DEPARTMENT OF PHYSICS
H.H.THE RAJAH'S COLLEGE (AUTO)
PUDUKKOTTAI - 622 001

COURSE STRUCTURE
AND
SYLLABI
FOR UG PROGRAMME

CHOICE BASED CREDIT SYSTEM
(2023 - 2024 ONWARDS)

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Frame work(LOCF) Guideline Based Credit and Hours Distribution System B.Sc. Physics Programme - 2023-2024 Onwards

Sem	Paper	Sub code	Hrs/ week	Credit	Exam hrs.	Marks		
						Internal	External	Total
1.1	Part -I-Tamil Paper-I/Hindi Paper-I	23ULT1/ 23ULH1	6	3	3	25	75	100
1.2	Part - II- English Paper-I	23ULE1	6	3	3	25	75	100
1.3	CC 1 - Properties of matter and sound	23UPH1	5	5	3	25	75	100
1.4	CC 2 - Physics Practical -I	23UPH2P	5	5	3	40	60	100
	Generic Elective Course-1- Mathematics Paper -I	23UMTGE1	4	3	3	25	75	100
1.5	Skill Enhancement Course - Foundation Course - Introductory Physics	23UPHSEF1	2	2	3	25	75	100
1.6	Skill Enhancement Course SEC1Soft Skill and Industry Awareness Paper-1	23USE1	2	2	3	25	75	100
			30	23				
2.1	Part -1-Tamil Paper-I/Hindi Paper-I	23ULT2/23 ULH2	6	3	3	25	75	100
2.2	Part - II- English Paper-I	23ULE2	6	3	3	25	75	100
2.3	CC 3 - Heat,Thermodynamics and Statistical Physics	23UPH3	5	5	3	25	75	100
2.4	CC 4 - Physics Practical -II	23UPH4P	5	5	3	40	60	100
2.5	Generic Elective Course-2 – Mathematics Paper -II	23UMTGE2	4	3	3	25	75	100
2.6	Skill Enhancement Course SEC 2 Soft Skill and Industry Awareness Paper-2	23USE2	2	2	3	25	75	100
2.7	Skill Enhancement Course SEC 3 -Nan Muthalvan Course -1	23UPHNM CI	2	2	3	25	75	100
			30	23				
3.1	Part -1-Tamil Paper-III/Hindi Paper-III	23ULT3/23 ULH3	6	3	3	25	75	100
3.2	Part - II- English Paper-III	23ULE3	6	3	3	25	75	100
3.3	CC 5 - General Mechanics and Classical Mechanics	23UPH5	5	5	3	25	75	100
3.4	CC 6 - Physics Practical -III	23UPH6P	5	5	3	40	60	100
3.5	Generic Elective Course (Allied 3&4)							
	Allied-2-Paper 1 (Chemistry Paper-I)*	23UCHGE3	4	3				
	Allied-2-Paper 2 (Chemistry Practical) *	23UCHGE4 P						
3.6	Skill Enhancement Course -SEC-	23UPHSE4	1		3	25	75	100

	4 (Entrepreneurial Skill) Common Paper			**1**				
3.7	**Skill Enhancement Course SEC-5-Nan Muthalvan Course -2**	**23UPHNMC2**	**2**	**2**	**3**	**25**	**75**	**100**
3.8	**Environmental studies**	**23UES**	**1**		**3**	**25**	**75**	**100**
			30	**22**				
4.1	**Part -1-Tamil Paper-IV/Hindi Paper-IV**	**23ULT4/23ULH4**	**6**	**3**	**3**	**25**	**75**	**100**
4.2	**Part - II- English Paper-IV**	**23ULE4**	**6**	**3**	**3**	**25**	**75**	**100**
4.3	**CC 7 –Optics and Spectroscopy**	**23UPH7**	**5**	**5**	**3**	**25**	**75**	**100**
4.4	**CC 8 – Physics Practical -IV**	**23UPH8P**	**5**	**5**	**3**	**40**	**60**	**100**
4.5	**Generic Elective Course (Allied 3&4)**							
	Allied-2-Paper 1 (Chemistry Paper-I) *	**23UCHGE3**			**3**	**25**	**75**	**100**
	Allied-2-Paper 2 (Chemistry Practical) *	**23UCHGE4P**	**3**	**3**	**3**	**40**	**60**	**100**
4.6	**Skill and Enhancement Course SEC- 6-Nan Muthalvan Course-3**	**23UPHNMC3**	**2**	**2**	**3**	**25**	**75**	**100**
4.7	**Value Education and Gender Studies**	**23UVEGS**	**2**	**2**	**3**	**25**	**75**	**100**
4.8	**Environmental studies**	**23UES**	**1**	**2**	**3**	**25**	**75**	**100**
			30	**25**				
5.1`	**CC 9- Electricity Magnetism and Electromagnetism**	**23UPH9**	**5**	**4**	**3**	**25**	**75**	**100**
5.2	**CC 10- Atomic Physics and Nuclear Physics**	**23UPH10**	**5**	**4**	**3**	**25**	**75**	**100**
5.3	**CC 11-Physics Practical - V**	**23UPH11P**	**5**	**4**	**3**	**40**	**60**	**100**
5.4	**CC 12- Project(with viva voce)work**	**23UPH12PW**	**5**	**4**	**3**	**20**	**80**	**100**
5.5	**Discipline Specific Elective 1 Analog Electronics**	**23UPHE1A**	**4**	**3**	**3**	**25**	**75**	**100**
	Discipline Specific Elective 1 Digital Photography	**23UPHE1B**						
	Discipline Specific Elective 2 Medical Instrumentations	**23UPHE2A**						
5.6	**Discipline Specific Elective 2 (Online Objective) C Programming Application in Physics**	**23UPHE2B**	**4**	**3**	**3**	**25**	**75**	**100**
5.7	**Skill and Enhancement Course SEC- 7-Nan Muthalvan Course-4**	**23UPHNMC4**	**2**	**2**	**3**	**25**	**75**	**100**
5.8	**Summer Internship /Industrial Training (30Hrs)**	**23UIT**	**-**	**2**	**3**	**25**	**75**	**100**
			30	**26**				
6.1	**CC13 - Wave Mechanics and Particle Physics**	**23UPH13**	**6**	**4**	**3**	**25**	**75**	**100**
6.2	**CC14 - Solid State Physics**	**23UPH14**	**6**	**4**	**3**	**25**	**75**	**100**
6.3	**CC15 - Physics Practical - VI**	**23UPH 15P**	**6**	**4**	**3**	**40**	**60**	**100**
6.4	**Discipline Specific Elective 3 Digital Electronics and**	**23UPHE3A**	**5**	**3**	**3**	**25**	**75**	**100**

	Microprocessor 8085							
	Discipline Specific Elective 3 Communication System	**23UPHE3B**						
6.5	**Discipline Specific Elective 4 Laser & Fibre Optics**	**23UPHE4A**	**5**	**3**	**3**	**25**	**75**	**100**
	Discipline Specific Elective 4 Nano Scienee and Nano Technology	**23UPHE4B**						
6.6	**Skill and Enhancement Course SEC- 8-Nan Muthalvan**	**23UPHNM C5**	**2**	**2**	**3**	**25**	**75**	**100**
6.7	**Extension Activity**	**23UEA**		**1**				
			30	**21**				
Total : 140 Credits								

***For Allied with Practical Courses, both the theory and Practical papers will have exams at the even semesters.**

Consolidated Semester wise and Component wise Credit distribution.

Parts	**Sem I**	**Sem II**	**Sem III**	**Sem IV**	**Sem V**	**Sem VI**	**Total Credits**
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	2	23
Part V	-	-	-	-	-	1	1
Total	23	23	22	25	26	21	**140**

***Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

B.Sc., PHYSICS SYLLABUS

Preamble:

Physics is one of the basic and fundamental sciences. The curriculum for the graduate programme in Physics is revised as per the UGC guidelines on Learning Outcome based Course Framework. The learner-centric courses let the student progressively develop a deeper understanding of various aspects of physics.

The new curriculum offer courses in the core areas of mechanics, acoustics, optics and spectroscopy, electricity and magnetism, atomic and nuclear physics, solid state, electronics and other fields. The courses will train students with sound theoretical and experimental knowledge that suits the need of academics and industry.In addition to the theoretical course work, the students also learn physics laboratory methods for different branches of physics, specialized measurement techniques, analysis of observational data, including error estimation and etc. The students will have deeper understanding of laws of nature through the subjects like classical mechanics, quantum mechanics, statistical physics etc. The problem solving ability of students will be enhanced. The students can apply principles in physics to real life problems. The courses like integrated electronics and microprocessors will enhance the logical skills as well as employability skills. The numerical methods and mathematical physics provide analytical thinking and provides a better platform for higher level physics for research.

The restructured courses with well-defined objectives and learning outcomes, provide guidance to prospective students in choosing the elective courses to broaden their skills not only in the field of physics but also in interdisciplinary areas.The elective modules of the framework offer students choice to gain knowledge and expertise in specialized domains of physics like astrophysics, medical physics, etc.

Programme	**B.Sc., Physics**
Programme Code	
Duration	**3 years [UG]**
Programme Outcomes: (These are mere guidelines. Faculty can create POs based on their curriculum or adopt from UGC or the University for their Programme)	**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 the analytic thought to a body of knowledge; analyze and evaluate the proofs, arguments, claims, beliefs on the basis of empirical evidences; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach. **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, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, 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 analyze 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 to embrace 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 demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior 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/deskilling.

Programme Specific Outcomes: **(These are mere guidelines. Faculty can create POs based on their curriculum or adopt from UGC or University for their Programme)**	**PSO1: Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions. **PSO 2**: **Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations **PSO3**: **Research and Development:** Design and implement HR systems and practices grounded in researches that comply with employment laws, leading the organization towards growth and development. **PSO4**: **Contribution to Business World:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5**: **Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit

COURSE	**FIRST SEMESTER – CORE**
COURSE TITLE	**CC1- PROPERTIES OF MATTER AND SOUND 23UPH1**
CREDITS	**5**
COURSE OBJECTIVES	Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers. It gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

UNITS	COURSE DETAILS
UNIT-I	**ELASTICITY:** Hooke's law – Stress-strain diagram – Elastic constants –Poisson's ratio – Relation between elastic constants and Poisson's ratio – Work done in stretching and twisting a wire – Twisting couple on a cylinder – Rigidity modulus by static torsion– Torsional pendulum (with and without masses)
UNIT-II	**BENDING OF BEAMS:** Cantilever – Expression for Bending moment – Expression for depression at the loaded end of the cantilever – Oscillations of a cantilever – Expression for time period – Experiment to find Young's modulus – Non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – Expression for elevation – Experiment to determine Young's modulus using microscope.
UNIT-III	**FLUID DYNAMICS:** *Surface tension*: Definition – Molecular forces– Excess pressure over curved surface – Application to spherical and cylindrical drops and bubbles – Determination of surface tension by Jaegar's method – Variation of surface tension with temperature. *Viscosity*:Definition – Streamline and Turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –Corrections – Terminal velocity and Stoke's formula– Variation of viscosity with temperature
UNIT-IV	**WAVES AND OSCILLATIONS:** Simple Harmonic Motion (SHM) – differential equation of SHM – Graphical Representation of SHM – Composition of two SHM in a straight line and at right angles – Lissajous's figures – Free, Damped, Forced vibrations – Resonance and Sharpness of resonance. Laws of transverse vibration in strings – Sonometer – Determination of AC frequency using sonometer –Determination of frequency using Melde's string apparatus.
UNIT-V	**ACOUSTICS OF BUILDINGS AND ULTRASONICS:** Intensity of sound – Decibel – Loudness of sound – Reverberation – Sabine's reverberation formula – Acoustic intensity – Factors affecting the acoustics of buildings. *Ultrasonic waves*: Production of ultrasonic waves – Piezoelectric crystal method – Magnetostriction effect – Application of ultrasonic waves.

