rule.

CO5:Explain various methods to identify anappropriate method for the separation of chemical components

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 15 | 15 | 15 | 15 | 15 |
| **Weighted percentage of**  **Course Contribution to Pos** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PSO’s and CO’s**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CO/PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 15 | 15 | 15 | 15 | 15 |
| **Weighted percentage of**  **Course Contribution to Pos** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PO’s and CO’s**

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| **SEMESTER: I**  **Part: III** | **23UCHEEP1**  **Chemistry for Physical Science Practicals – I** | **Credit : 1**  **Hours : 2** |

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| **Objectives of the course** | This course aims to provide knowledge on the   * basics of preparation of solutions. * principles and practical experience of volumetric analysis |
| **Course Outline** | **VOLUMETRIC ANALYSIS**   1. Estimation of sodium hydroxide using standard sodium carbonate. 2. Estimation of hydrochloric acid using standard oxalic acid. 3. Estimation of ferrous sulphate using standard Mohr’s salt. 4. Estimation of oxalic acid using standard ferrous sulphate. 5. Estimation of potassium permanganate using standard sodium hydroxide. 6. Estimation of magnesium using EDTA. 7. Estimation of ferrous ion using diphenyl amine as indicator. |
| **Reference Books** | V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles ofPractical Chemistry; Sultan Chand & sons, Second edition, 1997. |
| **Website and E-Learning Sources** | 1)http://www.federica.unina.it/agraria/analytical-chemistry/volumetricanalysis  2)<https://chemdictionary.org/titration-indicator/> |
| **Course Learning Outcomes (for Mapping with Pos and PSOs) On completion of the course the students should be able to**  CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO 2: design, carry out, record and interpret the results of volumetric titration.  CO 3: apply their skill in the analysis of water/hardness.  CO4: analyze the chemical constituents in allied chemical products | |

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| **CO /PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 12 | 12 | 12 | 12 | 12 |
| **Weighted percentage of**  **Course Contribution to PSOs** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PSO’s and CO’s**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CO /PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 12 | 12 | 12 | 12 | 12 |
| **Weighted percentage of**  **Course Contribution to Pos** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PO’s and CO’s**

**Note: Scheme for Practical Evaluation.**

**Volumetric Estimation – 75**

**Record – 10 marks**

**Procedure – 15marks**

**Results**

**< 2% - 50 marks**

**2-3% - 40 marks**

**3-4% - 30 marks**

**> 4% - 20 marks**

|  |  |
| --- | --- |
| **COURSE** | **ELECTIVE: I** |
| **COURSETITLE** | **PHYSICS – I** |
| **COURSE CODE** | **23UPHYE15** |
| **CREDITS** | 2 |
| **HOURS** | 3 |
| **COURSE**  **OBJECTIVES** | To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics. |

|  |  |
| --- | --- |
| **UNITS** | **COURSE DETAILS** |
| **UNIT-I** | **WAVES, OSCILLATIONS AND ULTRASONICS:** simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography – ultrasono imaging- ultrasonics in dentistry – physiotheraphy, phthalmology – advantages of noninvasive surgery – ultrasonics in green chemistry. |
| **UNIT-II** | **PROPERTIES OF MATTER:** *Elasticity*: elastic constants – bending of beam – theory of non- uniform bending – determination of Young’s modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum  *Viscosity*: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille’s formula – comparison of viscosities – burette method,  *Surface tension*: definition – molecular theory – droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension. |
| **UNIT-III** | **HEAT AND THERMODYNAMICS:** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde’s process of liquefaction of air– liquid Oxygen for medical purpose– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot’s cycle – efficiency – entropy – change of entropy in reversible and irreversible process. |
| **UNIT-IV** | **ELECTRICITY AND MAGNETISM:** potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart’s law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit – types of switches in household and factories– Smart Wi-Fi switches- fuses and circuit breakers in houses |
| **UNIT-V** | **DIGITAL ELECTRONICS AND DIGITAL INDIA:** logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan’s theorem – verification – overview of Government initiatives: software technological parks under MeitY, NIELIT- semiconductor laboratories under Dept. of Space – an introduction to Digital India |
| **TEXT BOOKS** | 1. R. Murugesan (2001), Allied Physics, S. Chand & Co, New Delhi. 2. Brijlal and N. Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi. 3. Brijlal and N. Subramaniam (1994), Properties of Matter, S. Chand & Co.,New Delhi. 4. J. B. Rajam and C. L. Arora (1976). Heat and Thermodynamics (8th edition), S. Chand & Co.,New Delhi. 5. R. Murugesan(2005), Optics and Spectroscopy, S.Chand & Co, NewDelhi. 6. A. Subramaniyam, Applied Electronics 2nd Edn., National Publishing Co., Chennai. |
| **REFERENCEBOOKS** | 1. Resnick Halliday and Walker(2018). Fundamentals of Physics (11thedition), John Willey and Sons, Asia Pvt .Ltd., Singapore. 2. V. R. Khanna and R. S. Bedi (1998), Textbook of Sound 1stEdn. Kedharnaath Publish & Co, Meerut. 3. N. S. Khare and S. S. Srivastava (1983), Electricity and Magnetism 10thEdn., Atma Ram & Sons, New Delhi. 4. D. R. Khanna and H.R. Gulati (1979). Optics, S. Chand &Co. Ltd., New Delhi. 5. V. K. Metha (2004).Principles of electronics 6th Edn. S. Chand and company. |
| **WEBLINKS** | 1. <https://youtu.be/M_5KYncYNyc> 2. <https://youtu.be/ljJLJgIvaHY> 3. <https://youtu.be/7mGqd9HQ_AU> 4. <https://youtu.be/h5jOAw57OXM> 5. <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/> 6. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html><https://www.youtube.com/watch?v=gT8Nth9NWPM><https://www.youtube.com/watch?v=9mXOMzUruMQ&t=1s><https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s><https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work> |

