HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)
Re-Accredited with A++ Grade by NAAC (3rd Cycle)
Uthamapalayam - 625 533.

DEPARTMENT OF MATHEMATICS

BACHELOR OF SCIENCE - MATHEMATICS
SYLLABUS

Choice Based Credit System – CBCS

(As per TANSCHE/MKU Guidelines)

With

Outcome Based Education (OBE)

(with effect from Academic Year 2023 -2024 onwards)

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College Vision and Mission

Vision

Our vision is to provide the best type of higher education to all, especially to students hailing from minority Muslim community, rural agricultural families and otherdeprived, under privileged sections of the society, inculcating the sense of social responsibility in them. Our college is committed to produce talented, duty-bound citizens to take up the challenges of the changing times.

Mission

Our mission is to impart and inculcate social values, spirit of service and religious tolerance as envisioned by our beloved Founder President Hajee Karutha Rowther.

The Vision beckons the Mission continues forever.

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Department Vision and Mission

Vision

Department of Mathematics will promote and support a comprehensive, innovative and dynamic learning environment that meets the changing needs of a diverse global students population prepare the young minds for the rapidly changing mathematical techniques.

Mission

The mission of the mathematics degree program is to equip students with analytic and problem solving skill for career and graduate work classes develop student abilities and aptitudes to apply mathematical methods and ideas not only to problemsin mathematics and related field such as the science, computer science, statistics but also to virtually any area of inquiry students learn to communicate ideas effectively andthey are encouraged to develop intellectually and to become involved with professional origination. The department cooperates fully with the school of education in meeting its mission for candidates for a degree in education with mathematics.

Introduction

B.Sc.Mathematics :Programme Outcome, Programme Specific Outcome and Course Outcome

Mathematics is the study of quantity, structure, space and change, focusing on problem solving, with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The Bachelor‟s Degree B.Sc. Mathematics is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements expected to be acquired by learners at the end of the Programme. Learning outcomes of Mathematics are aimed at facilitating the learners to acquire these attributes, keeping in view of their preferences and aspirations for gaining knowledge of Mathematics.

Bachelor‟s degree in Mathematics is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations and several other branches of Mathematics. This also leads to study of related areas like Computer science, Financial Mathematics, Statistics and many more. Thus, this programme helps learners in building a solid foundation for higher studies in Mathematics. The skills and knowledge gained have intrinsic aesthetics leading to proficiency in analytical reasoning. This can be utilised in Mathematical modelling and solving real life problems.

Students completing this programme will be able to present Mathematics clearly and precisely, make abstract ideas precise by formulating them in the language of Mathematics, describe Mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-Mathematicians.

Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc., MATHEMATICS**
Programme Code:	
Duration:	**3 years [UG]**
ELIGIBILITY FOR ADMISSION	Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu or any other Examination accepted by syndicate, as equivalent thereto, with **Mathematics** as one of the subjects in Higher Secondary Education. The candidate should possess the eligibility criteria prescribed by the Directorate of Collegiate Education, Government of Tamil Nadu.
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one‟s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one‟s learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses,

	predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one‟s life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Under Graduate Programme

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one‟s earning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

B.Sc Mathematics Programme Specific Outcomes:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other‟s ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)can be carried out accordingly, assigning the appropriate level in the grids:

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

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the „Training for Competitive Examinations" course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	**Foundation Course** To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Mathematics and simulating mathematical concepts to real world.	• Instil confidence among students • Create interest for the subject
I, II, III, IV	**Skill Enhancement papers** (Discipline centric / Generic / Entrepreneurial)	• Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable
		• Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects
		• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.
		• Entrepreneurial skill training will provide an opportunity for independent livelihood • Generates self – employment • Create small scale entrepreneurs • Training to girls leads to women empowerment
		• Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools
III, IV, V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	• Strengthening the domain knowledge • Introducing the stakeholders to the State-of Art techniques from the streams of multi- disciplinary, cross disciplinary and inter disciplinary nature • Students are exposed to Latest topics on Computer Science / IT, that require strong mathematical background • Emerging topics in higher education / industry /

		communication network / health sector etc. are introduced with hands-on-training, facilitates designing of mathematical models in the respective sectors
IV	Industrial Statistics	• Exposure to industry moulds students into solution providers • Generates Industry ready graduates • Employment opportunities enhanced
II year Vacation activity	Internship / Industrial Training	• Practical training at the Industry/ BankingSector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.
V Semester	Project with Viva – voce	• Self-learning is enhanced • Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Introduction of Professional Competency component	• Curriculum design accommodates all category of learners; „Mathematics for Advanced Explain" component will comprise of advanced topics in Mathematics and allied fields, for those in the peer group / aspiring researchers; • „Training for Competitive Examinations" –caters to the needs of the aspirants towards most sought - after services of the nation viz, UPSC, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: For Advanced Learners / Honours degree		• To cater to the needs of peer learners / research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, ProfessionalCommunication and Transferrable Skill