TEXT BOOKS	1. Elements of Properties of Matter, D.S.Mathur, S.Chand & Co (2010). 2. Properties of Matter, BrijLal & N. Subrahmanyam,S.Chand & Co 2003. 3. Fundamentals of General properties of matter, H.R. Gulati S. Chand & Co. Pvt. Ltd, (2012). 4. A Text Book of Sound, BrijLal and N.Subrahmanyam,Second revised edition,Vikas Publishing House.(2004). 5. Properties of Matter, R.Murugesan, S.Chand& Co.(2012).

REFERENCE BOOKS	1. Waves and oscillations,C.L. Arora - S. Chand & Co, 2002. 2. Fundamental of General Properties of Matter, H.R. Gulati, Fifth edition,R. Chand & Co(2012).. 3. A Text Book of Sound,R.L. Saihgal,S. Chand & Co. Pvt. Ltd, New Delhi,2007.
WEBLINKS	1. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 2. http://www.sound-physics.com/ 3. http://nptel.ac.in/courses/112104026/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Relate elastic behavior in terms of three modulii of elasticity and working of torsion pendulum.
	CO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.
	CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems.
	CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains.
	CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves.

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**).

23UPH1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	M	M	S	M	S
CO2	S	S	S	S	M	S	S	M	S	S
CO3	S	M	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	S	S	S	M

COURSE	**FIRST SEMESTER – CORE**
COURSE TITLE	**CC2- PHYSICS PRACTICAL-I 23UPH2P**
CREDITS	**5**
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results.

Properties of Matter (Any Eight of the below list)
1. Determination of specific heat capacity of liquid by Newton's law of cooling method. 2. Determination of Young's modulus of the given beam by non-uniform bending using Pin & Microscope. 3. To verify the laws of transverse vibration of a stretched string using sonometer. 4. Determination of surface tension of a liquid & interfacial surface tension between two liquids by drop weight method. 5. Determination radius of capillary tube by mercury pellet method. 6. Determination of g and K using compound pendulum. 7. Determination of internal resistance of a cell using potentiometer. 8. Determination of focal length of a long focus convex lens by auxiliary lens method. 9. Determination of Refractive Index of the given solid Prism using spectrometer. 10. Deterrmination of Young's modulus of the given beam by cantilever – oscillation method 11. Determination of frequency of a tuning fork using sonometer. 12. Frequency of AC by using sonometer.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan ,Chand&Sons (2017). 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers (2007).
REFERENCE BOOKS	1. Practical Physics,P.R. Sasi Kumar, – PHI. Learning Pvt .Ltd (2012). 2. Advanced Practical Physics,S. P.Singh, Pragathi Prakasam1Ed(007). 3. Practical Physics – St. Joseph College, Trichy. 2002. 4. Allied Physics Practical ,Somasundaram. 2nd edision ,S.Viswanathan-Publishers(2007).
WEBLINKS	1. https://nptel.ac.in/course.html/physics/experimental physics I,II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Realize principles and applications of Transmission of heat
	CO2	Analyze the concepts of Viscosity,Surface tension,Youngs modulus of different substances
	CO3	Realize principles and applications of Potentiometer,Sonameter, Magnetometer

	CO4	Realize principles and applications of focal length of a long focus convex lens
	CO5	Realize principles and applications of spectrometer and other optical instruments

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**).

23UPH2P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	M	S	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	S	S	S	M

COURSE	**FIRST SEMESTER – SEC - FOUNDATION COURSE**
COURSE TITLE	**INTRODUCTORY PHYSICS 23UPHSEF1**
CREDITS	**2**
COURSE OBJECTIVES	To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.

UNITS	**COURSE DETAILS**
UNIT-I	Vectors, Scalars – Examples for scalars and vectors from physical quantities – Addition, Subtraction of vectors – Resolution and Resultant of vectors – Units and Dimensions– Standard physics constants
UNIT-II	Different types of forces – Gravitational, Electrostatic, Magnetic, Electromagnetic, Nuclear – Mechanical forces like, Centripetal, Centrifugal, Friction, Tension, Cohesive, Adhesive forces
UNIT-III	Different forms of energy – Conservation laws of momentum, Energy – Types of collisions – Angular momentum– Alternate energy sources – Real life examples
UNIT-IV	Types of motion– Linear, Projectile, Circular, Angular, Simple Harmonic Motions – Satellite motion – Banking of a curved roads – Stream line and Turbulent motions – Wave motion – Comparison of light and sound waves – Free, Forced, Damped oscillations
UNIT-V	Surface tension – Shape of liquid drop – Angle of contact – Viscosity – Lubricants – Capillary flow – Diffusion – Real life examples – Properties and types of materials in daily use – Conductors, Insulators – Thermal and Electric.
TEXT BOOKS	1. Elements of Properties of Matter,D.S.Mathur,S.Chand & Co (2010). 2. Properties of Matter, BrijLal & N. Subrahmanyam,S.Chand & Co.(2003).
REFERENCE BOOKS	1. Fundamental of General Properties of Matter, H.R. Gulati,Fifth edition, S.Chand & Co.(2012).
WEBLINKS	1. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ 2. https://eesc.columbia.edu/courses/ees/climate/lectures/radiationhays/

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Apply concept of vectors to understand concepts of Physics and solve problems.
	CO2	Appreciate different forces present in Nature while learning about phenomena related to these different forces.
	CO3	Quantify energy in different process and relate momentum, velocity and energy.
	CO4	Differentiate different types of motions they would encounter in various courses and understand their basis.
	CO5	Relate various properties of matter with their behaviour and connect them with different physical parameters involved.

MAPPING WITH PROGRAM OUTCOMES:

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

23UPHSEF1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

COURSE	**SECOND SEMESTER – CORE 23UPH3**
COURSE TITLE	**CC3- HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS**
CREDITS	**5**
COURSE OBJECTIVES	The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation.

UNITS	COURSE DETAILS
UNIT-I	**CALORIMETRY:** Specific heat capacity – Specific heat capacity of gases C_P & C_V – Meyer's relation – Joly's method for determination of C_V – Regnault's method for determination of C_P. **LOW TEMPERATURE PHYSICS:** Joule-Kelvin effect – Porous plug experiment – Joule -Thomson effect – Boyle temperature – Temperature of inversion – Liquefaction of gas by Linde's Process – Adiabatic demagnetisation.
UNIT-II	**THERMODYNAMICS-I:** Zeroth law and first law of thermodynamics – P-V diagram – Heat engine – Efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engine – comparison of engines.
UNIT-III	**THERMODYNAMICS-II:** Second law of thermodynamics – Entropy of an ideal gas – Entropy change in reversible and irreversible processes – T-S diagram –Thermodynamical scale of temperature – Maxwell's thermodynamical relations – Clasius - Clapeyron's equation (first latent heat equation) – Third law of thermodynamics – un attainability of absolute zero – heat death.
UNIT-IV	**HEAT TRANSFER:** Modes of heat transfer: Conduction, Convection and Radiation. *Conduction*: Thermal conductivity – Determination of thermal conductivity of a good conductor by Forbe's method – Determination of thermal conductivity of a bad conductor by Lee's disc method. *Radiation*: Black body radiation (Ferry's method) – Distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation – Stefan's law – Deduction of Newton's law of cooling from Stefan's law.
UNIT-V	**STATISTICAL MECHANICS:** Definition of phase-space – micro and macro states – Ensembles –Different types of ensembles – Classical and quantum Statistics – Maxwell-Boltzmann statistics – Expression for distribution function – Bose-Einstein statistics – Expression for distribution function – Fermi-Dirac statistics –Expression for distribution function – comparison of three statistics.
TEXT BOOKS	1. Heat and Thermodynamics, Brijlal &N. Subramaniam,S.Chand&co(2000) 2. Heat and Thermodynamics, D.S.Mathur, Sultan Chand & Sons.2014 3. Thermal Physics ,P.Thangaraj and D.Jayaraman. 2nd Edition,2010. 4. R.Murugeshan and Kiruthiga Sivaprasath, Thermal physics, S. Chand&co New Delhi , (2008). 5.Statistical Mechanics,Gupta,Kumar,Sharma,2013,26thEdition,S.Chand& Co.

REFERENCE BOOKS	1. Heat and Thermodynamics,J.B.Rajam & C.L.Arora, 10th edition, S.Chand& Co. Ltd. 1983. 2. Thermal Physics, A. B. Gupta And H. P.Roy, Books &Allied Ltd; 3rd Revised Edition Edition (2010). 3. Heat, M. Narayanamoorthy and N. Nagarathinam National publishing Co,Chennai, Eight edition, 2002. 4. Resnick, Halliday&Walker , Fundamentals of Physics, 6th Edition. 2010. 5. University Physics with Modern Physics Sears, Zemansky, Hugh D. Young,Roger A. Freedman,15th Edition, Pearson. 2021
WEBLINKS	1. https://youtu.be/M_5KYncYNyc 2. https://www.youtube.com/watch?v=4M72kQulGKk&vl=en

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Low temperature Physics sets the basis for the students to understand cryogenics, superconductivity, super fluidity and Condensed Matter Physics.
	CO2	Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines
	CO3	Able to analyze performance of thermodynamic systems vise efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy.
	CO4	Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyze them.
	CO5	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron.

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**).

23UPH3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	S	S	M	S	S	S	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	S	M	M
CO5	S	S	S	S	S	S	M	M	S	M

COURSE	**SECOND SEMESTER – CORE**
COURSE TITLE	**CC4 - PHYSICS PRACTICAL-II 23UPH4P**
CREDITS	**5**
COURSE OBJECTIVES	Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results.

