B.SC.,

PHYSICS

SYLLABUS

FROM THE ACADEMIC YEAR

2024-2025

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION, CHENNAI – 600 005

Preamble

Physics is one of the basic and fundamental sciences. The curriculum for the undergraduate 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, electronicsand 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.

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE EDUCATION	
Programme	**B.Sc., Physics**
Programme Code	
Duration	**3 years [UG]**
Programme Outcomes: (These are mereguidelines. 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; analyse 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, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO8: Reflective thinking**: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society. **PO 09: 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 10: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
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 research 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

Credit Distribution for UG Programmes

SemI	Credit	H	SemII	Credit	H	SemIII	Credit	H	SemIV	Credit	H	SemV	Credit	H	SemVI	Credit	H
Part 1.Language – Tamil	3	6	Part..1.Language– Tamil	3	6	Part..1.Language– Tamil	3	6	Part..1.Language– Tamil	3	6	5.1 CoreCourse– \CCIX	4	5	6.1 CoreCourse– CCXIII	4	6
Part.2English	3	6	Part..2English	3	4	Part..2English	3	6	Part..2 English	3	6	5.2 CoreCourse– CCX	4	5	6.2 CoreCourse– CCXIV	4	6
1.3 CoreCourse – CCI	5	5	2..3 CoreCourse – CCIII	5	5	3.3 CoreCourse –CCV	5	4	4.3 CoreCourse – CCVII Core IndustryModule	5	5	5. 3.CoreCourseCC -XI	4	5	6.3 CoreCourse – CCXV	4	6
1.4 CoreCourse – CCII	5	5	2.4 CoreCourse – CCIV	5	5	3.4 CoreCourse –CCVI	5	4	4.4 CoreCourse –CC VIII	5	5	5. 4.CoreCourse– /Projectwith viva-voce CC -XII	3	5	6.4 Elective - VII Generic/DisciplineSpecific	3	5
1.5Elective IGeneric/DisciplineSpecific	3	4	2.5 Elective IIGeneric/DisciplineSpecific	3	4	3.5Elective IIIGeneric/DisciplineSpecific	3	4	4.5ElectiveIV Generic/DisciplineSpecific	3	3	5.5 Elective VGeneric/ Discipline Specific	3	4	6.5 ElectiveVIII Generic/ DisciplineSpecific	3	5
1.6 SkillEnhancementCourse SEC-1	2	2	2.6 SkillEnhancementCourse SEC-2	1	2	3.6 SkillEnhancementCourse SEC-4,(Entrepreneurial Skill)	1	2	4.6SkillEnhancementCourse SEC-5	1	2	5.6 Elective VIGeneric/ Discipline Specific	3	4	6.6 Extension Activity	1	-
1.7 SkillEnhancement - (Foundation Course)	2	2	2.7 SkillEnhancementCourse– SEC-3	1	2	3.7NaanMuthalvan	2	2	4.7NaanMuthalvan	2	2	5.7NaanMuthalvan	2	2	6.7NaanMuthalvan	2	2
			NaanMuthalvan	2	2	3.8E.V.S.	2	1	4.8 Value base education	2	1	5.8 Internship /Industrial Training	2				
	23	**30**		**23**	**30**		**24**	**30**		**24**	**30**		**25**	**30**		**21**	**30**
Total–140Credits																	

CreditDistributionforB.Sc.,Physics Programme,CourseswithLaboratoryHours

First Year Semester-I

Part	Listof Courses	Credit	No. ofHours
Part-I	Tamil	3	6
Part-II	English	3	6
Part-III	CoreTheory1–Properties ofMatterandAcoustics	5	5
	CorePractical1–PhysicsPractical I	3	3
	AlliedTheory 1–AlliedMathematics I	5	6
Part-IV	SkillEnhancementCourseSEC-1PHYSICSFOR EVERYDAYLIFE	2	2
	FoundationCourse – Introductory Physics	2	2
		23	**30**

Semester-II

Part	Listof Courses	Credit	No.of Hours
Part-I	Tamil	3	6
Part-II	English	3	4
Part-III	CoreTheory2 –Heat, Thermodynamics and Statistical Physics	5	5
	CorePractical2–PhysicsPractical II	3	3
	AlliedTheory2–AlliedMathematics II	5	6
Part-IV	SkillEnhancementCourse-SEC-2ASTROPHYSICS	1	2
	SkillEnhancementCourse-SEC-3(Discipline/Subject Specific) – Physics for Competitive Examinations	1	2
	NaanMuthalvan/ Basic Physics	2	2
		23	**30**

Students who failed in the Naan Muthalvan examination can write the paper Basic Physics

Second Year - Semester-III

Part	Listof Courses	Credit	No. ofHours
Part-I	Tamil	3	6
Part-II	English	3	6
Part-III	CoreTheory3–Mechanics	4	4
	CorePractical3–PhysicsPractical III	2	2
	AlliedTheory 1– AlliedChemistry I	4	4
	AlliedPractical 1–AlliedChemistryPractical I	2	2
Part-IV	SkillEnhancementCourse-SEC-4(Maintenance of Electricalappliances)	2	2
	NaanMuthalvan /(Instrumentationphysics I)	2	2
	EVS	2	2
		24	**30**

Students who failed in the Naan Muthalvan examination can write the paper

Semester-IV

Part	Listof Courses	Credit	No.of Hours
Part-I	Tamil	3	6
Part-II	English	3	6
Part-III	CoreTheory4–Optics andLaserPhysics	4	4
	CorePractical4–PhysicsPractical IV	2	2
	AlliedTheory 2– AlliedChemistry II	3	4
	AlliedPractical 2–AlliedChemistryPractical II	3	2
Part-IV	SkillEnhancementCourse-SEC-5(Maintenanceof Electronicappliances)	2	2
	NaanMuthalvan / InstrumentationPhysics II	2	2
	Value Based Education	2	2
		24	**30**

Students who failed in the Naan Muthalvan examination can write the paper InstrumentationPhysicsII

Third Year - Semester- V

Part	Listof Courses	Credit	No.of Hours
Part-III	CoreTheory5–Electricity,Magnetism andElectromagnetism	4	5
	CoreTheory6–Atomic and NuclearPhysics	4	5
	CoreTheory7 – AnalogandCommunication Electronics	3	5
	CorePractical5–Physics Practical V	3	3
	CorePractical 6 –Physics Practical VI	3	3
	Core–Project (Group)	2	4
	ElectiveCourse1 (Generic/DisciplineSpecific) EC1	2	3
Part-IV	Internship/IndustrialVisit/FieldVisit/Knowledge Updating Activity	2	-
	NaanMuthalvan / MODERN PHYSICS	2	2
		25	**30**

For Internship / Industrial Visit/Field Visit/Knowledge Updating Activity (Internal 50 marksExternal 50 Marks). Report should be submitted at the end of this semester and evaluated by external examiner

Core – Project – It must be the Group Project - Each group consists of maximum of five students - Project must be related to the Physics subject- Readymade projects not allowed Downloaded projects not allowed - Both experimental and theoretical projects are allowed GroupProject report will be submitted during practical examination External50 markswill be evaluatedbytheexternal examiner.viva voce Examination (Internal 50 marks External 50arks).