Programme Scheme Eligibility

A Pass in +2 examination conducted by Board of Higher Secondary Education, Governmentof Tamilnadu or equivalent with Mathematics as one of the subjects

For Programme
Completion A Candidate
shall complete:

- Part I - Language papers – Tamil/Arabic in semesters I, II, III and IV respectively
- Part II - Language papers - English in semesters I, II, III, IV respectively
- Part III - Core papers in semesters I, II, III, IV, V and VI respectively
- Part III - Elective papers (Discipline / Generic) in semesters I, II, III, IV, V and VI respectively
- Part IV – Skill Enhancement Course (NME) papers in semesters I and II respectively
- Part IV - Skill Enhancement Course papers in semesters I, II, III, and IV respectively

- Part IV - Skill Enhancement Course (Foundation Course) paper in semester I respectively
- Part IV - Skill Enhancement Course (Professional Competency Skill) in semester VI respectively
- Part IV - Value Education paper in semester V respectively
- Part IV - Environmental Studies paper in semesters III and IV respectively
- Part IV – Summer Internship/Industrial Training paper in semester V respectively
- Part V - Extension activity in semester VI respectively

Scheme of Examinations under Choice Based Credit System

Term End Examinations (TEE) -75 Marks

Continuous Internal Assessment Examinations (CIAE)-25 Marks

Total -100 Marks

Pattern of Continuous Internal Assessment Examinations (CIAE)

Average of Two Internal Tests (each 20 marks)-20 Marks

Assignment -05 Marks

Total -25 Marks

Pattern of Term End Examinations(Max. Marks: 75 / Time: 3 Hours)

External Examinations Question Paper Pattern for Part I & III and Part IV (Elective & Skill Enhancement Course Subject)

Section – A (10 X 1 = 10 Marks) Answer ALL questions.

- Questions 1 - 10
- Two questions from each UNIT
- Multiple choice questions and each question carries Four choices

Section – B (5 X 7 = 35 Marks)

Answer ALL questions choosing either A or B.

- Questions 11 - 15
- Two questions from each UNIT (either…. or…. type)
- Descriptive Type

Section – C (3 X 10 = 30 Marks)

Answer any THREE out of five questions.

- Questions 16 - 20
- One question from each UNIT
- Descriptive Type

External Examinations Question Paper Pattern forEnvironmental Studies and Value Education

Section – A: (5 X 6 = 30 Marks)
Answer ALL questions choosing either A or B.

- Questions 1 - 5
- Two questions from each UNIT (either…. or…. type)
- Descriptive Type

Section – B (3 X 15 = 45 Marks)
Answer any THREE out of five questions.

- Questions 6 – 10
- One question from each UNIT
- Descriptive Type

Part V (Extension Activities)

- Internal Evaluation

Passing Marks

Minimum 27 for External Exam

Eligibility for the degree - passing minimum is 40%

Practical Examination

Internal – 40 marks
External – 60 marks
Total – 100 marks Passing minimum is **40%**

Semester-I

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part I	23UTALL11	பொதுத்தமிழ் – 1 தமிழ் இலக்கிய வரலாறு-1	6	25	75	100	3
	23UARLL11	Paper I : Prose					
	23UMMLL11	Prose, Composition and Translation					
Part II	23UENLL11	General English - I	6	25	75	100	3
Part – III	23UMACC11	Algebra &Trigonometry	4	25	75	100	4
	23UMACC12	Differential Calculus	4	25	75	100	4
	23UPHGE11	Allied Physics - I	4	25	75	100	3
Part – IV	23UPHGE1P	Allied Physics Practical - I	2	40	60	100	2
	23UMASE11	Mathematics for Competitive Examinations - I	2	25	75	100	2
	23UMAFN11	Bridge Mathematics	2	25	75	100	2
Total			**30**				**23**

Semester-II

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – I	23UTALL21	பொதுத்தமிழ் - 2தமிழ் இலக்கிய வரலாறு-2	6	25	75	100	3
	23UARLL21	Paper II : Grammar					
	23UMMLL21	Office Communication Malayalam					
Part – II	23UENLL21	General English- II	6	25	75	100	3
Part – III	23UMACC21	Analytical Geometry (Two & Three Dimensions)	4	25	75	100	4
	23UMACC22	Integral Calculus	4	25	75	100	4
	23UPHGE21	Allied Physics – II	4	25	75	100	3
Part – IV	23UPHGE2P	Allied Physics Practical - II	2	25	75	100	2
	23UMASE21	Mathematics for Competitive Examinations - II	2	25	75	100	2
	23UMASE2P	LaTeX	2	40	60	100	2
Total			**30**				**23**