**METHOD OF EVALUATION:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Continuous Internal Assessment** | **End Semester Examination** | **Total** | **Grade** |
| 25 | **75** | **100** |  |

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|  |  |  |
| --- | --- | --- |
| **COURSEOUTCOMES** | **CO1** | Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field. |
| **CO2** | Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission. |
| **CO3** | Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology. |
| **CO4** | Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlatetheconnectionbetweenelectricfieldandmagneticfieldandanalyzethemmathematicallyverifycircuitsandapplytheconcepts to construct circuits and study them. |
| **CO5** | Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. InferoperationsusingBooleanalgebraandacquireelementaryideasofICcircuits.Acquire information about various Govt. programs/ institutions in this field. |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes **(CO)** for each course with program outcomes **(PO)** in the3-pointscale of STRONG (**S**), MEDIUM (**M**) and LOW (**L**).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | S | S | S | S | S | S | S |
| **CO2** | M | S | S | S | M | S | S | S | S | M |
| **CO3** | M | S | S | S | S | M | S | S | S | S |
| **CO4** | S | S | S | S | S | S | S | M | S | S |
| **CO5** | M | S | S | S | S | S | S | S | S | S |

|  |  |
| --- | --- |
| **COURSETITLE** | **PHYSICS PRACTICALS – I** |
| **CREDITS** | 1 |
| **COURSE CODE** | 23UPHYEP1 |
| **HOURS** | 2 |
| **COURSE**  **OBJECTIVES** | Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results |
| **ANY Seven only**   * 1. Young’s modulus by non-uniform bending using pin and microscope   2. Young’s modulus by non-uniform bending using optic lever, scale and telescope   3. Rigidity modulus by static torsion method.   4. Rigidity modulus by torsional oscillations without mass  1. Surface tension and interfacial Surface tension – drop weight method 2. Comparison of viscosities of two liquids – burette method 3. Specific heat capacity of a liquid – half time correction 4. Verification of laws of transverse vibrations using sonometer 5. Calibration of low range voltmeter using potentiometer 6. Determination of thermo emf using potentiometer 7. Verification of truth tables of basic logic gates using ICs 8. Verification of De Morgan’s theorems using logic gate ICs. 9. Use of NAND as universal building block.   *Note* : Use of digital balance permitted | |

**METHOD OF EVALUATION:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Continuous Internal Assessment** | **End Semester Examination** | **Total** | **Grade** |
| 25 | **75** | **100** |  |

|  |  |  |
| --- | --- | --- |
| **YEAR - I** | **BASIC MATHEMATICS - I** | **23UMATN16** |
| **SEMESTER -I** | **HRS – 2** |
| **NON-MAJOR ELECTIVE – 1** | **CREDIT – 2** |

**Course Objectives:**

Students can be given practice to solve all kinds of problems arise day today life in Science, technology and Business Using the concepts of number system, HCF and LCM, average, ratio, proportion, and partnership.

