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)

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 23UCHEEP1 23UPHYEP1	Elective - I (Generic / Discipline Specific) Python Programming (or) Chemistry for Physical Sciences–I (or) Physics - I Chemistry for Physical Sciences Practical –I Physics Practical - I	3/2 1	5/3 2	25 25	75 75	100 100
IV		Skill Enhancement Course – 1 (NME-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		Skill Enhancement Course – 2 (NME-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

IV	23UMATN16	Basic Mathematics - I	2	2	25	75	100

	23UMATN26	Basic Mathematics - II	2	2	25	75	100

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">ALGEBRA & TRIGONOMETRY</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="6">CORE I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23UMATC13</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">5</td><td colspan="2"></td><td colspan="2">--</td><td>5</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">• Basic ideas on the Theory of Equations, Matrices and Number Theory.
• Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.</td></tr>
<tr><td colspan="2" rowspan="5">Course Outline</td><td colspan="6">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.</td></tr>
<tr><td colspan="6">Unit II: Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.</td></tr>
<tr><td colspan="6">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.</td></tr>
<tr><td colspan="6">Unit IV: Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tannθ in terms of tan θ, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta\sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+,\ldots,+\theta_n)$-Expansions of sinθ, cosθ and tanθ in terms of θ - related problems.</td></tr>
<tr><td colspan="6">Unit V: Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.</td></tr>
</table>

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

	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

<table>
<tr><td>Title of the Course</td><td colspan="6">DIFFERENTIAL CALCULUS</td></tr>
<tr><td>Paper Number</td><td colspan="6">CORE II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23UMATC14</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td></td><td colspan="2">--</td><td>4</td></tr>
<tr><td>Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">• 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.</td></tr>
<tr><td rowspan="4">Course Outline</td><td colspan="6">UNIT-I: Successive Differentiation: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product
Chapter – III: Section – 1.1 to 1.6 and 2.1 to 2.2</td></tr>
<tr><td colspan="6">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</td></tr>
<tr><td colspan="6">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.</td></tr>
<tr><td colspan="6">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</td></tr>
</table>

	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. 2. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002. 3. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010. 4. 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

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

	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

<table>
<tr><td>Title of the Course</td><td colspan="6">PYTHON PROGRAMMING</td></tr>
<tr><td>Paper Number</td><td colspan="6">Elective - I</td></tr>
<tr><td rowspan="2">Category</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">23UPYPE15</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td></td><td colspan="2">--</td><td>4</td></tr>
<tr><td>Pre-requisite</td><td colspan="6">Basic Knowledge of Programming concept</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">• 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</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="6">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)</td></tr>
<tr><td colspan="6">UNIT-II: Control Statements -Iteration – while Statement - Input from Keyboard (3.13 – 3.15)</td></tr>
<tr><td colspan="6">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)</td></tr>
<tr><td colspan="6">UNIT-IV: Text Files- Directories (Sec. 7.1 and 7.2)</td></tr>
<tr><td colspan="6">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)</td></tr>
</table>

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

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

	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

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

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 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 of CH_4, C_2H_4, C_2H_2 and C_6H_6. Electronic effects: Inductive effect and consequences on K_a and K_b 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,propertie sofpyrroleandpyridine.
	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

	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.Principlesofvolumetric analysis.Separationandpurificationtechniques–extraction,distillationand crystallization. Chromatography: principle and application of column, paper and thin Layer chromatography.
Extended Professional Component(isa 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,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	5. P.L.Soni,Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, NewDelhi, twentieth edition,2007. 6. B.R.Puri,L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co.,NewDelhi, forty seventh edition,2018. 7. 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

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

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

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

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.
REFERENCE BOOKS	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.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPMhttps://www.youtube.com/watch?v=9mXOMzUruMQ&t=1shttps://www.youtube.com/watch?v=m4u-SuaSu1s&t=3shttps://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 correlatetheconnectionbetweenelectricfieldandmagneticfieldan danalyzethemmathematicallyverifycircuitsandapplytheconcepts 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. InferoperationsusingBooleanalgebraandacquireelementaryidea sofICcircuits.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
2. Surface tension and interfacial Surface tension – drop weight method
3. Comparison of viscosities of two liquids – burette method
4. Specific heat capacity of a liquid – half time correction
5. Verification of laws of transverse vibrations using sonometer
6. Calibration of low range voltmeter using potentiometer
7. Determination of thermo emf using potentiometer
8. Verification of truth tables of basic logic gates using ICs
9. Verification of De Morgan's theorems using logic gate ICs.
10. 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