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UMACC11	**ALGEBRA &TRIGONOMETRY**	**Core**	4	4	25	75	100

Learning Objectives		
L1	Basic ideas on the Theory of Equations, Matrices and Number Theory.	
L2	Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems	
UNIT	**Contents**	**No. of Hours**
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.	12
II	Summation of Series: Binomial–Exponential–Logarithmic series (Theorems without proof)–Approximations-related problems.	12
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.	12
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(θ1+θ2+…+θn)-Expansions of sinθ, cosθ and tanθ in terms of θ-related problems.	12
V	Hyperbolic functions–Relation between circular and hyperbolic functions, Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series-related problems.	12
	Total	**60**

Course Outcomes		**Knowledge Level**
CO	**On completion of this course, students will**	
1	Classify and Solve reciprocal equations.	K1,K2,K3,K4,K5
2	Find the sum of binomial, exponential and logarithmic series.	K1,K2,K3,K4,K5,K6
3	Find Eigen values, eigen vectors, verify Cayley–Hamilton theorem and diagonalize a given matrix.	K1,K2,K3,K4,K5,K6
4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine.	K1,K2,K3,K4,K5,K6
5	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series .	K1,K2,K3,K4,K5

Textbooks	
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.
Web Resources	
1.	https://nptel.ac.in

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	3	-	-	-	-	-
CO 2	2	1	3	1	-	-	-	-
CO 3	3	1	3	1	-	-	-	-
CO 4	3	1	3	-	-	-	-	-
CO 5	3	1	3	-	-	-	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	-	-
CO2	3	2	1	-	-
CO3	3	2	1	-	-
CO4	3	2	1	-	-
CO5	3	2	1	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UMACC12	DIFFERENTIAL CALCULUS	Core	4	4	25	75	100

Learning Objectives		
L1	The basic skills of differentiation, successive differentiation, and their applications.	
L2	Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.	
UNIT	**Contents**	**No. of Hours**
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 then^{th} derivative of a product– Feynman's method of differentiation.	12
II	Partial Differentiation: Partial derivatives–Successive partial derivatives–Function of a function rule–Total differential coefficient–A special case –Implicit Functions.	12
III	Partial Differentiation (Continued): Homogeneous functions–Partial derivatives of a function of two variables–Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.	12
IV	Envelope: Method of finding the envelope–Another definition of envelope–Envelope of family of curves which are quadratic in the parameter.	12
V	Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature–Evolutes and Involutes–Radius of Curvature in Polar Co-ordinates.	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula**.**	K1,K2,K3,K4,K5
2	Find the partial derivative and total derivative coefficient**.**	K1,K2,K3,K4,K5,K6
3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers.	K1,K2,K3,K4,K5,K6
4	Find the envelope of a given family of curves .	K1,K2,K3,K4,K5,K6
5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates.	K1,K2,K3,K4,K5

Textbooks	
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, 2010.
3	M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P.

	Ltd. (Pearson Education), Delhi, 2007.
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.
Web Resources	
1.	https://nptel.ac.in

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	3	-	-	-	-	-
CO 2	2	1	3	-	-	-	-	-
CO 3	3	2	3	2	-	-	-	-
CO 4	3	2	3	2	1	-	-	-
CO 5	3	2	3	2	1	-	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	-	-
CO2	3	2	1	-	-
CO3	3	2	1	-	-
CO4	3	2	1	-	-
CO5	3	2	1	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UPHGE11 / 23UPHGE31	Allied Physics–I	Allied	3	4	25	75	100

Learning Objectives		
L1	To impart basic principles of Physics that which would be helpful for students who have taken programme other than Physics.	
UNIT	**Contents**	**No. of Hours**
I	**PROPERTIES OF MATTER:** *Elasticity*: stress – strain – modulus of elasticity – elastic constants–bending of beam–theory of uniform bending – theory of non – uniform bending–determination of Young's modulus by uniform and 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 t of viscosity– Derivation of Poisiuille's formula (analytical method)–Bernoulli's theorem proof – Applications – Venturimeter – Pitottube	12
II	**SOUND:** Simple harmonic motions–Progressive waves properties–Composition of two S.H.M. and beats stationary waves –Properties– Melde's experiment for the frequency of electrical maintained tuning fork – Transverse and Longitudinal modes – Acoustics – Ultrasonic – Properties and application.	12
III	**FORCE, WORK, POWER AND ENERGY:** Basic forces in nature–Types of forces-Gravitational force, Electromagnetic force and nuclear forces–Conservative and Non conservative forces -Laws of Friction-Limiting, Coefficient and Angle of friction–Motion of bodies along an inclined plane -Work-Work done by varying force – Expression for kinetic energy and potential energy – Power.	12
IV	**ELECTRICITY AND MAGNETISM:** potentiometer – principle –measurement of thermoemfusing 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 a current and voltage–power factor and current values in an AC circuit.	12