Students who failed in the Naan Muthalvan examination can write the paper MODERN PHYSICS

Semester V ELECTIVE COURSES (EC) Select any one course

EC 1. Spectroscopy

EC 2. Mathematical Physics

EC 3. Python Programming and Basics of AI and Data Science

Semester – VI

Part	Listof Courses	Credit	No. ofHours
Part-III	CoreTheory8– Relativity and Quantum Mechanics	4	6
	CoreTheory9–Solid StatePhysics	4	6
	CoreTheory10–DigitalElectronics andMicroprocessor8085	4	6
	CorePractical7 –PhysicsPractical VII	2	3
	CorePractical8 –PhysicsPractical VIII	2	3
	ElectiveCourse 2(Generic/SubjectSpecific)EC 2	2	4
Part-IV	NaanMuthalavan / APPLIED PHYSICS	2	2
Part-V	ExtensionActivity,NSS/NCC/YRC/PhysicalEducation (OutsideCollegeHours)	1	-
		21	**30**

ExtensionActivity(Internal50 marksExternal 50Marks)
Students who failed in the Naan Muthalvan examination can write the paper APPLIED PHYSICS

Semester VI ELECTIVE COURSES (EC) Select any One courses

EC 4. Energy Physics

EC 5. Material Science

EC 6. Nanoscience and Nanotechnology

COURSE	**FIRST SEMESTER – FOUNDATION COURSE**
COURSE TITLE	**INTRODUCTORY PHYSICS**
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 forces –Mechanical Forces like, centripetal, centrifugal forces.
UNIT-III	**Work, Power and Energy :** Work done by the force Power Kinetic energy – potential energy – work energy theorem – principle of conservation of EnergyWork-Energy Theorem - Conservation laws of momentum,–angular momentum.
UNIT-IV	**Types of motion :** Linear, Projectile, Circular, Angular, Simple Harmonic motions – stream line and turbulent motions – wave motion – comparisonof light and sound waves .
UNIT-V	**Properties and types of materials:** Conductors, Semi-Conductors and Insulators – Thermal And Electric Properties – Introduction to Super Conductors.
TEXT BOOKS	1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co 2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S.Chand & Co.
REFERENCE BOOKS	1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand & Co.
WEBLINKS	1. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ 2. https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

Continuous InternalAssessment	**End SemesterExamination**	**Total**	**Grade**
25	**75**	**100**	

COURSEOUTCOMES:

Attheendofthe course the studentwillbeableto:

	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.

COURSEOUTCOMES	**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.

MAPPINGWITHPROGRAMOUTCOMES:
Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

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

COURSE	**FIRST SEMESTER –CORE THEORY 1**
COURSETITLE	**PROPERTIES OF MATTER AND ACOUSTICS**
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 a wire –Twisting couple on a cylinder – Rigidity modulus by torsion pendulum (with and without masses).
UNIT-II	**BENDING OF BEAMS:** Expression for the bending moment – Expression for depression at the loaded end of the cantilever–Experiment to determine Young's modulus by cantilever depression. Experiment to find Young's modulus by non-uniform bending. Uniform bending – Expression for elevation – Experiment to determine Young's modulus by uniform bending method using microscope.
UNIT-III	**FLUID DYNAMICS:** Surface tension: definition –molecular forces -Excess pressure over curved surface – application to spherical and cylindrical drops and bubbles. **Viscosity:** definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –terminal velocity and Stoke's formula.
UNIT-IV	**WAVES AND OSCILLATIONS:** Simple Harmonic Motion (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 – factors affecting the acoustics of buildings.**Ultrasonic waves:** Production of ultrasonic waves – Piezoelectric crystal method – Detection of ultrasonic waves-application of ultrasonic waves.
TEXT BOOKS	1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand and Co. 2. BrijLaland N. Subrahmanyam, 2003, Properties of Matter, S.Chand and Co 3. D.R.Khanna andR.S.Bedi, 1969, Textbook of Sound, AtmaRamand sons 4. Brijlal and N.Subrahmanyam, 1995, A Text Book of Sound, Second revised edition,Vikas Publishing House. 5. R.Murugesan, 2012, Properties of Matter, S.Chandand Co.
REFERENCE BOOKS	1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers 2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition,R. Chand and Co. 3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.
Web links	

METHOD OF EVALUATION:

Continuous InternalAssessment	End Semester Examination	Total	Grade
25	75	100	

COURSE OUTCOMES:
Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**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 OUTCOMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	S	S	M	M	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	M	M	S	S	M	S	S	S	S	M

COURSE	**FIRST SEMESTER – Skill Enhancement Course (SEC-1)**
COURSETITLE	**PHYSICS FOR EVERYDAY LIFE**
CREDITS	2
Learning Objective: To know where all physics principles have been put to use in daily life and appreciate the concepts with a better understanding also to know about Indian scientists who have made significant contributions to Physics	
UNITS	**COURSE DETAILS**
UNIT-I	**MECHANICAL OBJECTS: S**pring scales – bouncing balls– bicycles –rockets and space travel.
UNIT-II	**OPTICAL INSTRUMENTS AND LASER:**vision corrective lenses – Polaroid glasses – UV protective glass – holography and laser.
UNIT-III	**PHYSICS OF HOME APPLIANCES:**filament bulb – ceiling fan – hair drier – refrigerator – wet grinder
UNIT-IV	**SOLAR ENERGY:** Solar constant – General applications of solar energy – Solar water heaters – Solar Photovoltaic cells – online-offline solar power system.
UNIT-V	**INDIAN PHYSICIST AND THEIR CONTRIBUTIONS:** C.V.Raman, HomiJehangirBhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Dr. APJ Abdul Kalam and their contribution to science and technology.
TEXT BOOKS	1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019. 2.For the love of physics, Walter Lawin, Free Press, New York, 2011.

METHOD OF EVALUATION:

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

COURSE	**FIRST SEMESTER –CORE PRACTICAL 1**
COURSETITLE	**PRACTICAL 1**
CREDITS	3
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter& Acoustics, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

Minimum of Six Experiments from the list:

1. Determination of rigidity modulus without mass using a Torsional pendulum.
2. Determination of rigidity modulus with masses using a Torsional pendulum.
3. Determination of moment of inertia and 'g' using a Bifilar pendulum.
4. Determination of Young's modulus by uniform bending using pin and microscope.
5. Determination of Young's modulus by non-uniform bending using scale and telescope.
6. Determination of Young's modulus by the cantilever depression method.
7. Determination of rigidity modulus by static torsion.
8. Determination of Y, n and K by Searle's double bar method.
9. Determination of the frequency of AC by using a sonometer.
10. Determination of surface tension and interfacial surface tension by the drop weight method.
11. Determination of the co-efficient of viscosity by Stokes' method.
12. Determination of Poisson's ratio of a rubber tube.
13. Determination of viscosity by Poiseullie's flow method.
14. Determination of frequency of an electrically maintained tuning fork.
15. Determination of 'g' using a compound pendulum.

METHOD OF EVALUATION:

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

COURSE	**SECOND SEMESTER –CORE THEORY 2**
COURSETITLE	**HEAT, THERMODYNAMICS & 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 $C_P$and C_V– Meyer's relation – Joly's method for determination of C_V. **LOWTEMPERATUREPHYSICS:** Joule-Kelvin effect – Porous plug experiment –Boyletemperature – temperature of inversion – liquefaction of gas by Linde's Process.
UNIT-II	**THERMODYNAMICS-I:**Zeroth law and First law of thermodynamics – heat engine –efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines.
UNIT-III	**THERMODYNAMICS-II**: Second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram – Maxwell's thermodynamical relations –Clasius- Clapeyron's equation (first latent heat equation) –Third law of thermodynamics.
UNIT-IV	**HEAT TRANSFER:**Modes of heat transfer: conduction, convection and radiation. **Conduction:** thermal conductivity –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. 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 –Fermi-Dirac statistics – expression for distribution function.
TEXT BOOKS	1. BrijlalandN. Subramaniam, 2000, Heat and Thermodynamics, S.Chandand Co. 2. NarayanamoorthyandKrishnaRao, 1969,Heat,Triveni Publishers, Chennai. 3. V.R.KhannaandR.S.Bedi, 1998 1st Edition, Text book of Sound, Kedharnaath Publish and Co, Meerut 4. Brijlal and N. Subramanyam, 2001, Waves and Oscillations,Vikas Publishing House, New Delhi. 5.Ghosh, 1996, Text Book of Sound, S.ChandandCo. 6. R.MurugeshanandKiruthigaSivaprasath, Thermal Physics, S.Chandand Co.