HEAT, OSCILLATIONS, WAVES & SOUND(Any Eight of the below list)

1. Determination of Young's modulus by uniform bending – Scale & Telescope.
2. Determination of thermal conductivity of bad conductor by Lee's disc method.
3. Determination of specific heat capacity of solid by method of mixtures.
4. To verify the laws of transverse vibration using Melde's apparatus.
5. Determination of thickness of the wire using air wedge arrangement .
6. Study of V- I characteristics of a junction diode .
8. Study of V- I characteristics of a zener diode.
9. Determination of focal length of a concave lens by auxiliary lens method.
10. Determination of a.c.main frequency using sonometer.
11. Determination of rigidity modulus of the rod by static torsion.
12. Determination of viscosity of the given liquid by graduated burette method.

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007)
REFERENCE BOOKS	1,Practical Physics,P.R. Sasi Kumar PHI. Learning Pvt .Ltd (2012). 2.Advanced Practical Physics,S. P.Singh, Pragathi Prakasam1Ed'2007. 3.Practical Physics – St. Joseph College, Trichy. 2002. 4.Allied Physics Practical ,somasundaram. 2nd edision S.Viswanathan,Publishers(2007)
WEB LINKS	1. https://nptel.ac.in/course.html/physics/experimental physics I,II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Analyze the concepts of Viscosity,Youngs modulus of different substances.
	CO2	Realize principles and applications of Transmission of heat.
	CO3	Realize principles and application Potentiometer,Sonameter, Magnetometer.
	CO4	acquire the knowledge of the characteristics of an PN junction diode and Zener diode.
	CO5	Analyze the concepts of Viscosity,Surface tension.

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**)andLOW(**L**).

23UPH4P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	M	S	S
CO2	S	S	S	S	S	M	S	S	S	M
CO3	S	S	S	S	S	S	M	S	M	S
CO4	S	S	S	S	M	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	M

COURSE	**THIRD SEMESTER – CORE** **23UPH5**
COURSE TITLE	**CC5 - GENERAL MECHANICS AND CLASSICAL MECHANICS**
CREDITS	**5**
COURSE OBJECTIVES	This course allows the students: To have a basic understanding of the laws and principles of mechanics; To apply the concepts of forces existing in the system; To understand the forces of physics in everyday life; To visualize conservation laws; To apply Lagrangian equation to solve complex problems.

UNITS	**COURSE DETAILS**
UNIT-I	**LAWS OF MOTION:** Newton's Laws– forces – Equations of motion – frictional force – Motion of a particle in a uniform gravitational field – types of everyday forces in Physics. *Gravitation*: Classical theory of gravitation–Kepler's laws, Newton's law of gravitation – Determination of G by Boy's method – Earth-moon system – Weightlessness – Earth satellites – Parking orbit – Earth density – Mass of the Sun – Gravitational potential – Velocity of escape – Satellite potential and Kinetic energy
UNIT-II	**CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM: C**onservation of linear and angular momentum – Internal forces and momentum conservation – Center of mass – Examples – General elastic collision of particles of different masses – System with variable mass – Examples – Conservation of angular momentum – Torque due to internal forces – Torque due to gravity – Angular momentum about center of mass – Proton scattering by heavy nucleus.
UNIT-III	**CONSERVATION LAWS OF ENERGY:** Introduction – Significance of conservation laws – Law of conservation of energy concepts of work-Power Energy – Conservative forces – Potential energy and Conservation of energy In gravitational and electric field – Examples – Non-conservative forces – General law of conservation of energy.
UNIT-IV	**RIGID BODY DYNAMICS:** **T**ranslational and Rotational motion – Angular momentum – Moment of inertia – General theorems of moment of inertia – Examples – Rotation about fixed axis – Kinetic energy of rotation – Examples – Body rolling along a plane surface – Body rolling down an inclined plane – Gyroscopic precision – Gyrostatic applications.

UNIT-V	**LAGRANGIAN MECHANICS:** Generalized coordinates – Degrees of freedom – Constraints – Principle of virtual work and D' Alembert's Principle – Lagrange's equation from D' Alembert's principle – Applications – Simple pendulum – Atwood's machine.
TEXT BOOKS	1. Classical Mechanics. Herbert Goldstein C. Poole and J. Sofko, (Pearson Education, New Delhi,2013). 2. Mechanics,D.S. Mathur & P.S.Hemne, Revised Edition,S.Chand& Co.2000 3. Dynamics.Narayanamurthi, M.&Nagarathnam. N, 2008, 8th Edition The National Publishing,Chennai. 4. Statics, Hydrostatics and Hydrodynamics, Narayanamurthi, M. and Nagarathnam, N, 2008,8th Edition The National Publishers, Chennai.
REFERENCE BOOKS	1. ClassicalMechanics,J.C.Upadhyaya,2019,Himalaya Publishing house, Mumbai 2. R.Murugeshan, Mechanics and Mathematical Physics, S.Chand& Company Ltd., New Delhi , Third Revised Edition (2008). 3. Halliday, David Robert Resnick and Walker Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi
WEBLINKS	1. https://youtu.be/X4_K-XLUIB4 2. https://nptel.ac.in/courses/115103115 3. https://www.youtube.com/watch?v=p075LPq3Eas 4. https://www.youtube.com/watch?v=mH_pS6fruyg

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the Newton's Law of motion, understand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion.
	CO2	Acquire the knowledge on the conservation laws.
	CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces.
	CO4	Gain knowledge on rigid body dynamics and solve problems based on this concepts.
	CO5	Appreciate Lagrangian system of mechanics, apply D' Alemberts principle.

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**)andLOW(**L**).

23UPH5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	M	S	S
CO2	S	S	S	M	S	M	S	S	S	M
CO3	S	S	S	S	S	S	M	S	M	S
CO4	M	S	S	S	M	S	S	M	S	S
CO5	S	S	M	S	S	M	S	S	S	M

COURSE	THIRD SEMESTER – CORE
COURSE TITLE	CC6 - PHYSICS PRACTICALS-III 23UPH6P
CREDITS	5
COURSE OBJECTIVES	Construct circuits to learn about the concept of electricity, current, resistance in the path of current, light and different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concepts.

ELECTRICITY,MAGNETISM,HEAT,LIGHT (Any eight of the below list)

1. Calibration of ammeter using potentiometer.
2. Determination of earth's magnetic field using field along axis of current carrying circular coil.
3. Determination of resistance and specific resistance using Carey Foster's bridge.
4. Determination of e.m.f of thermo couple using potentiometer.
5. Determination of wavelength of prominent lines of mercury spectrum by Normal incidence method using spectrometer and grating.
6. Determination of refractive index of the material of the prism by i- d curve method using spectrometer.
7. Determination of specific heat capacity of liquid by Joule's calorimeter method.
8. Determination of rigidity modulus with and without mass using Torsional pendulum.
9. Determination of figure of merit of spot galvanometer.
10. Determination of specific resistance of the material of the wire using Post office box.
11. Measurement of low resistances using potentiometer.
12. Determination of viscosity by Searle's viscometer.

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007)
REFERENCE BOOKS	1.P.R. Sasi Kumar, Practical Physics –, PHI. Learning Pvt .Ltd (2012). 2.S.P.Singh, Advanced Practical Physics, Pragathi Prakasam1Ed'2007. 3.Practical Physics – St. Joseph College, Trichy. 2002. 4.Allied Physics Practical ,somasundaram. 2nd edision S.Viswanathan,Publishers(2007)
WEBLINKS	1. https://nptel.ac.in/course.html/physics/experimental physics I,II andIII 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Realize principles and applications of potentiometer & electro motive force.
	CO2	Realize principles and applications of spectrometer and other optical instruments
	CO3	Realize principles and applications of Potentiometer,and Magnetometer
	CO4	Realize principles and applications of Transmission of heat.
	CO5	Analyze the concepts of Viscosity,Surface tension.

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**)andLOW(**L**).

23UPH6P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	M	S	S
CO2	S	S	S	M	S	M	S	S	S	M
CO3	S	S	S	S	S	S	M	S	M	S
CO4	M	S	S	S	M	S	S	M	S	S
CO5	S	S	M	S	S	M	S	S	S	M

COURSE	**FOURTH SEMESTER – CORE**
COURSE TITLE	**CC7- OPTICS AND SPECTROSCOPY 23UPH7**
CREDITS	**5**
COURSE OBJECTIVES	To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics; To explain the behaviour of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization and apply the knowledge in day to day life; To understand the design of optical systems and methods to minims aberrations; To solve problems in optics by selecting the appropriate equations and performing numerical or analytical calculations.

UNITS	COURSE DETAILS
UNIT-I	**LENS AND PRISMS:** Fermat's principle of least time – Postulates of geometrical optics – Thick and thin lenses – Focal length, Critical thickness, Power and Cardinal points of a thick lens – Narrow angled prisms. *Lens*: Lens makers formula (no derivation) – Aberrations: Spherical aberration,Chromatic aberrations, Coma,and Astigmatism – Curvature of the field – Distortion – Chromatic aberrations methods. *Prism*: Dispersion, Deviation, Aberrations - Applications rainbows and halos. *Eyepieces*: Advantage of an eyepiece over a simple lens – Huygen's and Ramsden's eyepieces, construction and working – Merits and demerits of the eyepiece. *Resolving power*: Rayleigh's criterion for resolution – Limit of resolution for the eye – Resolving power of, (i) Prism (ii) grating (iii) telescope.
UNIT-II	**INTERFERENCE:** Division of wave front, Coherent sources – Phase difference – Path difference Fresnel's biprism – Fringes with white light – Division of amplitude: Interference in thin films due to, (i) Reflected light, (ii) Transmitted light – Colours of thin films applications – Air wedge – Newton's rings. *Interferometers* : Michelson's interferometer – Applications, (i) determination of the wavelength of a monochromatic source of light, (ii) Determination of the wavelength and separation D_1 and D_2 lines of sodium light.
UNIT-III	**DIFFRACTION:** Fresnel's assumptions – Fresnel type of diffraction – diffraction pattern due to a straight edge – Positions of maximum and minimum intensities – Diffraction due to a narrow slit – Fraunhofer type of diffraction – Fraunhofer diffraction at a single slit – Plane diffraction grating - Dispersive power of a grating – Resolving power of a telescope, microscope , Prism and grating – Comparison of grating and prism – Experiment to determine wavelengths – Width of principal maxima..