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.	12
VI	**PROFESSIONAL COMPONENTS:** expert lectures – seminars –webinars –industry inputs –social accountability–patriotism.	
	Total	**60**

Course Outcomes		**Knowledge Level**
CO	**On completion of this course, students will**	
1	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life.	K1,K2,K3,K4
2	Explain the Properties of Sound, acoustics and ultrasonic waves.	K1,K2,K3,K4,K5, K6
3	Analyze the laws of motion and central force.	K1,K2,K3,K4,K5, K6
4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and correlate the connection between electric field and magnetic field and analyze them mathematically verify circuits and apply the concepts to construct circuits and study them.	K1,K2,K3,K4,K5, K6
5	Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits. Acquire information about various Govt. programs / institutions in this field.	K1,K2,K3,K4,K5

Textbooks

1	R. Murugesan (2001), ***Allied Physics***, S.Chand and 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 and Co., New Delhi.
4	R. Murugesan (2005), ***Optics and Spectroscopy***, S. Chand and Co, New Delhi.
5	A. Subramaniyam, ***Applied electronics 2nd Edn.,*** National Publishing Co., Chennai.
6	Mechanics, Properties of Matter and Sound - R. Murugeshan, Shantha publications,2002.

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), ***Text book of Sound 1st Edn***.Kedharnaath Publish and Co, Meerut.
3	N.S. Khare and S.S. Srivastava (1983), ***Electricity and Magnetism 10th Edn.,*** Atma Ram and Sons, New Delhi.
4	D.R. Khanna and H.R.Gulati (1979), ***Optics***, S. Chandand Co. Ltd., New Delhi.
5	V.K. Metha (2004), ***Principles of electronics 6th Edn***. S. Chand and company.
Web Resources	
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=9mXOMzUruMQandt=1shttps://www.youtube.com/watch?v=m4u-SuaSu1sandt=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	3	3	3	3	3	3	3	3	3
CO 2	2	3	3	3	2	3	3	3	3	2
CO 3	2	3	3	3	3	2	3	3	3	3
CO 4	3	3	3	3	3	3	3	2	3	3
CO 5	2	3	3	3	3	3	3	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	2	3	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UPHGE1P/ 23UPHGE3P	Allied Physics Practical –I	Core	2	2	40	60	100

Learning Objectives	
L1	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

EXPERIMENTS

Minimum of Eight Experiments from the list:

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.
6. Surface tension and interfacial Surface tension –drop weight method.
7. Comparison of viscosities of two liquids–burette method.
8. Specific heat capacity of a liquid–half time correction.
9. Verification of laws of transverse vibrations using sonometer.
10. Coefficient of viscosity using Stoke's method.
11. Determination of thermoemfusing potentiometer.
12. Verification of truth tables of basic logic gates using ICs.
13. Verification of De Morgan's theorems using logic gate ICs.
14. Use of NAND as universal building block.

Note: Use of digital balance permitted.

Textbooks

C.L.Arora, 2010, B.Sc Practical Physics, S.Chand and Co.

Brijlaland N. Subrahmanyam, 2003, ***Properties of Matter***, S.Chand and Co.

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Find out the value of wavelength and refractive of prism and grating by spectrometer	K1,K2,K3,K4
2	Find the specific resistance of the material of the wire by using PO Box.	K1,K2,K3,K4,K5, K6
3	Determine thermal conducting property of a bad conductor	K1,K2,K3,K4,K5, K6
4	Determine B_H and M value using some experiments related to	K1,K2,K3,K4,K5,

	Electromagnetic theory	K6
5	Realize the nature of logic gates constructions using discrete components	K1,K2,K3,K4,K5

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**).