REFERENCE BOOKS	1. J.B.Rajamand C.L.Arora, 1976, Heat and Thermodynamics, 8th edition, S.Chandand Co. Ltd. 2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand and Sons. 3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand and Co. 4. Resnick, HallidayandWalker,2010, Fundamentals of Physics, 6th Edition. 5.Sears, Zemansky, Hugh D. Young,Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**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, superfluidity 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 viz 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 analyse 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:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

	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	S	M	S	S	S	M	M	S	M

COURSE	**COURSE SECOND SEMESTER –CORE PRACTICAL 2**
COURSETITLE	**PRACTICAL 2**
CREDITS	3
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

Minimum of Six Experiments from the list:

1. Verification of Newton's Law of Cooling.
2. Determination of thermal conductivity of a bad conductor by Lee's disc method.
3. Determination of specific heat capacity of Liquid by Newton's Law of Cooling.
4. Determination of specific heat capacity of a solid by method of mixture.
5. Determination of specific heat of a liquid by Joule's electrical heating method
6. Determination of Latent heat of a vaporization of a liquid.
7. Determination of Stefan's constant for Black body radiation.
8. Verification of Stefan's-Boltzmans law.
9. Determination of thermal conductivity of a rubber tube.
10. Determination of velocity of sound using Helmholtz resonator.
11. Determnation of Velocity of sound through a wire using Sonometer.
12. Determination of velocity of sound using Kundt's tube.
13. Verification of the laws of transverse vibration using a sonometer.
14. Verification of the laws of transverse vibration using Melde's apparatus.
15. Comparison of the mass per unit length of two strings using Melde's apparatus.

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

COURSE	**SECOND SEMESTER – Skill Enhancement Course (SEC-2)**
COURSE TITLE	**ASTROPHYSICS**
CREDITS	1

Learning Objective: This course intends tointroduce principles of astrophysics describing the science of formation and evolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestialbodies along with the instrumentation and techniques used in astronomical research	
UNITS	**COURSE DETAILS**
UNIT-I	**TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes – Hubble space telescope.
UNIT-II	**SOLAR SYSTEM:**Bode's law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves.
UNIT-III	**ECLIPSES:** types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits. **THE SUN:**physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11year solar cycle – solar flares.
UNIT-IV	**STELLAR EVOLUTION:** H-R diagram – birth and death of low mass, intermediate mass and massive stars – Chandrasekar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae.
UNIT-V	**GALAXIES:**Our Milky Way - Galactic structure - Galactic rotation - Galaxy types - Galaxy formation; Cosmology: Expansion of the Universe - redshifts - supernovae - the Big Bang - history of the Universe.
TEXT BOOKS	1. BaidyanathBasu, (2001). An introduction to Astrophysics, Second printing, Prentice – Hall of India (P) Ltd, New Delhi 2. K.S.Krishnaswamy, (2002), Astrophysics – a modern perspective, New Age International (P) Ltd, New Delhi. 3. Shylaja, B.S. andMadhusudan, H.R.,(1999), Eclipse: A Celestial Shadow Play, Orient BlackSwan,

METHOD OF EVALUATION:

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

COURSE	**SECOND SEMESTER – Skill Enhancement Course (SEC-3)**
COURSE TITLE	**PHYSICS FOR COMPETITIVE EXAMINATIONS**
CREDITS	1

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	**MECHANICS** Centre of gravity - Centre of gravity of a solid hemisphere - Hollow hemisphere - Friction – Laws of friction - angle of friction - Impact - Laws of Impact - Direct and oblique impact - Impact between two spheres - Loss of Kinetic energy.
UNIT-II	**PROPERTIES OF MATTER** Viscosity of liquids - Highly viscous liquids – Searle's method- Surface Tension - Method of drops - Surface tension of mercury - Laws of osmotic pressure and experimental determination of osmotic pressure.
UNIT-III	**HEAT AND THERMODYNAMICS** Vanderwaal's equation - Critical constants and Vanderwaal's constant - Isothermal, adiabatic, isobaric, isochoric processes and entropy changes **ELECTRICITY AND MAGNETISM** Coulomb's law - Permittivity of free space - Relative permittivity - Electric field - Intensity of field due to a point charge - Gauss theorem and its application - Ohm's law - Resistivity and conductivity.
UNIT-IV	**OPTICS** Snell's Law - Laws of reflection and refraction from Fermat's principle; Coherent and Incoherent sources, Scattering of light and polarization. **SOUND** Velocity of sound in solids and gases – Theory and experiment - Ultrasonics - properties and applications
UNIT-V	**NUCLEAR PHYSICS** Properties of nucleus - size, charge, mass, angular momentum, parity and spin - Nuclear magnetic dipole moment - Binding energy - Packing fractions - Semi- empirical mass formula and applications; Nuclear fission and fusion

TEXT BOOKS	1. D.S.Mathur, Mechanics, Revised Edition 2012, S.Chand and Company Ltd., 2. Brij Lal, N. Subrahmanyam, Properties of Matter, Eurasia Publishing House Limited, 1993. 3. Brij Lal, N. Subrahmanyam , Heat Thermodynamics and Statistical Physics, Revised Edition 2018, S.Chand and Company Ltd., 4. R Murugeshan, Electricity and Magnetism, 2017, S.Chand and Company Ltd., 5. Subrahmanyam. N, Brijlal and Avadhanulu. M.N, 2014, A textbook of optics, 25th Edition, S.Chand and Co. 6. N. Subrahmanyam, *Brij Lal*., *A Textbook of Sound,* Vikas Publishing House, 1985. 7. *D. C. Tayal , Nuclear Physics* ; 2009, Himalaya Publishing House.,
REFERENCE BOOKS	1. J.B.Rajamand C.L.Arora, 1976, Heat and Thermodynamics, 8th edition, S.Chandand Co. Ltd. 2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand and Sons. 3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand and Co. 4. Resnick, HallidayandWalker,2010, Fundamentals of Physics, 6th Edition. 5.Sears, Zemansky, Hugh D. Young,Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.

COURSE	**THIRD SEMESTER - CORE**
COURSETITLE	**MECHANICS**
CREDITS	4
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	**COURSEDETAILS**
UNIT-I	**LAWS OF MOTION:** Newton's Laws – forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field. *Gravitation*: Introduction – Kepler's laws, Newton's law of gravitation – Determination of G by Boy's method – Earth-moon system – weightlessness – earth satellites –earth density – mass of the Sun – gravitational potential –escape velocity – 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
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 field – examples –non-conservative forces – general law of conservation of energy.
UNIT-IV	**RIGID BODY DYNAMICS:** Translational 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
UNIT-V	**LAGRANGIAN MECHANICS:** Generalized coordinates –degrees of freedom - principle of virtual work and D' Alembert's Principle – Lagrange's equation from D' Alembert's principle – application –simple pendulum – Atwood's Machine.
TEXT BOOKS	1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P.DuraiPandian, LaxmiDuraiPandian, MuthamizhJayapragasam,2005, Mechanics, 6th revised edition, S.Chandand Co. 3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition, S.Chandand Co. 4. Narayanamurthi, M.andNagarathnam. N, 1998, Dynamics. The National Publishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.
REFERENCE BOOKS	1. Goldstein Herbert, 1980, Classical Mechanics. U.S.A: Addison and Wesely. 2. Halliday, David and Robert, Resnick, 1995, Physics Vol.I. New Age, International, Chennai. 3. Halliday, David Robert Resnick and Walker Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi
WEB RESOURCES	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 5. https://onlinecourses.nptel.ac.in/noc22_me96/preview 6. https://www.youtube.com/watch?v=tdkFc88Fw-M 7. https://onlinecourses.nptel.ac.in/noc21_me70/preview

METHOD OF EVALUATION:

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

COURSE OUTCOMES:
Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**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 concept
	CO5	Appreciate Lagrangian system of mechanics, apply D' Alemberts principle

MAPPING WITH PROGRAM OUT COMES:
Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

	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 – COREPRACTICAL 3**
COURSETITLE	**PHYSICS PRACTICAL III**
CREDITS	3
COURSE OBJECTIVES	Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept.