UNIT-IV	**POLARISATION:** Optical activity – Optically active crystals –Polarizer and Analyser–Double refraction – Optic axis, Principal plane – Huygens's explanation of double refraction in uniaxial crystals – Polaroids and applications – Circularly and Elliptically polarized light – Quarter wave plate – Half wave plate – Production and Detection of circularly and Elliptically polarized lights – Fresnel's explanation – Specific rotation – Laurent half shade polarimeter – Experiment to determine specific rotatory power.
UNIT-V	**SPECTROSCOPY:** Infra-red spectroscopy near infra-red and far infra-red – Properties – Origin of IR spectra – IR spectrophotometer – Applications interpretation of IR spectra – CH, CO, CN bending and stretching vibrational modes only – Scattering of light – Raman effect – Raman spectrometer-Characteristics of Raman lines – Applications – ultraviolet and visible spectroscopy – Properties – Spectrophotometer.
TEXT BOOKS	1. Optics, Subramaniam.N&Brijlal,25th edition,S.Chand &Co. 2014 2. Dr.M.N. Avathanulu, Optics, S. Chand& Co. Pvt. Ltd.- 9th revised edition, New Delhi ,2014 3. R. Murugeshan and Kiruthiga Sivaprasath, Optics and spectroscopy, S. Chand & Co, New Delhi (2010) 4. Elements of Spectroscopy, S.L.Gupta,V.Kumar & R.C.Sharma, 13th Edition, Pragati Prakashan, Meerut.1997.
REFERENCE BOOKS	1. Optics, Agarwal B.S, 2011,KedernathRamnath Publishers, Meerut. 2. Optics, Sathyaprakash, 1990VII edition, RatanPrakashanMandhir, New Delhi. 3. Introduction to Molecular Spectroscopy, C.N.Banewell, 2006, IV edition,TMH Publishing Co,New Delhi. 4. Optics, AjoyGhatak, 2009,4thedition, PHIPvt Ltd, New Delhi.
WEBLINKS	1. https://science.nasa.gov/ems/ 2. https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCzwo7UlGkb-8Pr6svxWo-LA&start_radio=1&t=2472 1. https://science.nasa.gov/ems/

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces
	CO2	Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light through working of interferometer
	CO3	Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyse the optical instruments
	CO4	Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries
	CO5	Relate the principles of optics to various fields of IR, Raman and UV spectroscopy and understand their instrumentation and application in industries

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**).

23UPH7	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	M	S	S	M	M
CO2	M	S	M	S	M	S	M	M	S	S
CO3	S	M	S	S	S	M	S	S	M	M
CO4	S	M	S	M	M	S	M	M	S	M
CO5	S	M	S	M	S	S	M	S	S	S

COURSE	**FOURTH SEMESTER – CORE**
COURSE TITLE	**CC8 - PHYSICS PRACTICALS-IV** **23UPH8P**
CREDITS	5
COURSE OBJECTIVES	Demonstrate various optical, electrical, magnetic phenomena principles, working, apply with various materials and interpret the results.

LIGHT(Any eight of the below list)

1. Determination of refractive index of liquid using hollow prism and spectrometer.
2. Determination of wavelength using Laser/Monochromatic source.
3. Determination of dispersive power of a prism using spectrometer.
4. Determination of radius of curvature of lens by forming Newton's rings.
5. Calibration of low range voltmeter using potentiometer.
6. Determination of Young's modulus by cantilever – load depression graph.(Scale & Telescope).
7. Determination of viscosity by Stoke's method.
8. Determination of surface tension by Capillary rise method.
9. Determination of M and B_H using deflection and vibration magnetometers.
10. Determination of emissive power of a surface by spherical calorimeter.
11. Determination of impedance and power factor of a coil.
12. Construction of full wave rectifier with filter.

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007)
REFERENCE BOOKS	1.P.R. Sasi Kumar, Practical Physics –, PHI. Learning Pvt .Ltd (2012). 2.S. P.Singh, Advanced Practical Physics, Pragathi Prakasam1Ed'2007. 3.Practical Physics – St. Joseph College, Trichy. 2002. 4.Allied Physics Practical ,somasundaram. 2nd edision S.Viswanathan,Publishers(2007)
WEB LINKS	1. https://nptel.ac.in/course.html/physics/experimental physics I,II andIII 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

METHOD OF EVALUATION:

Continuous InternalAssessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Realize principles and applications of potentiometer & electro motive force.
	CO2	Realize principles and applications of spectrometer and other optical instruments
	CO3	Realize principles and applications of Potentiometer,and Magnetometer
	CO4	Realize principles and applications of full wave rectifier with filter.
	CO5	Analyze the concepts of Viscosity,Surface tension &Young's modulus.

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**).

23UPH8P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	M	M
CO2	S	S	S	S	M	S	S	M	S	S
CO3	S	M	S	S	S	M	S	S	M	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	M	S	S	S

COURSE	**ALLIED-2 PAPER- I (ODD&EVEN SEMESTER)**
COURSE TITLE	**ALLIED PHYSICS (For B.sc Mathematics and Chemistry) 23UPHGE3**
CREDITS	**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	**DYNAMICS AND PROPERTIES OF MATTER:** Impact - Direct and oblique impact of two spheres - Moment of Inertia of a solid sphere and solid cylinder - Gravitation - Determination of G by Boy's method. Elasticity - Three modulii of Elasticity - Poisson's ratio - Relation between three modulii - Surface tension - Excess of pressure inside a bubble and drop weight method - Coefficient of viscosity - Determination of viscosity by variable pressure head method.
UNIT-II	**SOUND AND HEAT:** Laws of vibration in stretched strings - Sono meter - Verification of laws - Acoustics of buildings - Reverberation - Sabine formula - Ultrasonics - Production and applications. Newton's law of cooling - Specific heat capacity of a liquid - Thermal conductivity - Coefficient of thermal conductivity of bad conductor by Lee's disc method.

UNIT-III	**OPTICS, ELECTRO STATICS AND CURRENT ELECTRICITY**: Aberration - Definition of coma, Spherical aberration, Chromatic aberration – Equivalent focal length of two thin lenses eye pieces, Huygens and Ramsden eyepieces - Interference of light in thin films - Air wedge - Newton's rings - Diffraction of single slit - Grating - Determination of wave length of spectral lines - Normal incidence method. Gauss theorem - Capacitor - dielectrics - Energy of charged conductor - Sharing of charges between two charged conductor - Potentiometer - Measurement of current, Calibration of low range voltmeter and low range ammeter.
UNIT-IV	**ATOMIC PHYSICS AND NUCLEAR PHYSICS:** Atom models - Vector atom model - Pauli's exclusion principle - Quantum numbers and quantization of orbits - Stern and Gerlach experiment - X-rays - Continuous and characteristics X- rays - Mosley's law. Binding energy - General properties of nucleus - Nuclear forces and their characteristics - Nuclear models - liquid drop model - Shell model - Nuclear fission - Fusion reactions - Nuclear reactors.
UNIT-V	**ANALOG AND DIGITAL ELECTRONICS:** Semi conductors - P.N.Junction diode - Characteristics - Zener diode - Characteristics - Rectifiers - Zener diode as voltage regulator - Transistors - Characteristics in CE and CB mode - Binary arithmetics - Basic logic gates - Boolean algebra - Demorgan's theorem - Verification using truth tables.
TEXT BOOKS	1. A text book of sound - Brijilal and Subramanian,vikas publishing house New Delhi.(2005). 2. Heat and thermodynamics - Brijlal and Subramanian S.K.chandand Co New Delhi,(2002). 3. Modern Physics, Murugesan R. and Kiruthiga Sivaprasath. S. Chand and Company, 18th edition (2016). 4. Principles of Electronics by V.K.Metha, Rohith Metha, S.Chand & Company,New Delhi 11th edision(2015).7.
REFERENCE BOOKS	1. Properties of matter - R.Muruguesan, S.Chand& Co.(2004). 2. Atomic Physics, Rajam J B, S. Chand and Company Ltd, New Delhi, 20th edition (2009). 3. Thermal physics, R. Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co, New Delhi 2008. 4. Text Book of Sound. Brijlal & Subramanyam S. Chand & Co, 2005. 5. Digital Principles and Applications – Albert Malvino Leech, TMH,(2010).
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the Newton's Law of motion, understand general theory of relativity, Relate elastic behavior in terms of three modulii of elasticity and working of torsion pendulum and explain the surface tension and viscosity of fluid and support the interesting phenomena associated with

		liquid surface, soap films provide an analogue solution to many engineering problems.
	CO2	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life. Student identifies the relationship between heat capacity, specific heat capacity. Study the process of thermal conductivity and apply it to good and bad conductors.
	CO3	Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces and Extend the knowledge about nature of light through diffraction techniques. Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyze them.
	CO4	Explain different atom models. Articulate the knowledge about Continuous and characterization of x rays, Understand the nuclear models then nuclear reaction.
	CO5	Articulate the knowledge about semiconductor and diodes, rectifiers and CE &CB Configuration 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.

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**).

23UPHGE3	**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	**ALLIED-2- PAPER-II (ODD&EVEN SEMESTER) 23UPHGE4P**
COURSE TITLE	**ALLIED PHYSICS PRACTICAL (For B.sc Mathematics and Chemistry)**
CREDITS	**3**
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 Fifteen of the below list..

1. Determination of young's modulus by non uniform bending (pin and microscope).
2. Determination of surface tension and interfacial surface tension by drop weight method.
3. Verification of law of transverse vibrations in a stretched string using sonometer.
4. Determination of viscosity by graduated burette method.
5. Determination of specific heat capacity of liquid by Newton's cooling method.
6. Determination of thermal conductivity of bad conductor by Lee's disc method.
7. Determination of refractive index of material of the prism by spectrometer.
8. Study of VI characteristics of a junction diode.
9. Study of VI characteristics of a zener diode.
10. Determination of radius of curvature of a convex lens by forming Newton's rings.

11. Determine the specific resistance of the given coil using potentiometer.
12. Determination of g and k using compound pendulum.
13. Construction of full wave rectifier with filters.
14. Determine the figure of merit of a mirror galvanometer.
15. Determine the emf of a thermocouple by the direct deflection method.
16. Determine the prominent lines mercury spectrum by placing a grating in normal incidence position.
17. Determine the specific resistance of a wire using Carey Foster bridge.
18. Determine the focal length of a long focal convex lens.
19. Construction of low range power pack using two diodes.
20. Construction of AND, OR, NOT gates using diodes and transistor.

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007).
REFERENCE BOOKS	1.P.R. Sasi Kumar, Practical Physics –, PHI. Learning Pvt .Ltd (2012). 2.S. P.Singh, Advanced Practical Physics, Pragathi Prakasam1Ed'2007. 3.Practical Physics – St. Joseph College, Trichy. 2002. 4.Allied Physics Practicals ,Somasundaram. 2nd edision S.Viswanathan,Publishers(2007).
WEB LINKS	. 1. https://nptel.ac.in/course.html/physics/experimental physics I,II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

METHOD OF EVALUATION

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Analyze the concepts of viscosity,surface tension,youngs modulus of different substances. .
	CO2	Realize principles and applications of spectrometer and other optical instruments
	CO3	Realize principles and applications of potentiometer,sonameter ,Magnetometer & transmission of heat.
	CO4	Acquire the knowledge of the characteristics of an PN junction diode and Zener diode.
	CO5	Realize principles and applications of basic logic gates.