CO /PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	3	3	2	3	3
CO2	3	3	3	2	3	3	3	3	3	3
CO3	3	2	3	3	3	3	3	3	2	3
CO4	2	3	3	3	3	2	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3	2

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	2	3	3	3	3
CO5	3	3	3	3	2

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UMASE11	MATHEMATICS FOR COMPETITIVE EXAMINATIONS-I	NME	2	2	25	75	100

Learning Objectives		
L1	Develop problem-solving skills for competitive examinations.	
L2	Understand the concepts of averages, simple interest, compound interest, time and work, profit and loss, and problems on numbers.	
L3	Apply mathematical concepts to solve problems related to competitive examinations.	
UNIT	**Contents**	**No. of Hours**
I	Simplifications - Averages – concepts – problems.	6
II	Problems on numbers - short cuts – concepts – problems.	6
III	Profit and Loss - short cuts – concepts – problems.	6
IV	Time and work - short cuts – concepts - problems.	6
V	Simple Interest - Compound interest – concepts – problems.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Apply simplification and average skills to solve problems in competitive examinations.	K1,K2,K3,K4,K5
2	Understand the concepts of simple interest and compound interest.	K1,K2,K3,K4,K5
3	Understand the concepts of time and work.	K1,K2,K3,K4,K5
4	Use formulas to calculate profit/loss percentages and break-even points.	K1,K2,K3,K4,K5
5	Solve problems related to HCF and LCM.	K1,K2,K3,K4,K5

Textbooks	
1	Quantitative Aptitude" by R.S.Aggarwal, S.Chand& Company Ltd., Ram Nagar, New Delhi (2007) **Unit I:** Chapter 4 & 6 **Unit II**: Chapter 7 **Unit III:** Chapter 12 **Unit IV** :Chapter 17
Reference Books	
1.	U. Mohan Rao, Quantitative Aptitude for Competitive Examinations, Scitech Publications, 2016.
2.	Dr.M.Manoharan, Dr.C.Elango and Prof K.L.Eswaran, Business Mathematics, Palani paramount Publications, Reprint 2013
Web Resources	
1.	https://tamilnaducareerservices.tn.gov.in/

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2	3	2	1	1	-	-
CO 2	3	2	3	2	-	1	-	-
CO 3	3	2	3	2	-	1	-	-
CO 4	3	2	3	2	1	1	-	-
CO 5	3	2	3	2	1	1	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	-	-
CO2	3	2	1	-	-
CO3	3	3	1	-	-
CO4	3	2	1	-	-
CO5	3	3	1	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UMAFN11	**Bridge Mathematics**	**FC**	2	2	25	75	100

Learning Objectives		
L1	To bridge the gap and facilitate transition from higher secondary to tertiary education.	
L2	To instill confidence among stake holders and inculcate interest for Mathematics.	
UNIT	**Contents**	**No. of Hours**
I	Algebra: Binomial theorem, General term, middle term, problems based on these concepts**.**	6
II	Sequences and series (Progressions). Fundamental principle of counting. Factorial n.	6
III	Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.	6
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**.**	6
V	Calculus: Limits, standard formulae and problems, differentiation, rest principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration – product rule and substitution method.	6
	Total	**30**

Course Outcomes		**Knowledge Level**
CO	**On completion of this course, students will**	
1	Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems**.**	K1,K2,K3,K4,K5
2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting**.**	K1,K2,K3,K4,K5
3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations**.**	K1,K2,K3,K4,K5
4	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and sub multiple angles, etc. Also, they can solve the problems using the transformations.	K1,K2,K3,K4,K5

5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function and find the points of min/max of a function.	K1,K2,K3,K4,K5
Textbooks		
1	NCERT class XI and XII text books.	
2	Any State Board Mathematics text books of class XI and XII	
Web Resources		
1.	https://www.aicte-india.org/sites/default/files/final%20maths.pdf	
2.	https://egyankosh.ac.in/bitstream/123456789/13834/1/Unit-1.pdf	

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	1	1	1	1	1	-	-
CO 2	2	1	1	2	2	1	-	-
CO 3	2	1	1	2	2	1	-	-
CO 4	1	1	1	1	1	1	-	-
CO 5	1	1	1	1	1	1	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	-	-	-
CO2	2	1	-	-	-
CO3	2	1	-	-	-
CO4	2	1	-	-	-
CO5	2	1	-	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UMACC21	**ANALYTICAL GEOMETRY(Two &Three Dimensions)**	**Core**	4	4	25	75	100

Learning Objectives		
L1	Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes.	
L2	To present mathematical arguments about geometric relationships.	
L3	To solve real world problems on geometry and its applications.	
UNIT	**Contents**	**No. of Hours**
I	Pole, Polar-conjugate points and conjugate lines –diameters– conjugate diameters of an ellipse- semi diameters- conjugate diameters of hyperbola**.**	12
II	Polar coordinates: General polar equation of straight line–Polar equation of a circle given a diameter, Equation of a straight line, circle, conic Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola.	12
III	System of Planes-Length of the perpendicular–Orthogonal projection.	12
IV	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.	12
V	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.	12
	Total	**60**