Minimum of Six Experiments from the list:

1. Calibration of low range voltmeter using potentiometer
2. Calibration of ammeter using potentiometer.
3. Determination of field along the axis of a current carrying circular coil.
4. Determination of earth's magnetic field using field along axis of current carrying coil.
5. Determination of specific resistance of the material of the wire usingPO box.
6. Determination of specific resistance using Carey Foster's bridge.
7. Determination of e.m.f of thermo couple using potentiometer
8. Determination of figure of merit of BG or spot galvanometer.

9. Ballistic Galvanometer – Comparison of EMF's – E1 / E2
10. Series Resonance Circuit
11. Parallel Resonance Circuit
12. Owen's Bridge – Determination of self-inductance of the coil
13. Anderson's bridge – Self - inductance of the coil
14. Comparison of Magnetic Moments – Deflection Magnetometer (Tan A and Tan B position)
15. M and BH – Vibration magnetometer

Note : Use of digital balance, digital screw gauge, digital calipers are permitted

COURSE	**THIRD SEMESTER - Skill Enhancement Course (SEC-4)**
COURSETITLE	MAINTANANCE OF ELECTRICAL APPLIANCES
CREDITS	2
COURSE OBJECTIVES	This course enables the students to understand the operations and safety handling of certain commonly used domestic appliances. The paper needs a basic knowledge in electricity and magnetism and the learners are expected to gain knowledge to design and trouble shoot electrical circuits.

UNITS	**COURSEDETAILS**
UNIT-I	**Basic Electric components** Active & passive components-Resistance – capacitance types - inductance –its units- - Galvanometer, ammeter, voltmeter and multimeter- Transformers-types-coils –wire gauges-Electrical energy - power - consumption of electrical power.
UNIT-II	**Basic home Electrical appliances** Electric bulbs-working principles of - LED lamps-Electric Fans-Wet Grinder- Water purifier basics and working – maintenance-Mixie –electric Iron box
UNIT-III	**High Power Electrical appliances and safety requirements** Water Heater - Storage and Instant types – basics and working of microwave oven - Washing Machine - Air conditioner- its maintenance- concept of water pumping motor - overloading-short circuiting- ground earthing of appliances.
UNIT-IV	**Thermal electrical appliances** Room heater-basics and working of-electric iron & immersion rod-automatic rice cookerelectric kettle-toaster& hair dryer-induction cooker& stove
UNIT-V	**Relays & Switches Electrical protection** - Relays - Fuses - Electrical switches - Circuit breakers-MCB - basics and working of ELCB - RCCB - ground fault protection
TEXT BOOKS	1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P.DuraiPandian, LaxmiDuraiPandian, MuthamizhJayapragasam,2005, Mechanics, 6th revised edition, S.Chandand Co. 3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition, S.Chandand Co.

	4. Narayanamurthi, M.andNagarathnam. N, 1998, Dynamics. The National Publishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.
REFERENCEBOOKS	1. A text book in Electrical Technology - B L Theraja - S Chand &Co. 2. A text book of Electrical Technology - A K Theraja 3. Performance and design of AC machines - M G Say ELBS Edn. 4. Semiconductor Physics and Opto Electronics by P K Palanichamy 5. Basic Electronics - B L Theraja - S Chand &Co. 6. Principles of Communication Engineering - Arokh Singh and A K Chhabra – S Chand & Co.

COURSE	**FOURTH SEMESTER – CORE THEORY 4**
COURSETITLE	**OPTICS andLASER PHYSICS**
CREDITS	4
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 understand the working and applications of laser

UNITS	**COURSEDETAILS**
UNIT-I	**LENS AND PRISMS:** **Lens:**Lenses and its types – Equivalent focal length of two thin lenses in contact and separated by a distance – power of a lens. Aberrations: Spherical aberration, Methods of minimizing Spherical Aberration and chromatic aberrations. **Prism:**Dispersion by a prism, Angular dispersion and Dispersive power, Achromatic combination of prisms- Deviation without dispersion and Dispersion without deviation. Eyepieces:Eyepiece - Huygen's and Ramsden's eyepieces, construction and working – comparison
UNIT-II	**INTERFERENCE:** Interference – Conditions – Theory of Interference - Fresnel's biprism – Experimental determination of the wavelength of light - Colours of thin films - Production of colours in thin films – Air wedge (Wedge-shaped film) – Newton's rings. Michelson's interferometer – Applications, (i) determination of the wavelength of a monochromatic source of light and (ii) determination of a thickness of a mica sheet.

UNIT-III	**DIFFRACTION:**Fresnel and Fraunhofer diffraction - Fresnel's explanation of Rectilinear propagation of light - zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens – diffraction pattern due to a straight edge – plane transmission diffraction grating– experiment to determine wavelengths.
UNIT-IV	**POLARISATION:**Polarisation of light -double refraction – Nicol prism – Plane, circularlyand elliptically polarized light –quarter wave plate – half wave plate – production and detection of circularly and elliptically polarized lights – Optical activity - Fresnel's explanation – Laurent half shade polarimeter – experiment to determine specific rotatory power.
UNIT-V	**LASERS:**general principles of lasers – properties of lasers action – spontaneous and stimulated emission – population inversion – optical pumping – He-Ne laser (principle and working) – CO2 laser (principle and working) – laser applications – holography and its applications.
TEXT BOOKS	1. Subrahmanyam. N, Brijlal and Avadhanulu. M.N, 2014, A textbook of optics, 25th Edition,S.Chandand Co. 2. Murugeshan. R and Kiruthiga Sivaprasath, 2014, Optics and Spectroscopy, 9th Edition,S.Chandand Co.
REFERENCE BOOKS	1. Sathyaprakash, 1990,Optics,VII edition, Ratan Prakashan Mandhir, New Delhi. 2. Ajoy Ghatak, 2009,Optics, 4th Edition, PHIPvt Ltd, New Delhi. 3. Jenkins A.Francis and White, 2011, Fundamentals of Optics, 4th edition, McGraw Hill Inc., NewDelhi.

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**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:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

	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 PRACTICAL 4**
COURSETITLE	**PHYSICS PRACTICAL IV**
CREDITS	3
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results. Also, construct circuits to learn about the concept of electricity and magnetism.

Minimum of Six Experiments from the list:

1. Determination of refractive index of prism using spectrometer.
2. Determination of refractive index of liquid using hollow prism and spectrometer
3. Determination of dispersive power of a prism.
4. Determination of radius of curvature of lens by forming Newton's rings.
5. Determination of thickness of a wire using air wedge.
6. Determination of Cauchy's Constants.
7. Determination of resolving power of grating
8. Determination of refractive index of a given liquid by forming liquid lens
9. Determination of refractive index - by forming Newton's rings
10. Spectrometer - grating – oblique incidence - dispersive power
11. Tangent Galvanometer – Horizontal earth's magnetic induction
12. Spectrometer - grating – oblique incidence -Wave length of Mercury spectral lines
13. Ballistic Galvanometer – Absolute capacity of a condenser
14. Ballistic Galvanometer – Comparison of Capacitances (C1 / C2)
15. Determination of refractive index using Laser.