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**).

23UPHGE4P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	M	S	S	S	S	M
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	M

COURSE	**ALLIED-1 PAPER- I (ODD&EVEN SEMESTER)**
COURSE TITLE	**APPLIED PHYSICS (For B.sc computer science) 23UCPGE3**
CREDITS	**3**
COURSE OBJECTIVES	To impart knowledge on the concepts of electric and magnetic materials.To develop knowledge on the fundamental laws of electromagnetism.To explain the theory of semiconductors and diodes.To understand the basic lasing action and types of lasers.To study the applications of operational amplifier and optoelectronic devices.

UNITS	COURSE DETAILS
UNIT-I	**ELECTROSTATICS AND MAGNETOSTATICS:** Electric field and electric Intensity – Potential at a point due to a point charge – Relation between potential and field – Equipotential surface – Capacitors – Principle – Speherical and Cylindrical capacitors – Types of capacitor. .Magnetic potential at a point due to an isolated pole and potential due to a dipole – Radiation between magnetic potential and intensity – Magnetic shell – Potential at any point due to a magnetic shell – dia,para and ferro magnetic substances and their properties – Hysteresis.
UNIT-II	**CURRENT ELECTRICITY AND ELECTROMAGNETISM:** Ohm's law – Kirchoff's laws -– Wheatstone's bridge – Condition for balance – Carey Foster's bridge and measurement of resistance – Potentiometer – Measurement of current and resistance.Laws of electromagnetic induction - Eddy current and its application – Transformer theory and energy losses – AC circuit containing R only, C only – AC circuit containing L and R only – AC circuit containing C and R – Power in a pure resistive circuit – Power factor –Wattless currents – Choke – AC circuit having L,C and R in series and parallel.
UNIT-III	**SEMICONDUCTOR PHYSICS:** Theory of energy bands in crystals – Distinction between conductors, insulators and semiconductors – Intrinsic and extrinsic semiconductors –Junction diode and Zener diode – Avalanche break down – PNP and NPN transistors – DC characteristics of CB and CE configurations – Functions of a transistor in amplifiers and Oscillator – FET – N channel and P channel FET - Performance and characteristics
UNIT-IV	**LASERS AND MASERS:** Principle of LASER – Properties of LASER – Basic concepts of stimulated emission, induced absorption and spontaneous emission – Pumping action – Population inversion and meta stable state – Ammonia maser – Ruby laser –He - Ne laser – Semi conductor laser and Dye laser CO_2 LASER – Uses of laser.

UNIT-V	**OPERATIONAL AMPLIFIERS AND ELECTRONIC DEVICES:** The basic operational amplifier – Inverting and non-inverting operational amplifier – Basic uses of operational amplifier as sign changer, Differentiator, Integrator, Adder and Subtractor.LED – Radiation – Transition – Emission spectra – Methods of excitation visible materials for LED – LED configuration and performance – Photo conduction – Photo diode – Photo transistors – Seven segment displays – LCD.
TEXT BOOKS	1. Electricity and Magnetism by R.Murugeshan ,S. Chand & Company Pvt. Ltd.,New Delhi (2015). 2. N. Avadhanulu , An introduction to Laser, S. Chand & Company,(2001). 3. Principles of Electronics by V.K.Metha, Rohith Metha, S.Chand & Company,New Delhi 11th edision(2015). 4. Integrated Electronics by Jacob Milman and Christos Halkias , TMH 2nd edision (2017).
REFERENCE BOOKS	1. Electricity and Magnetism by Brijlal and Subramanian, S.K.chand and Co New Delhi,(2005). 2. Theraja. B.L, Basic electronics - Solid State, S.Chand and Company Ltd (2002). 3. K.Thyagarajan, A.K.Ghatak - Laser Theory and applications.Cambridge University Press.1983.
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Impart knowledge on the concepts of electric and magnetic materials. .
	CO2	Develop knowledge on the fundamental laws of electromagnetism.
	CO3	Explain the theory of semiconductors and diodes.
	CO4	Understand the basic lasing action and types of lasers.
	CO5	Study the applications of operational amplifier and optoelectronic devices

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**).

23UCPGE3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	S

CO2	S	S	S	S	M	S	S	S	S	M
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	S	S	S	M

COURSE	**ALLIED-2- PAPER-II (ODD&EVEN SEMESTER) 23UCPGE4P**
COURSE TITLE	**APPLIED PHYSICS PRACTICAL (For B.sc computer science)**
CREDITS	**3**
COURSE OBJECTIVES	Develop the experimental skills in Mechanics and Properties of matter. Gain Knowledge about the experiments based on Electricity and Magnetism. Motivate the students to apply the experimental techniques in Optics. Develop the experimental techniques in Sound. Motivate the students to apply the experimental techniques in Transmission.

Any Fifteen of the below list.

1. Specific resistance of the wire by potentiometer.
2. Calibration of ammeter using potentiometer.
3. Specific resistance of the wire by Carey Foster bridge.
4. Field along the axis of a coil-M.
5. Figure of merit of a mirror galvanometer.
6. Series resonance circuit.
7. Characteristics of a junction diode.
8. Characteristics of a zener diode.
9. Transistor characteristics –CE configuration.
10. Full wave rectifier construction with filters.
11. Voltage regulator using zener diode.
12. Transistor-single stage RC amplifier.
13. Operational amplifier –adder and subtractor.
14. Astable multivibrator using transistors.
15. LDR characteristics.
16. Hartley Oscillator.
17. Characteristics of a photovoltaic cell.
18. FET characteristics.

TEXT BOOKS	1. A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2. Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007).
REFERENCE BOOKS	1. P.R. Sasi Kumar, Practical Physics –, PHI. Learning Pvt .Ltd (2012). 2. S. P.Singh, Advanced Practical Physics, Pragathi Prakasam1Ed'2007. 3. Practical Physics – St. Joseph College, Trichy. 2002. 4. Allied Physics Practicals ,Somasundaram. 2nd edision S.Viswanathan,Publishers(2007).
WEB LINKS	1. https://nptel.ac.in/course.html/physics/experimental physics I,II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	60	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Analyze the concepts of the characteristics of transistor
	CO2	Realize principles and applications of LDR & photovoltaic cell.
	CO3	Realize principles and applications of potentiometer,amplifier ,Magnetometer & transmission of heat.
	CO4	Acquire the knowledge of the characteristics of an PN junction diode and Zener diode.
	CO5	Realize principles and applications of basic logic gates.

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**).

23UPHGE4P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	M	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	M

SUBMITTED TO BOARD OF STUDIES ON 12.03.2025

COURSE	**FIFTH SEMESTER - CORE COURSE**
COURSE TITLE	**CC 9- ELECTRICITY MAGNETISM AND ELECTROMAGNETISIM 23UPH9**
CREDITS	4
COURSE OBJECTIVES	To understand the laws of electrostatics and their applications. To make the students familiar with the physical quantities of magnetism and the properties of magnetic materials. To acquire the skills to know about the current electricity mechanism. To understand the laws of eddy current principle based on the electromagnetic inductions the current electricity mechanism. To understand the basis of AC and DC Circuits and also about their sensitiveness.

UNITS	**COURSE DETAILS**
UNIT-I	**ELECTROSTATICS:** Coulomb's inverse square law – Gauss theorem – Applications: Charged sphere, charged cylinder and infinite plane – Coloumb's theorem – Mechanical force on unit area of charged sphere – Electrified soap bubble – Cloud formation – Capacitors – Principles – Capacity of a spherical and cylindrical capacitor – Condensers in parallel and series connection.
UNIT-II	**MAGNETIC PROPERTIES OF MATERIALS:** Definitions of magnetic physical quantities – Cycle of magnetization and hysteresis loss – IH Curve – BH Curve – Magneto meter method – BG method – Area of BH loop – Applications of BH curve – Types of magnetic materials – Properties of dia, para, and ferro magnetic materials – Curie's laws and curie point – Bohr's magneton– Applications of magnetic materials.
UNIT-III	**ELECTRICITY AND MAGNETIC EFFECTS OF CURRENT:** Oersted's experiment – Carey-Foster bridge – Determination of specific resistance – Resistance and temperature coefficient of resistance of a coil – Magnetic field at a point along the axis of a solenoid – Ampere's theorem and its proof – Application – Field along the axis of a circular coil. Ballistic galvanometer – Determination of quantity sensitiveness – Damping correction – Current and voltage sensitivity of galvanometer.
UNIT-IV	**DC AND AC CIRCUITS:** Growth and decay of charge in LR, CR – Condition for discharge to be oscillator – Determination by leakage method. AC circuits containing double components LC,LR,CR – LCR circuit – Series and parallel resonance circuits – Q factor – Wattless current – Choke – Power factor – Skin effect – Impedance of an AC circuit – Tesla coil.
UNIT-V	**ELECTRO MAGNETIC INDUCTION:** Laws of electromagnetic induction: Faraday's law and Lenz law – Expression for both: Self induction and Mutual induction – Determination of L by Rayleigh's methods – Energy stored in magnetic field – Eddy current – Application – Rotating magnetic field – Rotor – Principle of induction motor – Couple acting on a coil placed in a rotating magnetic field.
TEXT BOOKS	1. A Text Book of Electricity and Magnetism. BrijLal and N. Subrahmanyam Ratan Prakasan Mandir Educational & University Publishers, New Deihi,(2005). 2. R. Murugeshan, Electricity and Magnetism, S. Chand & Company Pvt. Ltd.,New Delhi (2015).

	3. Electricity and Magnetism: Dr.D.N.Vasudeva - 2016, S.Chand&Co Delhi.
REFERENCE BOOKS	1. Electricity and Magnetism, Nagarathanam and Lakshminarayana. S. Chand &co.(2007). 2. Electricity and Magnetism, D. L. Sehgal, K. L. Chopra and N. K. Sehgal S.Chand & Sons. New Delhi. 1996 3. K. K. Tewari, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

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

COURSE OUTCOMES:
At the end of the course, the students will be able to:

COURSE OUTCOMES	**CO1**	Define and derive the laws of electrostatics
	CO2	Relate the properties of magnetic materials and intended applications
	CO3	Expertise the skills to develop the magnetic effects of current
	CO4	Know the derivatives of growth and decayed components of LCR series based on AC and DC Circuits.
	CO5	Understand the concepts of electromagnetic induction and ideas about induced emf

MAPPINGWITHPROGRAMOUTCOMES:

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

23UPH9	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	M	S	M
CO2	S	S	S	S	M	S	S	M	M	M
CO3	S	S	M	S	S	S	S	M	S	M
CO4	S	S	S	M	S	S	S	M	M	M
CO5	S	S	S	S	M	S	S	M	M	S

COURSE	FIFTH SEMESTER –CORE 23UPH10
COURSE TITLE	CC10- ATOMIC PHYSICS AND NUCLEAR PHYSICS
CREDITS	4
COURSE OBJECTIVES	To study about electric charges, their properties through experiments; To gain knowledge on photoelectric effect and solve problems based on Einstein's photoelectric equation; To make students understand the development of atom models, quantum numbers, coupling schemes and analysis of magnetic moments of an electrons; To gain knowledge on excitation and ionization potentials, splitting of spectral lines in magnetic and electric fields ;To acquire knowledge on different types of nuclear reactions and their applications& properties and models of nucleus.