**UNIT 1:**

Number System

**UNIT 2:**

H.C.F and L.C.M of Numbers

**UNIT 3:**

Average

**UNIT 4:**

Ratio and Proportion

**UNIT 5:**

Partnership

**Text Book:**

Quantitative Aptitude – Dr.R.S.Aggarwal, S. Chand Publications, Revised and Enlarged Edition 2017

Unit-1 Pages from 3 to 50

Unit-2 Pages from 51 to 68

Unit-3 Pages from 206-239

Unit-4 Pages from 426 to 475

Unit-5 Pages from 476 to 492

**Reference Books:**

1. Quantitative Aptitude for Competitive Examinations- Abhijit Guha,Third Edition (2006),Tata McGraw Hill publishing Company Ltd., New Delhi.
2. Course in Quantitative Aptitude for Competitive Examinations- Agarwal P. K, First Edition (2002), Cyber-tech Publications, New Delhi.
3. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publications,2004

**Course Outcomes**:

On successful completion of the course, the students will be able to:

**CLO1:** Understand the nature of number system

**CLO2:** Compute the HCF an LCM of given numbers

**CLO3:** Calculate the average of given values.

**CLO4** : Calculate Ratio and Proportion.

**CLO5**: Understand the concepts of Partnership

**Outcome Mapping:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | 1 | 1 | 2 | 3 | 3 | 1 |
| CLO2 | 2 | 3 | 3 | 1 | - | 2 | 3 | 2 | 1 |
| CLO3 | 3 | 3 | 3 | 3 | - | - | 3 | 3 | 1 |
| CLO4 | 3 | 2 | 3 | 2 | 3 | - | 3 | 3 | 1 |
| CLO5 | 3 | 2 | 3 | 2 | 3 | - | 3 | 3 | 1 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Title of the Course** | | Foundation course **- Bridge Mathematics** | | | | | | | | |
| **Paper Number** | | **FOUNDATION 1** | | | | | | | | |
| **Category** | Core | **Year** | I | | **Credits** | | 2 | **Course Code** | | **23UMATF17** |
| **Semester** | I | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| 2 | | - | | -- | | | 2 | |
| **Pre-requisite** | | 12th Standard Mathematics | | | | | | | | |
| **Objectives of the Course** | | To bridge the gap and facilitate transition from higher secondary to tertiary education;  To instil confidence among stakeholders and inculcate interest for Mathematics; | | | | | | | | |
| **Course Outline** | | **UNIT-I:** Algebra: Binomial theorem, General term, middle term, problems based on these concepts  NCERT Class 11 Mathematics: Chapter 7 | | | | | | | | |
| **Unit II:** Sequences and series (Progressions).  NCERT Class 11 Mathematics: Chapter 8 | | | | | | | | |
| **Unit III:** Permutations and combinations, Fundamental principle of counting. Factorial n. Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.  NCERT Class 11 Mathematics: chapter 6 | | | | | | | | |
| **Unit IV:** Trigonometry: Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae, multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule  NCERT Class 11 Mathematics: Chapter 3  NCERT Class 12 Mathematics: Chapter 2 | | | | | | | | |
| **Unit V:** Calculus: Limits, standard formulae and problems, differentiation, ﬁrst principle, uv rule, u/v rule, methods of diﬀerentiation, application of derivatives, integration - product rule and substitution method.  NCERT Class 11 Mathematics: Chapter 12 | | | | | | | | |
| **Recommended Text** | | NCERT class XI and XII text books. | | | | | | | | |
| **Website and**  **e-Learning Source** | | <https://nptel.ac.in> | | | | | | | | |

**Course Learning Outcome**

After completion of this course successfully, the students will be able to

**CLO 1:** Prove the binomial theorem and apply it to ﬁnd the expansions of any (x + y)n and also, solve the related problems

**CLO 2:** Find the various sequences and series and solve the problems related to them. Explain the principle of counting.

**CLO 3:** Find the number of permutations and combinations in diﬀerent cases. Apply the principle of counting to solve the problems on permutations and combinations

**CLO 4:** Explain various trigonometric ratios and ﬁnd them for diﬀerent angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.