Note : Use of digital balance, digital screw gauge, digital calipers are permitted

METHOD OF EVALUATION:

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

COURSE	**FOURTH SEMESTER - Skill Enhancement Course (SEC-5)**
COURSETITLE	**MAINTANANCE OF ELECTRONICS APPLIANCES**
CREDITS	2
COURSE OBJECTIVES	This course enables the students to understand the operations and safety handling of certain commonly used domestic appliances. The paper needs a basic knowledge in electricity and magnetism and the learners are expected to gain knowledge to design and trouble shoot electrical circuits.

UNITS	**COURSEDETAILS**
UNIT-I	**SOLDERING TECHNIQUES** Soldering tools- soldering iron-soldering station-dry solder joint, cold solder joints-Good and bad solders joints. Groove board, bread board and printed circuit board
UNIT-II	**POWER SUPPLY AND MEASURING INSTRUMENTS** Transformer Zener voltage regulators-Dual Power supply IC'S 7805, 7905-switch mode power supply (SMP'S), principle of SMP'S-block diagram of SMP'S. Practical uses of Multimeter (analog and digital) –testing and measurements of resistor, capacitor and transistor
UNIT-III	**MAINTENANCE OF ELECTRONICS HOME APPLIANCES** LED/LCD TV-music player, CCTV Camera block diagram-its working - cathode ray oscilloscope –its principle and block diagram- Measurement of Frequency, AC and DC using CRO
UNIT-IV	**MAINTENANCE OF COMPUTER SYSTEMS** Various parts of computer-its assembling-installing windows operating systems, software and antiviruscomputer hardware maintenance-formatting and maintenance-Basic network installation-IP address setting and its maintenance. Modem-working principle.
UNIT-V	**SOLAR POWER SYSTEMS AND INVERTERS** Solar Panels -Solar Inverter – their principle & operation, power rating-, Protection circuits used in inverters– Solar Battery- battery level, over load, over charging. Various faults and its rectification.
TEXT BOOKS	1. Principles of Electronics by V K Mehta, S Chand & Co., 5th edition2001.0 2. Functional Electronics by Ramanan. 3. Solar Power Hand Book, Dr. H. naganagouda (2014) 2. Green Power: Eco-Friendly Energy Engineering", Khartchenko . N.V, "Tech Books, and New Delhi, 2008.
REFEREN CEBOOKS	1. Basic Electronics, 6th edition by B Grob, McGraw Hill NY1 2. Integrated electronics-Millman and Halkias 3. Electronic principles - Malvino 6 th edition 4. Operational amplifier – Gyakwar 5. Basic electronics B. Basavaraj, H.N.Shivasankar University press

METHOD OF EVALUATION:

Continuous InternalAssessment	**End Semester Examination**	**Total**	**Grade**

25	**75**	**100**	

COURSE	**FIFTH SEMESTER – CORE THEORY 5**
COURSETITLE	**ELECTRICITY, MAGNETISM ANDELECTROMAGNETISM**
CREDITS	4
COURSE OBJECTIVES	To classify materials based on their electrical and magnetic properties. To analyse the working principles of electrical gadgets. To understand the behaviour of dc, ac and transient currents. To know about the communication by electromagnetic waves.

UNITS	**COURSE DETAILS**
UNIT I **UNIT-I**	**CAPACITORS AND THERMO ELECTRICITY** Capacitor - principle - capacitance of a parallel plate capacitor (with and without dielectric slab) - effect of dielectric - Carey Foster bridge - temperature coefficient of resistance - Seebeck effect - Laws of thermo emf - Peltier effect - Thomson effect - Thermoelectric diagrams and their uses - thermodynamics of thermo couple.
UNIT-II	**MAGNETIC EFFECT OF CURRENT** Biot and Savart's law - magnetic induction due to circular coil - force on a current element by magnetic field - force between two infinitely long conductors - torque on a current loop in a field - moving coil galvanometer - damping correction - Ampere's circuital law - differential form – divergence of magnetic field - magnetic induction due to toroid.
UNIT-III	**MAGNETISM AND ELECTROMAGNETIC INDUCTION** Magnetic induction B - Magnetization M - relation between B, H and M - magnetic susceptibility - magnetic permeability - experiment to draw B-H curve - energy loss due to hysteresis - importance of hysteresis curve - Faraday and Lenz laws - vector form - self-inductance -coefficient of self-inductance of solenoid - Anderson's method - mutual inductance - coefficient of mutual inductance between two coaxial solenoids - coefficient of coupling.
UNIT-IV	**TRANSIENT ANDALTERNATINGCURRENTS** Growthanddecay ofcurrentinacircuitcontainingresistanceandinductance-growthand decay ofchargeinacircuitcontaining resistanceandcapacitor- growth anddecay ofchargein anLCRcircuit(expression forchargeonly)-peak, averageand rmsvaluesofac-LCRseries-parallelcircuits-resonancecondition -Qfactor -power factor.

UNIT-V	**MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES** Maxwell'sequationsinvacuum,materialmedia- physicalsignificance of Maxwell'sequations-displacementcurrent-planeelectromagneticwavesinfree space-velocityoflight-Poyntingvector- electromagneticwavesinalinear homogeneous media-refractive index.

TEXT BOOKS	1. Murugeshan. R., - Electricity and Magnetism, 8th Edn, 2006, S.Chandand Co, New Delhi. 2. Sehgal D.L., Chopra K.L, Sehgal N.K., - Electricity and Magnetism, 3. Sultan Chand and Sons, New Delhi. 4. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition. 5. National Publishing Co., Meerut.
REFERENCE BOOKS	1. 1. Brijlal and Subramanian, Electricity and Magnetism, 6th Edn.,Ratanand Prakash, Agra. 2. Brijlal, N.Subramanyan and JivanSeshan, Mechanics and Electrodynamics (2005), 3. Eurasia Publishing House (Pvt.) Ltd., New Delhi. 4. David J. Griffiths, Introduction to Electrodynamics, 2nd Edn. 1997, Prentice Hall of 5. India Pvt. Ltd., New Delhi 6. D. Halliday, R. Resnik and J. Walker - Fundamentals of Physics, 6th Edn., Wiley, NY, 2001.
WEB RESOURCES	1. https://www.edx.org/course/electricity 2. https://www.udemy.com/courses/ electricity 3. https://www.edx.org/course/magnetism 4. http://www.hajim.rochester.edu/optics/undergraduate/courses.html

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Describe various thermo-electric effects and their properties.
	CO2	Apply Biot and Savart law to study the magnetic effect of electric current.
	CO3	Use Faraday and Lenz laws in explaining self and mutual inductance.
	CO4	Analyze the time variation of current and potential difference in AC circuits.
	CO5	Relate different physical quantities used to explain magnetic properties of materials.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

	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	S	M	S	S	S	M	M	S	M

COURSE	**FIFTH SEMESTER – CORE - 6**
COURSE TITLE	**ATOMIC and NUCLEAR PHYSICS**
CREDITS	4
COURSE OBJECTIVES	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 get knowledge on radioactive decay; To know the concepts used in nuclear reaction; to understand the quark model of classification of elementary particles.

UNITS	COURSE DETAILS
UNIT-I	**VECTOR ATOM MODEL**: Introduction – Vector atom model – electron spin – spatial quantisation – quantum numbers associated with vector atom model. Coupling SchemesL-S and j-j coupling. Pauli's Exclusion Principle. Magnetic dipole moment due to orbital motion and spin motion of the electron – Bohr magnetron – Stern-Gerlach experiment.
UNIT-II	**ATOMIC SPECTRA**: Spectral terms and notations – Zeeman Effect – quantum mechanical explanation of normal Zeeman effect. Anomalous Zeeman Effect – quantum mechanical theory – fine structure of sodium D-lines. Paschen-Back Effect, Stark Effect.
UNIT-III	**STRUCTURE OF NUCLEI**: General Nuclear Properties – charge, size, shape, mass, density, spin, parity. Mass defect and Binding energy – Binding energy curve. Nuclear force – characteristics of nuclear forces. Nuclear Models – Liquid Drop Model – similarities between nucleus and liquid drop – mass formula. Shell Model - magic numbers – evidences that led to shell
UNIT-IV	**RADIOACTIVITY**: Discovery of radioactivity – exponential decay law– half-life, mean-life. Natural and Artificial radio activity. Properties of alpha rays, beta rays and gamma rays – Gamow's theory of alpha decay (qualitative study) – Geiger-Nuttal law – beta decay spectra

UNIT-V	**Nuclear Reactor, Accelerator and Detectors**: Nuclear fusion – Nuclear fission. Nuclear Reactor – construction and working – radio isotopes and its applications. Charged Particle Accelerators - Cyclotron – Detectors of Nuclear Radiation – GeigerMuller Counter – Scintillation Counter. Nuclear facilities in India.