Course Outcomes		**Knowledge Level**
CO	**On completion of this course, students will**	
1	Find pole ,polar for conics, diameters, conjugate diameters for ellipse and hyperbola.	K1,K2,K3,K4
2	Find the polar equations of straight line and circle, equations of chord ,tangent and normal and to find the asymptotes of hyperbola.	K1,K2,K3,K4,K5,K6
3	Explain in detail the system of Planes.	K1,K2,K3,K4,K5,K6
4	Explain in detail the system of Straight lines.	K1,K2,K3,K4,K5,K6
5	Explain in detail the system of Spheres.	K1,K2,K3,K4,K5,K6
Textbooks		
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
Reference Books	
1.	Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
2.	Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961.
3.	Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010.
4.	William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006.
5.	John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969
6.	Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Web Resources	
1.	https://nptel.ac.in

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	1	-	-	-	-
CO 2	2	2	2	1	-	-	-	-
CO 3	3	2	2	1	-	-	-	-
CO 4	3	2	3	1	-	-	-	-
CO 5	3	2	3	1	-	-	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	-	-
CO2	3	2	1	-	-
CO3	3	2	1	-	-
CO4	3	2	1	-	-
CO5	3	2	1	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UMACC22	INTEGRAL CALCULUS	Core	4	4	25	75	100

Learning Objectives		
L1	Knowledge on integration and its geometrical applications , double, triple integrals and improper integrals.	
L2	Knowledge about Beta and Gamma functions and their applications.	
L3	Skills to Determine Fourier series expansions.	
UNIT	**Contents**	**No. of Hours**
I	Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions- Bernoulli's formula, Feyman's technique of integration**.**	12
II	Multiple Integrals - definition of double integrals –evaluation of double integrals–double integrals in polar coordinates-Change of order of integration.	12
III	Triple integrals–applications of multiple integrals-volumes of solids of revolution-areas of curved surfaces–change of variables-Jacobian.	12
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.	12
V	Geometric and Physical Applications of Integral calculus.	12
	Total	**60**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae.	K1,K2,K3,K4,K5,K6
2	Evaluate double and triple integrals and problems using change of order of integration.	K1,K2,K3,K4,K5,K6
3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution.	K1,K2,K3,K4,K5,K6
4	Explain beta and gamma functions and to use them in solving problems of integration.	K1,K2,K3,K4,K5,K6
5	Explain Geometric and Physical applications of integral calculus.	K1,K2,K3,K4,K5,K6

Textbooks	
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)
Web Resources	
1.	https://nptel.ac.in

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	3	-	-	-	-	-
CO 2	3	1	3	-	-	-	-	-
CO 3	3	1	3	-	-	-	-	-
CO 4	3	1	3	-	-	-	-	-
CO 5	3	1	3	-	2	1	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	-	-
CO2	3	2	1	-	-
CO3	3	2	1	-	-
CO4	3	2	1	-	-
CO5	3	2	1	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UPHGE21/ 23UPHGE41	Allied Physics–II	ALLIED	3	4	25	75	100

Learning Objectives		
L1	To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.	
UNIT	Contents	No. of Hours
I	**Geometrical Optics** Deviation produced by thin lens-Focal length of two thin lenses in and out of contact-Cardinal points-Refraction through a thin prism-Dispersion-Dispersive power-Combination of thin prisms to produce i) Deviation without dispersion and ii) Dispersion without deviation-Direct vision spectroscope-Chromatic aberration in lenses and its removal-Spherical aberration and its removal.	12
II	**INTERFERENCE AND DIFFRACTION** Interference in thin films-Air wedge-Newton's rings-Determination of wavelength-Jamin's Interferometer-principle and uses-Diffraction-Theory of plane transmission grating (normal incidence only)-Experiment to determine wave length.	12
III	**POLARISATION** Double refraction-Nicol prisms, constructions, action and uses-QWP and HWP- .Optical activity-Biot's laws-Specific rotator power-Half shade polarimeter-Determination of specific rotator power-Fiber optics-Light propagation in fibers-Fiber optic communication system.	12
IV	**Heat transfer: Conduction, Convection and Radiation** Thermal conductivity – Lee's disc method for conductivity of Bad conductor- Analogy between heat flow and electric current – Wiedemann-Franz law. Convection in atmosphere – Lapse rate-Stability of atmosphere - Greenhouse effect. Stefan's law – determination of Stefan's Constant by filament heating method – Solar constant measurement – Water flow Pyrheliometer – temperature of the Sun – solar spectrum – energy distribution in black body spectrum – Planck's law (no derivation) – derivation of Wien's and Rayleigh Jean's laws from Planck's law.	12
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	12

	mathematical treatment)–USB cell phone charger–introduction to e-vehicles and EV charging stations.	
VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars –webinars –industry inputs –social accountability–patriotism.	
	Total	**60**