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="6">Foundation course - Bridge Mathematics</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="6">FOUNDATION 1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">23UMATF17</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td>Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>2</td><td colspan="2">-</td><td>--</td><td colspan="2">2</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="6">To bridge the gap and facilitate transition from higher secondary to tertiary education;
To instil confidence among stakeholders and inculcate interest for Mathematics;</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="6">UNIT-I: Algebra: Binomial theorem, General term, middle term, problems based on these concepts
NCERT Class 11 Mathematics: Chapter 7</td></tr>
<tr><td colspan="6">Unit II: Sequences and series (Progressions).
NCERT Class 11 Mathematics: Chapter 8</td></tr>
<tr><td colspan="6">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</td></tr>
<tr><td colspan="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</td></tr>
</table>

	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

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="8">ANALYTICAL GEOMETRY OF THREE DIMENSION</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="8">CORE III</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">23UMATC23</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">4</td><td colspan="2"></td><td colspan="2">--</td><td>4</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="8">12th Standard Mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="8">• 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.</td></tr>
<tr><td colspan="2" rowspan="4">Course Outline</td><td colspan="8">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</td></tr>
<tr><td colspan="8">UNIT-II: System of Planes-Length of the perpendicular–Orthogonal projection.</td></tr>
<tr><td colspan="8">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.</td></tr>
<tr><td colspan="8">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.</td></tr>
<tr><td colspan="2"></td><td colspan="8">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.</td></tr>
</table>

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

<table>
<tr><td>Title of the Course</td><td colspan="6">INTEGRAL CALCULUS</td></tr>
<tr><td>Paper Number</td><td colspan="6">CORE IV</td></tr>
<tr><td>Category Core</td><td>Year I
Semester II</td><td>Credits</td><td>4</td><td>Course Code</td><td colspan="2">23UMATC24</td></tr>
<tr><td>Instructional Hours per week</td><td>Lecture
4</td><td>Tutorial</td><td>Lab Practice
--</td><td colspan="3">Total
4</td></tr>
<tr><td>Pre-requisite</td><td colspan="6">12th Standard Mathematics</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">• 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.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="6">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</td></tr>
<tr><td colspan="6">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</td></tr>
<tr><td colspan="6">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</td></tr>
<tr><td colspan="6">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</td></tr>
<tr><td colspan="6">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</td></tr>
</table>

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

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

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="8">PYTHON PROGRAMMING LAB</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="8">Elective - II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2"></td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23UPYPE15</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">6</td><td>6</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="8">Basic of programming skill</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="8">• 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</td></tr>
<tr><td colspan="2" rowspan="8">List of Exercises:</td><td colspan="8">1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user’s choice.</td></tr>
<tr><td colspan="8">2. 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</td></tr>
<tr><td colspan="8">3. Create a menu driven Python program to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.</td></tr>
<tr><td colspan="8">4. Write a Python script that prints prime numbers in between given two numbers.</td></tr>
<tr><td colspan="8">5. Program to find factorial of the given number using recursive function.</td></tr>
<tr><td colspan="8">6. Write a Python script to generate the Fibonacci series</td></tr>
<tr><td colspan="8">7. Write a Python program to count the number of even and odd numbers from array of N numbers.</td></tr>
<tr><td colspan="8">8. Write a Python class to reverse a string word by word.</td></tr>
</table>

	9. 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)
	10. 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).
	11. Write a Python program to construct the following pattern, using a nested loop * ** *** **** ***** **** *** ** *
	12. Write a Python program to carry out Matrix Multiplication
	13. Write a Python script to generate the Pascal Triangle
	14. Read a file content and copy only the contents at odd lines into a new file.
	15. 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	4. E Balagurusamy, "Introduction to Computing and Problem Solving Using Python",1st Edition, McGraw Hill India; 2016 5. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015. 6. 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

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.

	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

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

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.

	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.

	3. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.
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.

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

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

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

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:

	(a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose]. (b) Detection of elements (N, S, Halogens). (c) To distinguish between aliphatic and aromatic compounds. (d) 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	

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

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.

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

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.
REFERENCE BOOKS	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=QrhxU47gtj4https://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:

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**).

	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

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

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:

	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