TEXT BOOKS	1. R. Murugesan, Modern Physics, S. Chand and Co**. (**All units**)** (Units IandII-Problems) 2. Brijlaland N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units) 3. J. B. Rajam, Modern Physics, S. Chand and Co. 4. SehgalandChopra, Modern Physics, Sultan Chand, New Delhi 5. Arthur Beiser– Concept of Modern Physics, McGraw Hill Publication, 6th Edition.
REFERENCE BOOKS	1. Perspective of Modern Physics, Arthur Beiser, McGraw Hill. 2. Modern Physics, S. Ramamoorthy, National Publishing and Co. 3. Laser and Non-Linear Optics by B.B.Laud, Wiley Easter Ltd.,New York,1985. 4. Tayal, D.C.2000 – Nuclear Physics, Edition, Himalaya Publishing House, Mumbai. 5. Irving Kaplan (1962) Nuclear Physics, Second Edition, Oxford and IBH Publish and Co, New Delhi. 6. J.B. Rajam– Atomic Physics, S. Chand Publication, 7th Edition. 7. Roy and Nigam, – Nuclear Physics (1967) First edition, Wiley Eastern Limited, New Delhi.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html 2. https://makingphysicsfun.files.wordpress.com/2015/01/photoelectric-effect.pptx 3. https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/types-of-decay 4. https://www.khanacademy.org/science/in-in-class-12th-physics-india/nuclei

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Listthe properties of electrons and positive rays, definespecific charge of positive rays and knowabout different mass spectrographs.
	CO2	Outlinephotoelectric effect and the terms related to it, Statelaws of photoelectric emission, Explain experiments and applications of photo electric effect, Solve problems based on photoelectric equation.
	CO3	Explain different atom models, Describedifferent quantum numbers and different coupling schemes.

	CO4	Differentiate between excitation and ionization potentials, Explain Davis and Goucher's experiment,Apply selection rule,AnalysePaschen-Back effect,Compare Zeeman and Stark effect.
	CO5	Understand the condition for production of laser, Appreciate various properties and applications of lasers.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithpogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**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	M	S	S	S	S	M	S	M	M	M
CO5	S	M	S	S	M	S	S	M	M	S

COURSE	**FIFTH SEMESTER – CORE - 7**
COURSETITLE	**ANALOG AND COMMUNICATION ELECTRONICS**
CREDITS	3
COURSE OBJECTIVES	To studythe design, working and applications of semiconducting devices. To construct various electronic circuits. To study them in details. To study the basis of audio and video communication systems and the aspects of satellite and FibreOptic Communications**.**
UNITS	**COURSE DETAILS**
UNIT-I	**DIODES:** Diode characteristics –half wave rectifier, center tapped and bridge fullwave rectifiers, calculation of efficiency and ripple factor - clipper circuits, clamping circuits. DC power supply: Block diagram of a power supply, Zener diode as voltage regulator.
UNIT-II	**TRANSISTOR AMPLIFIERS:** Transistor configurations: CB, CE and CC modes – I-V characteristics and hybrid parameters – DC load line – Q point self-bias - RC coupledCE amplifier – power amplifiers – push pull amplifiers – tuned amplifiers.
UNIT-III	**TRANSISTOR OSCILLATORS:** feedback amplifier - principle of feedback, positive and negative feedback - voltage and current gain - advantages of negative feedback - Barkhausen's criterion- Transistor oscillators: Hartley, Colpitts, Phase shift oscillators.
UNIT-IV	**OPERATIONAL AMPLIFIERS AND TIMER:** Differential amplifiers – OP-AMP characteristics – IC 741 pin configuration – inverting and non-inverting amplifiers–summing and difference amplifiers – differentiator and integrator –IC 555 pin configuration-astablemultivibrator (square wave generator) – monostable vibrator

UNIT-V	**MODULATION AND DEMODULATION: T**heory of amplitude modulation - frequency modulation – comparison of AM and FM – phase modulation – pulse width modulation – pulse modulation systems: PAM, PPM, and PCM – D**emodulation:** AM and FM detection.
TEXT BOOKS	1. V.K.Mehta - Principles of Electronics, S.Chand and Co. Ltd., 2004. 2. V.Vijayendran - Integrated Electronics, S.Vishwanathan Publishers, Chennai. 3. B.L. Theraja - A Text Book of Electrical Technology. 4. John D. Ryder - Electronic fundamentals and Applications. 5. Malvino - Electronic Principles, Tata McGraw Hill.
REFERENCE BOOKS	1. B. Grob - Basic Electronics, 6th edition, McGraw Hill, NY, 1989. 2. Herbert Taub and Donald schilling - Digital Integrated Electronics, McGraw Hill, NY. 3. Ramakant A. – Op amp principles and linear integrated circuits, Gaykward 4. Bagde and S. P. Singh - Elements of Electronics. 5. Millman and Halkias- Integrated Electronics, Tata McGraw Hill.
WEB RESOURCES	1. https://www.queenmaryscollege.edu.in/eresources/undergraduateprogram/py157 2. www.ocw.mit.edu>...> Circuits and Electronics 3. www.ocw.mit.edu>...> Introductory Analog Electronics Laboratory 4. https:// www.elprocus.com> semiconductor devices 5. https:// www.britannica.com>technology

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Explain the basic concepts of semiconductors devices.
	CO2	know and classify the basic principles of biasing and transistor amplifiers
	CO3	Acquire the fundamental concepts of oscillators.
	CO4	Understand the working of operational amplifiers
	CO5	Learn and analyze the operations of sequential and combinational digital circuits

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**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	M	S	M	M	M
CO3	M	M	S	L	S	S	L	S	S	S
CO4	M	S	S	S	S	S	S	M	L	M
CO5	S	M	S	S	M	M	S	M	M	S

ELECTIVE COURSES (EC)

STUDENTS CAN CHOOSE ANY OF THESES SUBJECTS IN SEMESTER V

EC 1. Spectroscopy
EC 2. Mathematical Physics
EC 3. Python Programming and Basics of AI and Data Science