**CLO 5:** Find the limit and derivative of a function at a point, the deﬁnite and indeﬁnite integral of a function. Find the points of min/max of a function.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Speciﬁc Outcomes (PSOs)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 |
| CLO1 | 3 | 1 | 3 | 1 | 2 | 1 | 1 | 3 |
| CLO2 | 2 | 3 | 1 | 2 | 2 | 3 | 2 | 1 |
| CLO3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 |
| CLO4 | 2 | 3 | 3 | 2 | 1 | 3 | 2 | 1 |
| CLO5 | 1 | 2 | 3 | 1 | 3 | 3 | 2 | 1 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Title of the Course** | | **ANALYTICAL GEOMETRY OF THREE DIMENSION** | | | | | | | | |
| **Paper Number** | | **CORE III** | | | | | | | | |
| **Category** | Core | **Year** | I | | **Credits** | | 4 | **Course Code** | | **23UMATC23** |
| **Semester** | II | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| 4 | |  | | -- | | | 4 | |
| **Pre-requisite** | | 12th Standard Mathematics | | | | | | | | |
| **Objectives of the Course** | | * Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes. * To present mathematical arguments about geometric relationships. * To solve real world problems on geometry and its applications. | | | | | | | | |
| **Course Outline** | | **UNIT-I:** Rectangular cartesian co-ordinates: direction cosines of a line- Angle between two lines-Projections-Direction cosines-Direction ratios- Conditions for perpendicularity and parallelism | | | | | | | | |
| **UNIT-II:** System of Planes-Length of the perpendicular–Orthogonal projection. | | | | | | | | |
| **UNIT-III:** Representation of line–angle between a line and a plane – co – planar lines–shortest distance between two skew lines –length of the perpendicular–intersection of three planes. | | | | | | | | |
| **UNIT-IV:** Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of two spheres- condition for the orthogonality- radical plane. | | | | | | | | |
|  | | **UNIT-V** The Central Quadrics and Cone- The equation of a surface. Cone. Right circular cone. Intersection of a straight line and a quadric cone. Tangent plane and normal. Condition that the cone has three mutually perpendicular generators. Cylinder Enveloping Cylinder. | | | | | | | | |
| **Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)** | | Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved  (To be discussed during the Tutorial hour) | | | | | | | | |
| **Skills acquired from this course** | | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | | | | | | |
| **Recommended Text** | | 1. T.K. Manickavachagom Pillai and T. Natarajan. A Text Book Of Analytical Geometry (Part II-Three Dimensions)Viswanathan (Printers & Publishers) Pvt. Ltd.   Unit I Chapter 1 : Sec (1-12)  Unit II Chapter 2: Sec (13-23)  Unit III Chapter 3: Sec (24-30,33)  Unit IV Chapter 4: Sec (35-42)  Unit V Chapter 5: Sec (43-49) | | | | | | | | |
| **Reference Books** | | 1. S. L. Loney, Co-ordinate Geometry. 2. Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions. 3. William F. Osgood and William C. Graustein, Plane and Solid Analytic Geometry, Macmillan Company, New York, 2016.Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010. 4. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961. 5. Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010. 6. William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006. | | | | | | | | |
| **Website and**  **e-Learning Source** | | <https://nptel.ac.in> | | | | | | | | |