UNITS	COURSE DETAILS
UNIT-I	**CATHODE AND POSITIVE RAYS**: Production and Properties of Cathode rays – Electronic charge – Millikan's oil drop method – Production and properties of positive rays – Thomson's parabola method-Aston's, Dempster's and Bain bridge mass spectrographs(e/m)–Mass defect and Packing Fraction.
UNIT-II	**ATOMIC STRUCTURE:** Introduction – Vector atommodel – Quantum numbers – Pauli's exclusion principle – Magnetic dipole moment due to orbital motion and spin of the electron – The Stern and Gerlach experiment – Zeeman effect – Experimental arrangement for the normal Zeeman effect – Larmor's theorem – Quantum mechanical explanation of the normal Zeeman effect–Anomalous Zeeman effect–Paschen Back Effect –Stark effect.
UNIT-III	**PHOTOELECTRIC EFFECT:** Photoelectric effect– Lenard's experiment–Richardson and Compton experiment – Experimental investigation son the photoelectric effect–Laws of photoelectric emission – Einstein's photoelectric equation – Experimental verification –Millikan's experiment – Photoelectric cells – Photo emissive cell – Photovoltaic cell – Photoconductive cell–Applications of Photoelectric cells.
UNIT-IV	**PROPERTIES OF NUCLEUS:** Constituents of nucleus – Isotopes, Isobars, Isotones – Nuclear size, mass, density, charge, spin, angular momentum, magnetic dipole moment, electric quadrupole moment (qualitative) – Binding energy – mass defect – packing fraction – Nuclear stability – Binding energy per nucleon graph – Properties of nuclear force.
UNIT-V	**NUCLEAR MODELS:** Liquid drop model –Weizacker's semi-empirical mass formula – magic numbers. **NUCLEAR REACTIONS:** Types of nuclear reactions – conservation laws in nuclear reaction – Q-value– Threshold energy – Nuclear fission– Thermonuclear reactions – Controlled thermonuclear reactions. **RADIOACTIVITY** : Laws of Natural radioactivity – Law of radioactive disintegration – Half life period – Mean life period – Law of successive disintegration

TEXT BOOKS	1. R Murugeshan & Kiruthiga Sivaprasath,Modern Physics,S.Chand & Co. (2013). 2. Modern Physics, Sehgal&Chopra ,Sultan Chand, New Delhi 3. Atomic and Nuclear Physics , Brijlal& N. Subramaniyan, S.Chand& Co (All units) 4. J.B. Rajam, Modern Physics, S Chand &Co.Publishing Co. 5. Nuclear Physics, S. N. Ghoshal, S Chand & Co. Edition 2003.
REFERENCE BOOKS	1.Perspective of Modern Physics, Arthur Beiser, McGraw Hill. 2.Modern Physics, S. Ramamoorthy, National Publishing & Co. 3.Basic ideas and concepts in Nuclear Physics, K.Heyde, 3rd Edn., Institute of Physics Pub.
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	List the properties of electrons and positive rays, define specific charge of positive rays, know different mass spectrographs.
	CO2	**O**utline photoelectric effect and the terms related to it, State laws of photoelectric emission, Explain experiments and applications of photo electric effect, Solve problems based on photoelectric equation.
	CO3	Explain different atom models**,** Describe different quantum numbers and different coupling schemes.
	CO4	Differentiate between excitation and ionization potentials, selection rule,Analyse Paschen-Back effect,Compare Zeeman and Stark effect.
	CO5	Describe various models that explain about the nuclear structures and Discuss the concepts used in nuclear reaction.

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**).

23UPH10	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	S	M	M	M

COURSE	**FIFTH SEMESTER – CORE**
COURSE TITLE	**CC11- PHYSICS PRACTICAL-V** **23UPH11P**
CREDITS	4
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.

LIST OF EXPERIMENTS

Section A: General Physics Experiments (Any 12)

1. Determination of refractive index of the material of the prism by i- i' method using spectrometer.
2. Determination of wavelength of mercury lines by minimum deviation method using spectrometer and grating.
3. Determination of Cauchy's constant using spectrometer.
4. Determination of refractive index of a lens by forming Newton's rings.
5. Determination of angle of a small angled prism using spectrometer.
6. Determination of quantity sensitivity of a ballistic galvanometer.
7. Determination of absolute capacity of a condenser using ballistic galvanometer.
8. Determination of self inductance of a coil by Anderson's method using ballistic galvanometer.
9. Determination of mutual inductance between pair of coils using ballistic galvanometer.
10. Comparison of mutual inductances between pairs of coils using ballistic galvanometer.
11. Determination of moment of a magnet by nullifying the field produced along the axis of a Circular coil.
12. Determination of Young's modulus by Koenig's method.
13. Calibration of high range voltmeter using potentiometer.
14. Determination of specific resistance of a wire using potentiometer.
15. Determine the emf of a thermocouple by the direct deflection method.

Section B: C Programming (Any 3)

1. Arranging words in alphabetical order.
2. Addition and subtraction of square matrices.
3. Sorting of numbers in ascending and descending order..
4. Conversion of Fahrenheit temperature into Celsius temperature.
5. Solving quadratic equation.

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007)
REFERENCE BOOKS	1.Practical Physics – P.R. Sasi Kumar, PHI. Learning Pvt .Ltd (2012). 2.Advanced Practical Physics,S. P.Singh, Pragathi Prakasam1Ed'2007. 3.Practical Physics – St. Joseph College, Trichy. 2002. 4.Allied Physics Practical ,somasundaram. 2nd edision, S.Viswanathan blishers(2007)

WEBLINKS	. 1. https://nptel.ac.in/course.html/physics/experimental physics I,II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Analyze the concepts of ballistic galvanometer,youngs modulus of different substances.
	CO2	Realize principles and applications of spectrometer and other optical instruments.
	CO3	Realize principles and applications of potentiometer,and magnetometer
	CO4	Analyze the emf of a thermocouple.
	CO5	Write and excute programme in C and evaluate the solution for different Mathematical problem.

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**).

23UPH12PW	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	M	M	S	M

COURSE	**FIFTH SEMESTER – CORE** **23UPH12PW**
COURSE TITLE	**CC12 - PROJECT(WITH VIVA VOCE)WORK**
CREDITS	4
COURSE OBJECTIVES	To develop abilities and skills that encourage research and development activities and are useful in everyday life and understanding and competencies required by practicing teachers for effective teaching-learning process at the secondary stage. Sustained in depth study on a specific topic to enable the students to critically examine the background literature relevant to their background literature relevant to their specific research area. An environment that encourages the students originally and creativity in their research and opportunity to develop skills in making and testing hypotheses in developing new theories and in planning and conducting experiments, developing practical research skills and learn new stage of the art techniques. The opportunity to expand the student's knowledge of their research area, including

	its theoretical foundation and the specific techniques used to study it. An environment in which to develop skills in written work, oral presentation and publishing the results of their research scientific journals for future development and the students in acquiring basic knowledge in the specialized thrust areas such as Material science and Nano science, Theoretical physics, Crystal growth, Thin films in various fields of branch of physics.

COURSE DETAILS
PROJECT DISSERTATION

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
20	**80**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Have some research experience within a specific field of physics, through a supervised project (Master dissertation).
	CO2	Have a thorough knowledge of literature and a understanding of scientific methods and techniques applicable in their field of research
	CO3	Be able to summarize major themes and current research problems in their area of specialization and be able to explain and identify open problems and areas needing development in their fields.
	CO4	Be able to demonstrate originality in the application of knowledge, together with a practical understanding of how research and enquiry are a used to create and interpret knowledge in their field.
	CO5	Able to act independently in the planning and implementation of research and have carried out and presented an original work of research in their discipline.

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**).

23UPH12PW	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	S	S	M	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	S	S	S	S	S	M	M	S	M

COURSE	**FIFTH SEMESTER - ELECTIVE - I**
COURSE TITLE	**ANALOG ELECTRONICS 23UPHE1A**
CREDITS	**3**
COURSE OBJECTIVES	To study the basics of semiconductor diodes,Rectifiers and filters. To familiarize biasing of BJT & FET devices. To study the classification and analyses of amplifiers. To empower students to understand the design and working of oscillators. To illustrate op- amp circuits.

UNITS	**COURSE DETAILS**
UNIT-I	**SEMICONDUCTOR DIODES:** Semiconductor: Intrinsic and Extrinsic, P type and N type semiconductors – V-I characteristics of: P-N Junction diodes ,Crystal diode,Zener diode, Light Emitting Diode, Varactor diode – Schottky diode – Tunnel diode – Rectifiers – Half wave rectifiers and Full wave rectifier – Filter circuits – Capacitor filter – Choke input filter – π filter.
UNIT-II	**TRANSISTORS:** Bipolar JunctionTransistor:Definition, Terminals, Modes of operation and Types– Input and output characteristics of CB and CE configurations – h parameter – Transistor biasing: Definition, importance and method of biasing – Transistor as an amplifier – Transistor as a switch. Field Effect Transistor: Definition, Symbol, Types and Working – Construction, Working and Characteristics of N Channel JFET, Depletion type MOSFET.
UNIT-III	**AMPLIFIERS :** Construction, working and Classification – Faithful amplification – Voltage and Power amplifiers – Construction and Working of Single - Stage Amplifier, RC coupled amplifier, Class A, class B and Class C amplifier, Push pull amplifier – Feedback – Negative Feedback – Types of Negative Feedback amplifier - Emitter Follower.
UNIT-IV	**OSCILLATORS AND MULTIVIBRATORS:** Classification of oscillators, condition for oscillation (Barkhausen condition) – Positive feedback – Positive feedback in oscillators – LC Oscillator : Construction and Working of Tuned Collector oscillator, Tuned base oscillator, Hartley Oscillator and Colpitt Oscillator – RC Oscillator : construction and working of Phase shift oscillator -Crystal oscillator- Multivibrators : Definition and its types.
UNIT-V	**OPERATIONAL AMPLIFIER:** Operational amplifier – characteristics, parameters and applications – Ideal operational amplifier – Inverting amplifier – Non inverting amplifier – adder – subtractor – integrator – differentiator – comparator, Schmitt trigger, Voltage Follower using op amp.