COURSE	**FIVETH SEMESTER –ELECTIVE COURSE (EC -1)**
COURSETITLE	**SPECTROSCOPY**
CREDITS	4
COURSE OBJECTIVES	This course facilitates an understanding of atomic and molecular spectra and the instrumentations. The paper needs a basic knowledge about atomic structure and the learners are expected to gain knowledge to identify materials with the help of various spectra
UNITS	**COURSEDETAILS**
UNIT-I	**MICROWAVE SPECTROSCOPY**: Rotation of molecules – Classification of molecules – Rotation spectra of diatomic molecules – Intensities of spectral lines – Effect of isotopic substitution – non-rigid rotator – Spectrum of a non-rigid rotator-Techniques and Instrumentation of Microwave spectroscopy (Microwave spectrometer)
UNIT-II	**INFRARED SPECTROSCOPY**: I.R. spectroscopy – Vibrating diatomic molecules – Simple Harmonic Oscillator - Anharmonic oscillator – Diatomic vibrating rotator - Analysis by IR techniques. Difference between IR and Microwave spectroscopy.
UNIT-III	**RAMAN SPECTROSCOPY**: Raman effect- Discovery – Quantum theory of Raman effect – Classical theory of Raman Effect –Pure rotational Raman spectra of Linear molecules – Advantages and disadvantages of Raman spectroscopy-Raman spectrometer.
UNIT-IV	**ELECTRONIC SPECTROSCOPY:** Vibrational coarse structure-Frank-Condon principle – Rotational fine structure of electronic - vibration spectra-Dissociation energy — Fortrat parabola.
UNIT-V	**NMR SPECTROSCOPY:** Introduction –Theory of NMR spectroscopy and origin of NMR signal – NMR instrumentation – Application of NMR spectroscopy - Magnetic resonance imaging (MRI) – Interpretation of NMR spectra- Advantages and disadvantages of MRI.
TEXT BOOKS	1.Fundamentals of Molecular Spectroscopy - Colin N Banwell Elaine- M MccashFifth Edition 2.Molecular Structure and Spectroscopy - G. Aruldhas, PHI Learning Pvt. Ltd,India
REFERENCE BOOKS	1.Hand book of Analytical Instruments -R.S. Khandpur, Tata MC Grow Hill Ltd. 2.Spectroscopy -G.R. Chatwal and S.K. Anand, Himalaya publishing House, NewDelhi.

METHOD OF EVALUATION:

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

COURSE	**FIFTH SEMESTER –ELECTIVE COURSE (EC -2)**
COURSETITLE	**MATHEMATICAL PHYSICS**
CREDITS	2
COURSE OBJECTIVES	To understand higher mathematical concepts which are applied to solve problems in Physics and similar situations

UNITS	**COURSE DETAILS**
UNIT-I	**MATRICES:**Types of matrices – symmetric, Hermitian, unitary and orthogonal matrices– characteristic equation of a matrix –Cayley-Hamilton theorem – inverse of matrix by Cayley-Hamilton theorem –diagonalization of 2x2 real symmetric matrices.
UNIT-II	**VECTOR CALCULUS:** Vector differentiation – directional derivatives – definitions & Physical significance of gradient, divergence, curl and Laplace operators– vector identities – line, surface and volume integrals – statement and proof for Gauss's divergence theorem and Stoke's theorem
UNIT-III	**ORTHOGONAL CURVILINEAR COORDINATES:** Basis vectors –unit vectors in Cartesian,cylindrical and spherical coordinate systems –gradient of a scalar –divergence and curl of a vector – Laplacian in these coordinate systems.
UNIT-IV	**FOURIER SERIES:** Periodic functions – Dirichlet's conditions – general Fourier series – even and odd functions and their Fourier expansions – Fourier cosine and sine –Fourier analysis of square wave, saw-tooth wave, half wave/full wave rectifier wave forms. **FOURIER TRANSFORMS**: Fourier Integral theorem(Statement only)– Fourier, Fourier sine and Fourier cosine transforms,– Fourier transform ofsingle pulse – trigonometric,exponential and Gaussianfunctions – inverse Fourier transform
UNIT-V	**NUMERICAL METHODS:**Determination of zeros of polynomials – roots of algebraic and transcendental equations using bisection methods – Newton-Raphson method to find square root and cube roots – Evaluation of definite integral using trapezoidal rule, Simpson's 1/3 and 1/8 rule
TEXT BOOKS	1. Mathematical Physics - *Satya prakash*, Sultan Chand, Meerut 2. Mathematical Physics – B. D. Gupta. 3. Mathematical Physics – H. K. Das, S. Chand & Co, New Delhi. 4. Numerical methods,Singaravelu,Meenakshipublication,4th Edn., 1999. 5. Numerical methodsP.Kandasamy, K.Thilagavathy, K. Gunavathi, S.Chand, 2016
REFERENCE BOOKS	1. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill. 2. Engineering Mathematics III- B, M. K. Venkataraman, 3. Applied Mathematics for Scientists and Engineers, Bruce R. Kusse & Erik A. Westwig, 2nd Ed, WILEY-VCH Verlag, 2006. 4. Vector space & Matrices – J. C. Jain, Narosa Publishing House Pvt. Ltd.

METHOD OF EVALUATION:

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

COURSE	**FIFTH SEMESTER –ELECTIVE COURSE (EC -3)**
COURSETITLE	**PYTHON PROGRAMMING AND BASICS OF AI & DATA SCIENCE**
CREDITS	2
COURSE OBJECTIVES	Objective of the course is to provide knowledge about the basics of Computerprogramming in Python and to solve problems by writing programs. Basic knowledge of AI and Data Science. The paper does not need any special prerequisite and the learners are expected to come out with the ability to apply the computer language PYTHON to solve PHYSICS problems.

UNITS	COURSE DETAILS
UNIT-I	**BASICS -** Python Introduction – Tokens:literals, Variables, Reserved Words, Operators, Delimiters and Escape sequences - Standard Data Types -Expressions – Comments in Python - InputandOutput functions -Simple Physics formula based programming in Python..
UNIT-II	**CONTROL STATEMENTS**: Control Flow Statements andSyntax with examples- Looping statements - string operations- LISTS: List- list slices - list methods - list loop –Tuples assignment– sets - Dictionaries.
UNIT-III	**FUNCTIONS:** Definition and types- Passing parameters to a Function- Scope–Typeconversion-PassingFunctionstoaFunction-Modules-StandardModules–Inbuilt Function- Scope of Variables.
UNIT-IV	**OBJECT ORIENTED FEATURES**: Introduction-Defining Classes- Public and private Data member-Creating Object-Accessing class members-Using objects. Constructors-Destructors- Introduction of simple Inheritance – Introduction of simple Polymorphism-**ERROR HANDLING** :Run Time Errors - Exception Model
UNIT-V	**ARTIFICIAL INTELLIGENCE AND DATA SCIENCE:** Introduction - History of AI - Applications of AI – Defining Algorithm – A* Algorithm. **DATA SCIENCE**: Introduction – Defining Data , Information and Data structure-Basic concept of Probability and Statistics.

TEXT BOOKS	1. Fundamental of Pythons-First program by Kenneth A.Lambert 2. Python Programming-A modular approach by pearson-sheetal Taneja 3. Hands on AI for beginners by Patric D. SmithIntroduction to Data Science by by Dr. Sushil Dohare, Dr. V SelvaKumar Sachin Raval

REFERENCE BOOKS	1. Python Crash Course – Eric Matthes No starch press,san fransisco 2. Python programming using problem solving approach – Reema Thareja-Oxford university press 3. Python: The Complete Referenceby Martin C. Brown 4. AI for beginners by Jassim M
WEB LINK	1. https://youtu.be/eWRfhZUzrAc 2. https://youtu.be/kqtD5dpn9C8 3. https://youtu.be/9IgscYw7BnY 4. https://youtu.be/ua-CiDNNj30

METHODOF EVALUATION:

Continuous InternalAssessment	End Semester Examination	Total	Grade
25	75	100	

COURSE	**FIFTH SEMESTER – CORE PRACTICAL 5**
COURSETITLE	**PHYSICS PRACTICAL V**
CREDITS	2
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.

GENERAL PHYSICS EXPERIMENTS - I

Minimum of Six Experiments from the list:

1. Potentiometer – Calibration of Voltmeter (High Range)
2. Spectrometer– Grating - Normal incidence - Wave length of Mercury spectral lines.
3. Spectrometer – Grating - Minimum deviation - Wave length of Mercury spectral lines.
4. Young's Modulus – Elliptical Fringes
5. Bi-prism – Determination of Wavelength.
6. Thevenin's and Norton's Theorem verification
7. Y – by Cornus method.
8. Forbe's method – Thermal conductivity of a metal rod.
9. Spectrometer – (i-d) curve.
10. Spectrometer – (i-i′) curve.
11. Ballistic Galvanometer – High resistance by leakage
12. Desauty's Bridge – Determination of C, C1 & C2 in series and parallel

METHOD OF EVALUATION:

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

COURSE	**FIFTH SEMESTER – CORE PRACTICAL 6**
COURSETITLE	**PHYSICS PRACTICAL VI**
CREDITS	2
COURSE OBJECTIVES	To perform basic experiments on characteristics of electronic devices and then get into the applications such as amplifiers, oscillators, counters, multivibrators. Perform fundamental experiments on microprocessor 8085 and learn to write programs by themselves.