Course Outcomes		**Knowledge Level**
CO	**On completion of this course, students will**	
1	Know the different types of lenses, principal points, cardinal points and the equivalent focal length of the lens system.	K1,K2,K3,K4
2	Learn the principles of Interference, Diffraction and polarization and the experiments related to them.	K1,K2,K3,K4, K5,K6
3	Understand the concept of optical rotation.	K1,K2,K3,K4, K5,K6
4	Comprehend basic concept of thermal physics and deals with different types of heat transfer.	K1,K2,K3,K4, K5,K6
5	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.	K1,K2,K3,K4, K5

Textbooks	
1	R. Murugesan (2004), ***Optics and Spectroscopy***, Vivekanda Press, Madurai.
2	K. Thangaraj and D. Jayaraman (2004), ***Allied Physics***, Popular Book Depot, Chennai.
3	Brijlal and N. Subramanyam (2002), ***Text book of Optics***, S.Chand and Co, New Delhi.
4	R. Murugesan (2005), ***Modern Physics***, S. Chand and Co, New Delhi.
5	A. Subramaniyam, ***Applied Electronics***, 2nd Edn., National Publishing Co., Chennai.
6	***Thermal Physics*** by R. Murugeshan, Unit-II, SPM offset Printers, Madurai.

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 and Co. Ltd., New Delhi.
3	A. Beiser (1997), ***Concepts of Modern Physics***, Tata Mc Graw 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.
6	Heat and Thermodynamics by Brijlal and N. Subramaniyam – S.Chand & Co.
7	Ancillary Physics Vol-II by A. Ubald Raj & Jose Robin.

Web Resources	
1	https://www.berkshire.com/learning-center/delta-p-

	facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318andv=D38BjgUdL5Uandfeature=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

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	3	3	3	3	3	3	3	3	3
CO 2	2	3	3	3	2	3	3	3	3	2
CO 3	2	3	3	3	3	2	3	3	3	3
CO 4	3	3	3	3	3	3	3	2	3	3
CO 5	2	3	3	3	3	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	2	3	3	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UPHGE2P/ 23UPHGE4P	Allied Physics Practical – II	Core	2	2	40	60	100

Learning Objectives	
L1	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.

EXPERIMENTS

Minimum of Eight Experiments from the list:

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 merittable galvanometer.
10. Determination of Earth's magnetic field using field along the axis of a coil.
11. Characterization 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.

Textbooks

C.L.Arora, 2010, B.Sc Practical Physics, S.Chand and Co.

Brijlaland N. Subrahmanyam, 2003, ***Properties of Matter***, S.Chand and Co.

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Determine the properties of matter like young's modulus and to understand the elastic property.	K1,K2,K3,K4
2	Determine the properties of matter like rigidity modulus and to understand the elastic property.	K1,K2,K3,K4, K5,K6
3	Determine the properties of matter like surface tension and viscosity.	K1,K2,K3,K4, K5,K6
4	Understand the thermo e.m.f. using potentiometer	K1,K2,K3,K4,

		K5,K6
5	Realize the nature of logic gates constructions using discrete components	K1,K2,K3,K4, K5

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**).

CO /PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	3	3	2	3	3
CO2	3	3	3	2	3	3	3	3	3	3
CO3	3	2	3	3	3	3	3	3	2	3
CO4	2	3	3	3	3	2	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3	2

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	2	3	3	3	3
CO5	3	3	3	3	2

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UMASE21	MATHEMATICS FOR COMPETITIVE EXAMINATIONS-II	NME	2	2	25	75	100

Learning Objectives		
L1	Develop the problem solving skills for competitive examinations.	
L2	Understand the concepts of Surds, Indices, Percentage, Ratio and Proportions ,Time and Distance, Permutations and Combination, Probability.	
L3	Apply mathematical concepts to solve problems related to competitive examinations.	
UNIT	**Contents**	**No. of Hours**
I	Problems on ages – Surds and indices-concepts –Solved problems	6
II	Percentage – Ratio and Proportions – concepts – Solved problems	6
III	Time and distance –Problems on trains- concepts - Solved problems	6
IV	Calendar and Clock - short cuts – concepts – Solved problems	6
V	Permutation and combinations-Probability– concepts - Solved problems	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Understand the concepts of Problems on ages – Surds and indices.	K1,K2,K3,K4,K5
2	Understand the concepts of Percentage – Ratio and Proportions.	K1,K2,K3,K4,K5
3	Understand the concepts of time and distance, problem on trains .	K1,K2,K3,K4,K5
4	Solve problems in calendar and clock .	K1,K2,K3,K4,K5
5	Solve problems in Permutation and combination, Probability.	K1,K2,K3,K4,K5