**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

**CLO 1:** Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola

**CLO 2:** Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola

**CLO 3:** Explain in detail the system of Planes

**CLO 4:** Explain in detail the system of Straight lines

**CLO 5:** Explain in detail the system of Spheres

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 2 | 2 | 2 | 1 | - | - | 3 | 2 | 1 |
| CLO2 | 2 | 2 | 2 | 1 | - | - | 3 | 2 | 1 |
| CLO3 | 3 | 2 | 2 | 1 | - | - | 3 | 2 | 1 |
| CLO4 | 3 | 2 | 3 | 1 | - | - | 3 | 2 | 1 |
| CLO5 | 3 | 2 | 3 | 1 | - | - | 3 | 2 | 1 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Title of the Course** | | **INTEGRAL CALCULUS** | | | | | | | | |
| **Paper Number** | | **CORE IV** | | | | | | | | |
| **Category** | Core | **Year** | I | | **Credits** | | 4 | **Course Code** | | **23UMATC24** |
| **Semester** | II | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| 4 | |  | | -- | | | 4 | |
| **Pre-requisite** | | 12th Standard Mathematics | | | | | | | | |
| **Objectives of the Course** | | * Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals. * Knowledge about Beta and Gamma functions and their applications. * Skills to Determine Fourier series expansions. | | | | | | | | |
| **Course Outline** | | **UNIT-I:** Reduction formulae -Types, integration of product of powers of algebraic and logarithmic functions - Bernoulli’s formula,  Chapter 1: Section – 13.1 to 13.5, 13.10,15.1 | | | | | | | | |
| **UNIT-II:** Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration.  Chapter 5 : Section – 1, 2.1 to 2.2, 3.1 | | | | | | | | |
| **UNIT-III:** Triple integrals –applications of multiple integrals - volumes of solids of revolution - change of variables - Jacobian.  Chapter 5: Section 4, 5.1 to 5.4  Chapter 6 : Section 1.1,1.2, 2.1 to 2.4 | | | | | | | | |
| **UNIT-IV:** Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications.  Chapter 7: Section 2.1 to 2.3 ,3, 4, 5 | | | | | | | | |
| **UNIT-V:** Geometric and Physical Applications of Integral calculus.  Chapter 2 : Section 1.1 to 1.3, 2.1,2.2  Chapter 3 : Section 1.1 to 1.3 | | | | | | | | |
| **Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)** | | Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved  (To be discussed during the Tutorial hour) | | | | | | | | |
| **Skills acquired from this course** | | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | | | | | | |
| **Recommended Text** | | S.Narayanan and T.K.Manicavachagom Pillai, Calculus Volume II, S.Viswanathan (Printers&Publishers) Pvt Limited , Chennai (2013) | | | | | | | | |
| **Reference Books** | | 1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002. 2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007. 3. D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd. 4. P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series, 2001 (second edition). | | | | | | | | |
| **Website and**  **e-Learning Source** | | [https://nptel.ac.in](file:///C:\Users\JSC\Downloads\%0bhttps:\nptel.ac.in%0d) | | | | | | | | |

**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

**CLO 1:** Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae

**CLO 2:** Evaluate double and triple integrals and problems using change of order of integration

**CLO 3:** Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution

**CLO4:** Explain beta and gamma functions and to use them in solving problems of integration

**CLO 5:** Explain Geometric and Physical applications of integral calculus

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO2 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO3 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO4 | 3 | 1 | 3 | - | - | - | 3 | 2 | 1 |
| CLO5 | 3 | 1 | 3 | - | 2 | 1 | 3 | 2 | 1 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Title of the Course** | | **PYTHON PROGRAMMING LAB** | | | | | | | | |
| **Paper Number** | | **Elective - II** | | | | | | | | |
| **Category** |  | **Year** | I | | **Credits** | | 5 | **Course Code** | | 23UPYPE15 |
| **Semester** | II | |
| **Instructional Hours**  **per week** | | **Lecture** | | **Tutorial** | | **Lab Practice** | | | **Total** | |
| -- | | -- | | 6 | | | 6 | |
| **Pre-requisite** | | Basic of programming skill | | | | | | | | |
| **Objectives of the Course** | | * Acquire programming skills in core Python. * Acquire Object-oriented programming skills in Python. * Develop the skill of designing graphical-user interfaces (GUI) in Python. * Develop the ability to write database applications in Python. * Acquire Python programming skills to move into specific branches | | | | | | | | |
| **List of Exercises:** | | 1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user’s choice. | | | | | | | | |
| 1. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:   Grade A: Percentage >=80  Grade B: Percentage >=70 and 80  Grade C: Percentage >=60 and <70  Grade D: Percentage >=40 and <60  Grade E: Percentage < 40 | | | | | | | | |
| 1. Create a menu driven Python program to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user. | | | | | | | | |
| 1. Write a Python script that prints prime numbers in between given two numbers. | | | | | | | | |
| 1. Program to find factorial of the given number using recursive function. | | | | | | | | |
| 1. Write a Python script to generate the Fibonacci series | | | | | | | | |
| 1. Write a Python program to count the number of even and odd numbers from array of N numbers. | | | | | | | | |
| 1. Write a Python class to reverse a string word by word. | | | | | | | | |
| 1. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3) | | | | | | | | |
| 1. Create a Savings Account class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance). | | | | | | | | |
| 1. Write a Python program to construct the following pattern, using a nested loop   \*  \*\*  \*\*\*  \*\*\*\*  \*\*\*\*\*  \*\*\*\*  \*\*\*  \*\*  \* | | | | | | | | |
| 1. Write a Python program to carry out Matrix Multiplication | | | | | | | | |
| 1. Write a Python script to generate the Pascal Triangle | | | | | | | | |
| 1. Read a file content and copy only the contents at odd lines into a new file. | | | | | | | | |
| 1. Create a Turtle graphics window with specific size. | | | | | | | | |
| Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) | | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC –  CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) | | | | | | | | |
| Skills acquired from this course | | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | | | | | | |
| **Recommended Text** | | 1. E Balagurusamy, "Introduction to Computing and Problem Solving Using Python",1st Edition, McGraw Hill India; 2016 2. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015. 3. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016 | | | | | | | | |
| **Reference Books** | | 1. Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition. 2. Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1 st Edition. 3. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410 4. Michel Dawson, “Python Programming for Absolute Beginers” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009 | | | | | | | | |
| **Website and**  **e-Learning Source** | | [https://onlinecourses.swayam2.ac.in/cec22\_cs20/preview](https://nptel.ac.in) | | | | | | | | |