TEXT BOOKS	1. Principles of Electronics by V.K.Metha, Rohith Metha, S.Chand & Company,New Delhi 11th edision(2015). 2. B.L, Basic electronics - Solid State, Theraja. S.Chand and Company Ltd (2002). 3. Integrated Electronics by Jacob Milman and Christos Halkias , TMH 2nd edision (2017).
REFERENCE BOOKS	1. Digital Principles and Application, A.P. Malvino, D.P. Leach IV Edition,Tata McGraw Hill, New Delhi, 2011

	2. Hand book of Electronics, Gupta & Kumar Pragati Prakhasan, Meerut(2012) 3. Foundations of electronics, D. Chattopadhyay& P.C. Rakshit NewAge International Publishers (2015).
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Apply the basics of semiconductor and its applications in different areas.
	CO2	Acquire knowledge about transistor, FET and its application.
	CO3	Learn how to construct a transistor amplifier and how its gain varies with frequency observe the effect of positive feedback.
	CO4	Able to design working of different Oscillators using Multivibrator.
	CO5	Prepare the students for getting the knowledge about Operational Amplifier working as adder, subtractor, differentiators, integrator etc

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	M	S	M
CO2	S	S	M	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	S	M	M	M

COURSE	**FIFTH SEMESTER - ELECTIVE - II**
COURSE TITLE	**C PROGRAMMING APPLICATION IN PHYSICS 23UPHE2B (online objective)**
CREDITS	3
LEARNING OBJECTIVES	To get basic knowledge on the fundamental concepts of C Program.To exploit the appropriate decision making statements for the given program.To inscribe C programs by applying the concepts of functions and strings.To implement user defined data types like unions in C program.To gain basic knowledge on pointers and file operation in C.

UNITS	COURSE DETAILS
UNIT-I	**DATA TYPES, OPERATORS AND EXPRESSIONS IN C:** Introduction to C – structure of C program – character set – keywords and identifiers – data types – constants and variables – declaration - symbolic

	constants – operators – expressions – hierarchy of operators – i/o statements - formatted i/o - simple C programs : g using simple pendulum – focal length of a lens by uv method - decimal to binary and octal conversions.
UNIT-II	**INPUT, OUTPUT AND CONTROL STATEMENTS IN C:** If and if …else statements – nesting if …else statemnts – switch and break statements – goto statements – while, do…while statements – for statements – C program to calculate youngs's modulus and rigidity modulus, frequency of oscillator.
UNIT-III	**FUNCTIONS AND STRINGS IN C:** Functions – library functions – passing arguments of a function – recursion – strings – string functions – storage classes – automatic variables – global and external variables – static variables – C programs for field along the axis, projectiles – time of flight – centre of gravity of solid hemisphere...
UNIT-IV	**ARRAYS, STRUCTURES AND UNIONS IN C:** Defining and arrays of one and two dimensions – multidimensional arrays – structures – definition and manipulation – user defined structures – unions – definition – C programs for matrix addition, subtraction and multiplication – sorting of a list in ascending and descending order – searching.
UNIT-V	**POINTERS AND FILES:** Pointers – definition – declarations – operation on pointers – files opening and closing a data file – creating a data file – processing a data file – simple file manipulation programs.
TEXT BOOKS	1. E. Balagurusamy – Programming in ANSI C – Tata McGraw Hill EducationPrivate Limited, New Delhi,2012. 2. K. R. Venugopal and S. R. Prasad – Programming with C – Tata McGraw-Hill Publishing Company Limited, New Delhi, 2002. 3. Byron Gottfried,Jitender Chhabra,Programming with C,Schaum Series.2010.
REFERENCE BOOKS	1. Schaum's outline of theory and problems of programming with C. 2. Byron's Gottfried - Programming with C - TMH - New Delhi 2003. 3. S. ThamaraiSelvi and R. Murugesan, C for all, Pearson education 2012.

METHOD OF EVALUATION:

Continuous InternalAssessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	basic knowledge on the fundamental concepts of C Program.
	CO2	an ability to exploit the appropriate decision making statements for the given program
	CO3	an ability to inscribe C programs by applying the concepts of functions and strings
	CO4	an ability to implement user defined data types like unions in C program
	CO5	basic knowledge on pointers and file operation in C

MAPPINGWITHPROGRAMOUTCOMES:

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

23UPHE2B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	S	M	S

COURSE	**SIXTH SEMESTER - CORE**
COURSE TITLE	**CC 13 - WAVE MECHANICS AND PARTICLE PHYSICS 23UPH13**
CREDITS	4
COURSE OBJECTIVES	To understand the dual nature of radiation and matter. To get the perception of Schrodinger wave equation and uncertainty principle. To acquire the knowledge of Schrödinger wave equation. To give the awareness of elementary particles. To understand the laws of conservations in elementary particles.

UNITS	**COURSE DETAILS**
UNIT-I	**DUAL NATURE OF MATTER:** Introduction – matter waves – properties – de Broglie hypothesis of matter waves-group velocity-phase velocity – relation between group velocity and phase velocity -Davisson and Germer experiment- G.P. Thomson's experiment.
UNIT-II	**SCHRODINGER'S WAVE EQUATION:** Basic postulates of wave mechanics–Eigen values and Eigen function-wave function-Time dependent and Time independent wave Schrodinger equation - physical interpretation of wave function-normalized and orthogonal wave function-conditions satisfied by wave function-linear and nonlinear operators
UNIT-III	**APPLICATIONS OF SCHRODINGER'S WAVE EQUATION:** Particle in a box- Infinite Square well potential- finite well potential-barrier potential- linear harmonic oscillator - zero point energy - correspondence principle-expectation values-Ehrenfest's theorem.
UNIT-IV	**ELEMENTARY PARTICLES:** Introduction – classification of elementary particles- fundamental interaction-gravitational – electromagnetic - weak- strong interactions- quantum numbers-Baryon number-Lepton number- Isospin quantum number- strangeness and strange particles- hypercharge- Gell-Mann Nishijima relation
UNIT-V	**CONSERVATION LAWS OF ELEMENTARY PARTICLES:** Introduction- conservation laws-linear momentum-angular momentum-energy-charge-lepton number - Baryon number - isospin –strangeness-hypercharge-charge conjugation-space –inversion invariance-combined inversion- time reversal – combined inversion of CPT – unitary symmetry [SU(2)]- quarks- mesons-Baryons.

TEXT BOOKS	1. Modern Physics , Murugesan .R, and KiruthigaSivaprasath .S, S.Chand and Company,18th edition 2. Modern Physics , Sehgal Chopra D.L,Chopra.K.L,andN.K.Sultan , sultan Chand & sons ,9th edition(2004) 3. Concepts of Modern Physics,Arthur Beisar,Shobhit Mahajan ,Raichoudhry.S 6th edition,(2009) 4. Quantum Mechanics , Sathya Prakash ,KedarNath RamV. Nath&co Edition(2005) 5. Introduction to Elementary Particles , David Griffiths , John Wiley &sons Inc
REFERENCE BOOKS	1. An Introductory course of Particle Physics, PalashB.Pal,CRCpress,Newyork 2. Introduction to the physics of nuclei & particles, R.A. Dunlap. (Thomson Asia, 2004). 3. Introduction to High Energy Physics, D.H. Perkins, Cambridge Univ. Press
WEBLINKS	1. http://hyperphysics.phy-astr.gsu.edu/hbase/nuccon.html 2. https://www.kent.edu/physics/nuclear-physics-links 3. https://www.lbl.gov/abc/links.html

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the dual nature of radiation and matter.
	CO2	Get the knowledge of Schrödinger's wave equation and uncertainty principle.
	CO3	Insight the application of Schrödinger's wave equation.
	CO4	Knowledge the classification of elementary particles.
	CO5	Grasp the conservation laws of elementary particles.

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**).

23UPH13	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	S	M	M	M

COURSE	**SIXTH SEMESTER - CORE**
COURSE TITLE	**CC14 - SOLID STATE PHYSICS 23UPH14**
CREDITS	4
COURSE OBJECTIVES	To learn about the crystal structure and their packing parameters. To know about carrier concentration in metals and semiconductors. To gain the knowledge of magnetic and superconducting materials and their applications. To understand the dielectric material and their properties. To acquire the skill to fabricate new materials and nano phase materials.

UNITS	COURSE DETAILS
UNIT-I	**BONDING IN SOLIDS, CRYSTAL STRUCTURE:** Types of bonding – Ionic bonding – Bond energy of NaCl molecule – Covalent bonding – Metallic bonding – hydrogen bonding – Van-der-Waals bonding – Crystal lattice – Lattice translational vectors – Lattice with basis – Unit cell – Bravais' lattices – Miller indices – procedure for finding them – Packing of BCC and FCC structures – Structures of NaCl and diamond crystals – Reciprocal lattice – Reciprocal lattice vectors – Properties of reciprocal lattice – X-rays: Bragg's law (simple problems)
UNIT-II	**CONDUCTING AND SEMICONDUCTING MATERIALS:** Band theory of solids – Classical free electron theory of metals – Electrical conductivity – Thermal conductivity – Wiedmann - Franz law – Lorentz number – Fermi distribution function – Density of energy states – *Elementary band theory:* Kronig-Penny model – band gap(no derivation) – conductor, semiconductor (P and N type) and insulator – conductivity of semiconductor – mobility – Hall effect – measurement of conductivity (four probe method) – Hall coefficient – Carrier concentration derivation – Intrinsic semiconductor – Extrinsic semiconductors.
UNIT-III	**MAGNETIC AND SUPERCONDUCTING PROPERTIES:** Permeability, Susceptibility, Relation between them – Classification of magnetic materials – Properties of dia, para,ferro, ferri and anti ferromagnetism – Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Curie-Weiss law – Weiss theory of ferromagnetism(qualitative only) – Heisenberg's quantum theory of ferromagnetism – Domains – Discussion of B-H curve – Hysteresis and energy loss – soft and hard magnets – Magnetic alloys.
UNIT-IV	**DIELECTRIC PROPERTIES OF MATERIALS:** Polarization and electric susceptibility – Local electric field of an atom – Dielectric constant and polarisability – Polarization processes: Electronic polarization – Calculation of polarisability – Ionic, orientational and space charge polarization – Internal field – Clausius-Mosotti relation – Frequency dependence of dielectric constant – Dielectric loss – Effect of temperature on dielectric constant – Dielectric breakdown and its types – Classical theory of electric polarisability.
UNIT-V	**FERROELECTRIC & SUPERCONDUCTING PROPERTIES OF MATERIALS:** *Ferroelectric effect*: Curie-Weiss Law – Ferroelectric domains, P-E hysteresis loop – *Superconductivity:*Experimental results – Critical temperature –Critical magnetic field – Meissner effect –type-I and type-II superconductors – London's equation and penetration depth – Isotope effect – Idea of BCS theory (no derivation).