Textbooks	
1	Quantitative Aptitude by R.S.Aggarwal, S.Chand& Company Ltd., Ram Nagar, New Delhi (2007) **Unit I:** Chapter 8 , 9 **Unit II**: Chapter 10,12 **Unit III:** Chapter 17,18 **Unit IV** :Chapter 27,28 **Unit V** :Chapter 30,31

Reference Books	
1.	U. Mohan Rao, Quantitative Aptitude for Competitive Examinations, Scitech Publications, 2016.
2.	Dr.M.Manoharan, Dr.C.Elango and Prof K.L.Eswaran, Business Mathematics, Palani paramount Publications, Reprint 2013

Web Resources	
1.	https://tamilnaducareerservices.tn.gov.in/

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2	3	2	1	1	-	-
CO 2	3	2	3	2	-	1	-	-
CO 3	3	2	3	2	-	1	-	-
CO 4	3	2	3	2	1	1	-	-
CO 5	3	2	3	2	1	1	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	-	-
CO2	3	2	1	-	-
CO3	3	3	1	-	-
CO4	3	2	1	-	-
CO5	3	3	1	-	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UMASE2P	LaTeX	SEC	2	2	40	60	100

Learning Objectives		
L1	To enable the students to acquire knowledge in basic concepts of LaTeX.	
L2	To get knowledge to prepare sample reports, sample articles, sample presentation and sample poster.	
UNIT	**Contents**	**No. of Hours**
I	Preamble : Motivation - Running LaTeX - Resources – Basic LaTeX- Sample Document and Key Concepts - Type Style -Environments-Lists- Centering -Tables –Verbatim - Vertical And Horizontal Spacing.	6
II	Typesetting Mathematics - Examples - Equation Environments -Fonts, Hats, and Underlining – Braces – Arrays and Matrices-Customized Commands -Theorem-like Environments – Math Miscellany – Math Styles–Bold Math-Symbols for Number Sets - Binomial Coefficient.	6
III	Further Essential LaTeX : Document Classes and the Overall Structure-Titles for Documents – Sectioning Commands – Miscellaneous Extras-Spacing – Accented Characters –Dashes And Hyphens –Quotation Marks-Troubleshooting – Pinpointing the Error-Common Errors-Warning Messages.	6
IV	Packages – Inputting Files – Inputting Pictures – Making a Bibliography – Making an Index – Latex through the years.	6
V	Sample Article – Sample Report – Sample presentation - Sample Poster – Internet Resources.	6
	Total	30

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Learn LaTeX.	K1,K2,K3,K4
2	Typesetting Mathematics.	K1,K2,K3,K4,K5,K6
3	Know the essential of LaTeX, Document Classes and the Overall Structure.	K1,K2,K3,K4,K5,K6
4	Know the packages, Inputting Files, Inputting Pictures, Making a Bibliography.	K1,K2,K3,K4,K5,K6
5	Prepare the Sample Article, Sample Report, Sample presentation and Sample Poster.	K1,K2,K3,K4,K5,K6

Textbooks	
1	Learning LaTeX : David F. Griffiths, Desmond J. Higham. - SIAM -Society for Industrial and Applied Mathematics, Philadelphia.

Reference Books	
1.	A Guide to LaTeX,Helmut Kopka Patrick W. Daly, Electronic Publishing (Fourth edition) ©Addison Wesley Longman Limited 2004.
2.	LaTeX Tutorials, APRIMER, Indian TEX Users Group, Trivandrum, India 2003 September.
3.	LaTeX Beginner's Guide, Stefan Kottwitz, Published by Packt Publishing Ltd.32 Lincoln Road Olton,Birmingham,B276PA,UK.
Web Resources	
1.	Over leaf:https://www.overleaf.com/
2.	Share LaTeX:https://www.sharelatex.com/
3.	LaTeX Wikibook:https://en.wikibooks.org/wiki/LaTeX

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2	1	-	-	-	-	-
CO 2	3	2	1	-	-	-	-	-
CO 3	3	2	1	-	-	-	-	-
CO 4	3	2	1	-	-	-	-	-
CO 5	3	2	1	-	-	-	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	-	-
CO2	3	2	1	-	-
CO3	3	3	1	-	-
CO4	3	2	1	-	-
CO5	3	3	1	-	-

Strong-3 Medium-2 Low-1