**Course Learning Outcome (for Mapping with POs and PSOs)**

**Students will be able to**

**CLO1:** To understand the problem solving approaches

**CLO2:** To learn the basic programming constructs in Python

**CLO3:** To practice various computing strategies for Python-based solutions to real world problems

**CLO4:** To use Python data structures - lists, tuples.

**CLO5:** To do input/output with files in Python.

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|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 1 |
| CLO2 | 2 | 1 | 3 | 1 | - | 1 | 3 | 2 | 1 |
| CLO3 | 3 | 1 | 3 | 1 | - | - | 3 | 2 | 1 |
| CLO4 | 3 | 1 | 3 | 2 | 3 | - | 3 | 2 | 1 |
| CLO5 | 3 | 1 | 3 | 2 | 3 | - | 3 | 2 | 1 |

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| **SEMESTER: II**  **Part: III** | **23UCHEE25**  **Chemistry for Physical Science– II** | **Credit: 2**  **Hours: 3** |

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| **Objectives of the course** | This course aims at providing knowledge on the   * Co-ordination Chemistry and Water Technology * Carbohydrates and Amino acids * basics and applications of electrochemistry * basics and applications of kinetics and catalysis * Various photochemical phenomenon |
| **Course Outline** | **UNIT I**  **Co-ordination Chemistry and Water Technology**  Co-ordination Chemistry: Definition of terms-IUPAC Nomenclature - Werner’stheory - EAN rule - Pauling’s theory – Postulates - Applications to [Ni(CO)4], [Ni(CN)4]2-,[Co(CN)6]3- Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) – Applications in qualitative and quantitative analysis.  Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques-  BOD, COD. |
| **Unit II**  **Carbohydrates and Amino acids**  Carbohydrates: Classification, preparation and properties of glucose, fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Glucose –fructose interconversion. Properties of starch and cellulose.  Amino acids: Classification - preparation and properties of  alanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only). |
| **UNIT III**  **Electrochemistry**  Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention. |

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|  | **UNIT IV**  **Kinetics and Catalysis**  Order and molecularity. Integrated rate expression for I and II (2A  Products) order reactions. Pseudo first order reaction, methods of determining order of a reaction – Half-life period – Catalysis - homogeneous and heterogeneous, catalyst used in Contact and Haber’s processes. Concept of energy of activation and Arrhenius  equation. |
| **UNIT V**  **Photochemistry**  Grothus-Draper’s law and Stark-Einstein’s law of photochemical equivalence, Quantum yield - Hydrogen-chloride reaction. Phosphorescence, fluorescence, chemiluminescence and  photosensitization and photosynthesis (definition with examples). |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination  question paper) | Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved  (To be discussed during the Tutorial hours) |
| Skills acquired  from this course | Knowledge, Problem solving, Analytical ability, Professional  Competency, Professional Communication and Transferable skills. |
| **Recommended Text** | 1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition, 2012. 4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007. |
| **Reference Books** | 1. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 2. R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry;   Vishal Publishing Co., New Delhi, forty seventh edition, 2018. |

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|  | 3. B.K,Sharma, Industrial Chemistry;  Meerut, sixteenth edition, 2014. | GOEL | publishing | house, |
| **Website and**  **e-learning source** |  | | | |
| **Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to**  **CO 1:** write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology  **CO 2:** explain the preparation and property of carbohydrate, amino acids and nucleic acids.  **CO 3:** apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.  **CO 4:** identify the reaction rate, order for chemical reaction and explain the purpose of a catalyst.  **CO 5:** outline the various type of photochemical process. | | | | |

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| **CO /PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 15 | 15 | 15 | 15 | 15 |
| **Weighted percentage of Course Contribution to**  **PSOs** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PSO’s and CO’s**