TEXT BOOKS	1. Material science, Dr. M.N. Avadhanulu S.Chand & Company, New Delhi, 2014 2. M. Arumugam, Material Science, Anuradha Agencies, 1ST edision(2004). 3. Solid State Physics , R L Singhal, Kedarnath Ram Nath& Co., Meerut 2003 4. S. O. Pillai - Solid State Physics, Narosa publication 2014.

REFERENCE BOOKS	1.Kittel - Introduction to solid state physics, Wiley and Sons, 7th edition2004 2.Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, 3. Solid State Physics, S.L.Gupta and V.Kumar, Pragati Prakashan (2002). 4. Fundamentals of Solid State Physics, B.S.Saxena, R.C.Gupta and P.N.Saxena,Pragati Prakashan, Meerut (2010).
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Classify the bonding &crystal structure also learn about the crystal structure analysis using X ray diffraction.
	CO2	Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.
	CO3	Give reason for classifying magnetic material on the basis of their behaviour.
	CO4	Comprehend the dielectric behavior of materials.
	CO5	Appreciate the ferroelectric and super conducting properties of materials.

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	M	S	S	S	S	S	M	S	S
CO2	M	S	M	S	M	M	S	M	M	M
CO3	S	M	S	M	S	M	M	S	S	S
CO4	S	S	S	S	M	S	S	M	M	M
CO5	S	M	M	S	S	M	S	M	M	S

COURSE	**SIXTH SEMESTER - CORE**
COURSE TITLE	**CC15-PHYSICS PRACTICAL-VI** **23UPH15P**
CREDITS	4
COURSE OBJECTIVES	To perform basic experiments on characteristics of electronic devices and then get into the applications such as transistors,amplifiers, oscillators, multivibrators. Perform fundamental experiments on microprocessor 8085 and learn to write programs by themselves.

LIST OF EXPERIMENTS

Section A: Electronics Experiments (Any 12)

1. Series and Parallel resonance circuits.
2. Transistor Characteristics CE mode.
3. Regulated power supply.
4. Emitter follower amplifier.
5. Tuned collector oscillator.
6. Hartley oscillator.
7. Colpitt's oscillator.
8. Phase shift oscillator.
9. Astable multivibrator.
10. Monostable multivibrator.
11. FET characteristics.
12. Basic Logic gates - using ICs.
13. NAND and NOR as universal gates.
14. Operational amplifier - Adder and Subtractor.
15. Operational amplifier - Integrator and Differentiator.
16. Half adder and Half subtractor.
17. Boolean expression simplifications using ICs.

Section B: Microprocessor (Any 3)

1. 8 bit addition and subtraction.
2. 8 bit multiplication and division.
3. Biggest number among a list.
4. Smallest number among a list.
5. Conversion from decimal to Hexadecimal and vice versa

TEXT BOOKS	1.A text book of practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, Sultan Chand&Sons(2017) 2.Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan,Publishers(2007)
REFERENCE BOOKS	1.P.R. Sasi Kumar, Practical Physics –, PHI. Learning Pvt .Ltd (2012). 2.S. P.Singh, Advanced Practical Physics, Pragathi Prakasam1Ed'2007. 3.Practical Physics – St. Joseph College, Trichy. 2002. 4.Allied Physics Practical ,somasundaram. 2nd edision S.Viswanathan,Publishers(2007)
WEBLINKS	1. https://nptel.ac.in/course.html/physics/experimental physics I,II and III 2. https://nptel.ac.in/courses/115/105/115105110/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	60	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Design different types of power supplies,Amplifiers and Oscillators
	CO2	Analyze the characteristics of various electronic devices like Transistor and Multivibrator.
	CO3	Realize principles and applications of Universal gates
	CO4	Acquire the knowledge of the characteristics of an operational amplifier
	CO5	Write and excute the manipulating 8085 microprocessor programme.

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**).

23UPH15P	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	S	S	S	S	S	S	S	M	M	M

COURSE	**SIXTH SEMESTER – ELECTIVE-III** **23UPHE3A**
COURSE TITLE	**DIGITAL ELECTRONICS AND MICROPROCESSOR 8085**
CREDITS	3
COURSE OBJECTIVES	To learn all types of number systems, Boolean algebra and identities, digital circuits for addition and subtraction, flip-flops, registers, counters. To get the knowledge on fundamentals of 8085 architecture, instruction sets and simple programs.

UNITS	**COURSE DETAILS**
UNIT-I	**NUMBER SYSTEMS, BOOLEAN ALGEBRA AND LOGIC GATES:** Decimal, binary, octal, hexadecimal numbers systems and their conversions – codes: BCD, gray and excess-3 codes –code conversions –complements (1's, 2's, 9's and 10's) –binary addition, binary subtraction using 1's & 2's complement methods – Boolean laws – De-Morgan's theorem –basic logic gates -universal logic gates (NAND & NOR)
UNIT-II	**KARNAUGH MAP, LOGIC FAMILIES AND COMBINATIONAL SYSTEM:** K map - 2,3and 4 variables - Reduction of Boolean expressions using Boolean laws - SOP and POS expression - Reduction using K map - Characteristics of logic families - RTL,DTL and TTL family - Half adder - Full adder - Half subtractor - full subtractor Multiplexer - Demultiplexer - Decoder - BCD to 7 segment decoder - Encoder - Decimal to BCD encoder.

UNIT-III	**SEQUENTIAL SYSTEMS:** Flip-flops: S-R Flip-flop , J-K Flip-flop, T and D type flip-flops, master-slave flip-flop, truth tables, registers:- serial in serial out and parallel in and parallel out – counters asynchronous:-mod-8, mod-10, synchronous - 4-bit &ring counter
UNIT-IV	**D/A AND A/D CONVERSIONS AND MEMORY DEVICES:** Digital to analog conversion - Binary weighted resistor conversion - Binary ladder conversion - Analog to Digital conversion - Counter type conversion - Continuous conversion - Successive approximation conversion - Memory - Semi conductor memories - RAM - ROM memories - Flash memory - CCD memory - Cache memory.
UNIT-V	**MICROPROCESSOR:** 8085 Microprocessor: introduction to microprocessor – INTEL 8085 architecture – register organization –pin configuration of 8085, interrupts and its priority – Program Status Word (PSW) –instruction set of 8085 –addressing modes of 8085 – assembly language programming using 8085 – programmes for addition (8-Bit), subtraction (8-Bit), multiplication (8- Bit), division (8- Bit) – largest and smallest number in an array.
TEXT BOOKS	1. Digital principles and applications, Don Leach, Albert Malvino, McGraw-Hill Inc., US (2009) 2. Digital Fundamentals, B.Basavaraj - Vikas publishing House private limited - (2012) 3. Digital fundamentals. V.Vijayendran, S. Viswanathan Printers and Publishers Pvt. Ltd., (2009) 4. Fundamentals of Microprocessors and Microcontrollers- B. Ram - Dhanpat Rai Publications (P) Ltd., New Delhi, 2013.
REFERENCE BOOKS	1. Digital Electronics, Avinashi Kapoor and L. K. Maheswari, Principles and Practice, Macmillan India Limited (2004). 2. Digital electronics, Virendra Kumar, NewAge International Publishers (2007) . 3. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the concepts of Binary codes.
	CO2	Understand the operation of basic digital electronic devices
	CO3	Have foundation in the techniques and designing of flipflops, counters and registers.
	CO4	Apply the gained knowledge of semiconductor memories in their day-to-day life
	CO5	Apply the functions of microprocessor for practical purposes.

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**).

23UPHE3A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	M	M	M
CO5	S	S	S	S	M	S	S	M	M	M

COURSE	**SIXTH SEMESTER – ELECTIVE-IV**
COURSE TITLE	**LASERS AND FIBER OPTICS** **23UPHE4A**
CREDITS	3
LEARNING OBJECTIVES	The students will learn the fundamentals, types of lasers, laser instrumentation and their applications also the interconnect between optics with lasers.

UNITS	COURSE DETAILS
UNIT-I	**FUNDAMENTALS OF LASER:** Basic principles: Spontaneous and Stimulated emission – Einstein's coefficient – Pumping mechanism: optical, electrical and laser pumping – Population inversion – Two and Three level laser system – Quality factor – Threshold condition – concept of Q switching–Theory of mode locking.
UNIT-II	**TYPES OF LASER:** **S**olid state laser: ruby laser, Nd:YAGlaser,Nd:Glass laser– Semiconductor laser: Intrinsic semiconductor laser, Doped semiconductor laser – Dye laser – Gas laser:Neutral atom gas laser (He-Ne laser), CO_2 laser, Copper vapour laser.
UNIT-III	**APPLICATIONS OF LASER:** Application of laser in metrology – Optical communication – Material processing: Laser instrumentation of material processing, Powder feeder, laser heating, laser welding, laser melting – Medical application – Holography - Acoustic holography, Compact disc – Laser instrumentation for surgeries.
UNIT-IV	**FIBER OPTICS:** Basic components of optical fiber communication – Principles of light propagation through fiber – Total internal reflection – Optical fiber – Numerical aperture and skew mode – Types of fiber: Single mode and Multi-mode fiber – Step index and Graded index fiber – Fiber optic sensors – Application of fiber optics.
UNIT-V	**CHARACTERISTICS AND FABRICATION OF OPTICAL FIBER:** Fiber Characteristics: mechanical and transmission characteristics – Light source – LED,LASER absorption loss and scattering loss measurements – Dispersion – connectors and splicers – Communication system (block diagram) Photodetectors Optical time domain reflectometer (OTDR) and its uses – Fiber material – fiber fabrication – fiber optic cables design.
TEXT BOOKS	1. Laser and Non-linear Optics, B.B. Laud ,New Age International Publications Third Edition, NewDelhi.2010. 2. Lasers:Principles,Types,and Applications, K.R.Nambiar," NewAge International 2004. 3. An introduction to Laser,N. Avadhanulu , S. Chand & Company,(2001). 4. Optical fibres and Fibre Optic Communication system, Subir Kumar Sarkar - S.Chand& Co, New Delhi,(2001).

REFERENCE BOOKS	1. An introduction to Laser theory and application, M.N.Aravamudhan,S. Chand & Co. Pvt. Ltd (2012) 2. Laser theory and applications, Thyagarajan,A.K.Ghatak, Cambridge university press1996.. 3. Laser systems and applications, Nityanand Chowdry and Richa Verma PHI, (2011
WEBLINKS	1. https://swayam.gov.in/nc_details/NPTEL

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the concepts of laser and to enhance their knowledge.
	CO2	Learn about the types of laser and their applications.
	CO3	Learn and clear knowledge about the applications of laser.
	CO4	Know about the concepts of theoretical part of optical fiber communication system.
	CO5	Learn and understand the postulates of optical fiber communication and their applications.

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**).

23UPHE4A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	M	S	S	S	M	S	M	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	S	S	S	S	S	S	S	M	M