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| **CO /PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 15 | 15 | 15 | 15 | 15 |
| **Weighted percentage of**  **Course Contribution to POs** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PO’s and CO’s**

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| **SEMESTER: II**  **Part: III** | **23UCHEEP2**  **Chemistry for Physical Science Practicals – II** | **Credit: 1**  **Hours: 2** |

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| **Objectives of the course** | This course aims to provide knowledge on   * identification of organic functional groups * different types of organic compounds with respect to their properties. * determination of elements in organic compounds.. |
|  | **SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS**  The analysis must be carried out as follows: |

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|  | 1. Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose]. 2. Detection of elements (N, S, Halogens). 3. To distinguish between aliphatic and aromatic compounds. 4. To distinguish – Saturated and unsaturated compounds. |
| **Reference Books** | V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles ofPractical Chemistry; Sultan Chand & sons, Second edition, 1997. |
| Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to  CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO 2: design, carry out, record and interpret the results of volumetric titration.  CO 3: apply their skill in the analysis of water/hardness.  CO4: analyze the chemical constituents in allied chemical products | |

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| **CO /PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 12 | 12 | 12 | 12 | 12 |
| **Weighted percentage of**  **Course Contribution to PSOs** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Level of Correlation between PSO’s and CO’s**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CO /PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 |
| **Weightage** | 12 | 12 | 12 | 12 | 12 |
| **Weighted percentage of**  **Course Contribution to POs** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

Level of correlation between CO’s and PO’s

Scheme of Valuation:

Max.Marks:100

Int.Marks:25

Ext.Marks:75

Record:15 marks

Preliminary Tests:10 marks

Detection Of elements:10 marks

Detection of functional group:10 marks

Identification of compound:10 marks

Confirmatory Tests:5 marks

Report:5 marks

Systamatic Procedure:10 marks

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| **COURSE** | **ELECTIVE: II** |
| **COURSE TITLE** | **PHYSICS –II** |
| **COURSE CODE** | **23UPHYE25** |
| **CREDITS** | 2 |
| **HOURS** | 3 |
| **COURSE**  **OBJECTIVES** | To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics. |

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| **UNITS** | **COURSE DETAILS** |
| **UNIT-I** | **OPTICS: i**nterference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster’s law – optical activity – application in sugar industries |
| **UNIT-II** | **ATOMIC PHYSICS:** atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli’s exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein’s photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices |
| **UNIT-III** | **NUCLEAR PHYSICS:** nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods –introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion. |
| **UNIT-IV** | **INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES**: frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence –introduction on gravitational waves, LIGO, ICTs opportunities at International Centre for Theoretical Sciences |
| **UNIT-V** | **SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – Zener diode – characteristic of Zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger –introduction to e-vehicles and EV charging stations |

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| **TEXT BOOKS** | 1. R. Murugesan (2005), Allied Physics, S. Chand & Co, New Delhi. 2. K. Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai. 3. Brijlal and N. Subramanyam (2002), Textbook of Optics, S. Chand & Co, New Delhi. 4. R. Murugesan (2005), Modern Physics, S. Chand & Co, New Delhi. 5. A. Subramaniyam Applied Electronics, 2nd Edn., National Publishing Co., Chennai. |
| **REFERENCEBOOKS** | 1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore. 2. D. R. Khanna and H .R. Gulati (1979).Optics, S. Chand & Co. Ltd., New Delhi. 3. A. Beiser (1997), Concepts of Modern Physics, Tata McGraw Hill Publication, New Delhi. 4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, New Delhi. 5. V. K. Metha (2004), Principles of electronics, 6th Edn. , S. Chand and Company, New Delhi. |
| **WEBLINKS** | 1. <https://www.berkshire.com/learning-center/delta-p-facemask/><https://www.youtube.com/watch?v=QrhxU47gtj4><https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo> 2. <https://www.youtube.com/watch?v=JrRrp5F-Qu4> 3. <https://www.validyne.com/blog/leak-test-using-pressure-transducers/> 4. <https://www.atoptics.co.uk/atoptics/blsky.htm>- 5. <https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects> |

**METHOD OF EVALUATION:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Continuous Internal Assessment** | **End Semester Examination** | **Total** | **Grade** |
| 25 | **75** | **100** |  |

**COURSE OUTCOMES:**

At the end of the course the student will be able to:

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| **COURSEOUTCOMES** | **CO1** | Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns |
| **CO2** | Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance ofinterpretingimprovingtheoreticalmodelsbasedonobservation.Appreciateinterdisciplinarynatureofscience and in solar energy related applications. |
| **CO3** | Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. Solve problems on delay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy, safety measures carried and get our Govt. agencies like DAE guiding the country in the nuclear field. |
| **CO4** | To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice-versa. Relate this with current research in this field and get an overview of research projects of National and International importance, like LIGO, ICTS, and opportunities available. |
| **CO5** | Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations. |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes **(CO)** for each course with program outcomes **(PO)** in the 3-point scale of STRONG (**S**), MEDIUM (**M**) and LOW (**L**).

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | S | S | S | S | S | S | S |
| **CO2** | M | S | S | S | M | S | S | S | S | M |
| **CO3** | M | S | S | S | S | M | S | S | S | S |
| **CO4** | S | S | S | S | S | S | S | M | S | S |
| **CO5** | M | S | S | S | S | S | S | S | S | S |

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| **COURSE TITLE** | **PHYSICS PRACTICALS – II** |
| **COURSE CODE** | **23UPHYEP2** |
| **CREDITS** | 1 |
| **HOURS** | 2 |
| **COURSE**  **OBJECTIVES** | Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results |
| **Any Seven only**   1. Radius of curvature of lens by forming Newton’s rings 2. Thickness of a wire using air wedge 3. Wavelength of mercury lines using spectrometer and grating 4. Refractive index of material of the lens by minimum deviation 5. Refractive index of liquid using liquid prism 6. Determination of AC frequency using sonometer 7. Specific resistance of a wire using PO box 8. Thermal conductivity of poor conductor using Lee’s disc 9. Determination of figure of merit table galvanometer 10. Determination of Earth’s magnetic field using field along the axis of a coil 11. Characteristics of Zener diode 12. Construction of Zener / IC regulated power supply 13. Construction of AND, OR, NOT gates using diodes and transistor 14. NOR gate as a universal building block | |

**METHOD OF EVALUATION:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Continuous Internal Assessment** | **End Semester Examination** | **Total** | **Grade** |
| 25 | **75** | **100** |  |

**NON-MAJOR ELECTIVE –2**

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| --- | --- | --- |
| **YEAR - I** | **BASIC MATHEMATICS - II** | **23UMATN26** |
| **SEMESTER –II** | **HRS – 2** |
| **NON-MAJOR ELECTIVE – 2** | **CREDIT – 2** |

**Course Objectives:**

To enhance the problem solving techniques in real life applications of mathematical concepts Time, work, distance, Boats and Stream, Alligation or Mixture , Volume and Surface area.

UNIT 1:

Time and Work

UNIT 2:

Time and Distance

UNIT 3:

Boats and Streams

UNIT 4:

Alligation or Mixture

UNIT 5:

Volume and Surface Area

Text Book:

Quantitative Aptitude – Dr.R.S.Aggarwal, S. Chand Publications, Revised and Enlarged Edition 2017

Unit-1 Pages from 526 to 561

Unit-2 Pages from 562 to 599

Unit-3 Pages from 600 to 611

Unit-4 Pages from 633 to 640

Unit-5 Pages from 766 to 813

Reference Books:

1. Quantitative Aptitude for Competitive Examinations- Abhijit Guha,Third Edition   
 (2006),Tata McGraw Hill publishing Company Ltd., New Delhi.

1. Course in Quantitative Aptitude for Competitive Examinations- Agarwal P. K, First Edition (2002), Cyber-tech Publications, New Delhi
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publications,2004

**Course Outcomes**:

On successful completion of the course, the students will be able to:

**CLO1**: Solve problems on time and work.

**CLO2**: Calculate time and distance for real word problems.

**CLO3**: Compute the speed of boats and streams.

**CLO4**: Calculate the mixing of water in milk

**CLO5**: Solve problems on Volume and Surface area.

**Outcome Mapping:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 1 |
| CLO2 | 2 | 3 | 3 | 1 | - | 2 | 3 | 2 | 1 |
| CLO3 | 3 | 3 | 1 | 1 | - | - | 3 | 2 | 1 |
| CLO4 | 2 | 2 | 3 | 2 | 3 | - | 3 | 2 | 1 |
| CLO5 | 3 | 1 | 3 | 2 | 3 | - | 3 | 2 | 1 |