ELECTRONICSEXPERIMENTS - I

Minimum of Six Experiments from the list:

1. V-I Characteristics of Junction diode and Zener diode
2. Zener diode – voltage regulations bridge rectifier
3. Dual power supply using IC's
4. OPAMP – Adder & Subtractor
5. OPAMP – Low Pass & High Pass Filter
6. Characteristics of a transistor – (CE mode)
7. RC coupled CE transistor amplifier - single stage.
8. Colpitt's oscillator -transistor.
9. FET - characteristics.
10. UJT –characteristics
11. Astable multivibrator using 555 timer
12. Bistable multivibrator – 555 timer

METHOD OF EVALUATION:

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

COURSE	**SIXTHSEMESTER – CORE -8**
COURSETITLE	**RELATIVITY AND QUANTUM MECHANICS**
CREDITS	**4**
COURSE OBJECTIVES	To understand the theory of relativity, its postulates and the consequences. To learn the importance of transformation equations. And also, to learn special theory of relativity. To interpret the wave theory of matter with various theoretical and experimental evidences. To derive and use Schrodinger's wave equation and also learn about various operators. To solve Schrodinger's wave equation for simple problems and analyse to understand the solutions.

UNITS	**COURSE DETAILS**
UNIT-I	**SPECIAL THEORY OF RELATIVITY**: Frames of reference – Galilean Relativity – Postulates of special theory of relativity – Lorentz transformations – length contraction – time dilation – concept of simultaneity – variation of mass with velocity – Einstein's mass-energy relation – relativistic momentum – energy relation.
UNIT-II	**FAILURE OF CLASSICAL PHYSICS**: Black body radiation – Failure of Classical Physics to explain energy distribution in the spectrum of a black body – Planck's Quantum theory – Wein's distribution law – Rayleigh Jean's law. Photo Electric Effect – Difficulty with Classical Physics – Einstein's Photo Electric Equation – work function.
UNIT-III	**CONCEPT OF MATTER WAVES**: de Broglie's concept of matter waves – expression for de Broglie's wave length – phase velocity – group velocity – relationship. Heisenberg's Uncertainty Principle – Elementary proof of Heisenberg's uncertainty relations.
UNIT-IV	**OPERATORS AND SCHRÖDINGER EQUATION**: Postulates of quantum mechanics – Wave function and its interpretation – linear operators – Eigenvalue – Hermitian operator – Properties of Hermitian operator – Commutator Algebra. **SCHRÖDINGER EQUATION**: Schrodinger's wave equation in time dependent form – Steady state Schrodinger's wave equation – extension to three dimensions.
UNIT-V	**APPLICATIONS OF SCHRÖDINGER EQUATIONS**: Particle in a one-dimensional box – Particle in a rectangular three- dimensional box. Simple harmonic oscillator – One dimensional simple harmonic oscillator in quantum mechanics – zero-point energy. Reflection at a step potential – Transmission across a potential barrier – Barrier Penetration (tunnelling effect).

TEXT BOOKS	1. Modern Physics, R. Murugeshan, KiruthigaSivaprasath,S. Chand and Co.,17th Revised Edition, 2014. 2. Concepts of Modern Physics, A.Beiser, 6th Ed., McGraw-Hill, 2003. 3. *Special Theory of Relativity,S. P.Puri,* Pearson Education, India, 2013. 4. Quantum Mechanics, GhatakandLoganathan, Macmillan Publications. 5. Quantum mechanics – Satyaprakash and Swati Saluja. KedarNath Ram Nathand Co.
REFERENCE BOOKS	1. Fundamentals of Modern Physics, Peter J. Nolan, 1stEdition, 2014, by Physics 2. Quantum Mechanics, V. Devanathan, Narosa Pub. House, Chennai, 2005. 3. Quantum Mechanics, V.K. Thangappan, New Age International, New Delhi. 4. A Text Book of Quantum Mechanics, Mathews andVenkatesan, Tata McGraw Hill, New Delhi. 5. Introduction to Quantum Mechanics, Pauling and Wilson, McGraw Hill Co., NewYork.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/qapp.html 2. https://swayam.gov.in/nd2_arp19_ap83/preview 3. https://swayam.gov.in/nd1_noc20_ph05/preview 4. https://www.khanacademy.org/science/physics/special-relativity/minkowski-spacetime/v/introduction-to-special-relativity-and-minkowski-spacetime-diagrams

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Understand various postulates of special theory of relativity.
	CO2	**Appreciate the importance of transformation equations and also the general theory of relativity..**
	CO3	Realise the wave nature of matter and understand its importance
	CO4	Derive Schrodinger equation and also realize the use of operators.
	CO5	Apply Schrödinger equation to simple problems.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**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	M	S	M	M	M
CO3	M	M	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	M	M	S	M	M	S

COURSE	**SIXTH SEMESTER – CORE 9**
COURSETITLE	**SOLID STATE PHYSICS**
CREDITS	4
COURSE OBJECTIVES	To understand constituents, properties and models of nucleus. To give reason for radioactivity and study their properties.To learn about the principles of various particle detectors and accelerators. To acquire knowledge on different types of nuclear reactions and their applications.To know the reason for cosmic rays and their effect on the surface of earth and also understand the classification of elementary particles.
UNITS	**COURSE DETAILS**
UNIT-I	**BONDING IN SOLIDS, CRYSTAL STRUCTURE**: types of bonding –ionic bonding – bond energy of NaCl molecule –covalent bonding — Van-der-Waals bonding – crystal lattice – lattice translational vectors – lattice with basis – unit cell – Bravais' lattices –crystal structure – packing of SCC, BCC, andFCCstructures – structures of NaCl and diamond crystals – Miller indices – procedure for finding them.
UNIT-II	**ELEMENTARY LATTICE DYNAMICS**: lattice vibrations and phonons: linear monoatomic and diatomic chains. acoustical and optical phonons – Dulong and Petit's Law –properties of metals – classical free electron theory of metals(Drude-Lorentz) – Ohm's law – electrical and thermal conductivities – Weidemann-Franz' law.
UNIT-III	**MAGNETIC PROPERTIES OF SOLIDS**: permeability, susceptibility, relation between them – classification of magnetic materials – properties of dia, para,ferro, ferri and antiferromagnetism – Langevin'stheory of diamagnetism – Weiss theory of paramagnetism – Curie-Weiss law – Weiss theory of ferromagnetism(qualitative only) – domains –B-H curve –hysteresis and energy loss – soft and hard magnets.

UNIT-IV	**DIELECTRIC PROPERTIES OF MATERIALS**: Basic definitions - 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.
UNIT-V	**FERROELECTRIC & SUPERCONDUCTING PROPERTIES OF MATERIALS**: ferroelectric effect: Curie-Weiss Law – ferroelectric domains,– elementary band theory:band gap(no derivation) — Hall effect – measurement of conductivity (four probe method) - Hall coefficient. Superconductivity: general properties of superconducting materials – critical temperature –critical magnetic field – Meissner effect –isotope effect– type-I and type-II superconductors – London's equation and penetration depth.
TEXT BOOKS	1. Introduction to Solid State Physics,Kittel, Willey Eastern Ltd (2003). 2. Solid state Physics, Rita John,1st edition, TataMcGraw Hill publishers (2014). 3. Solid State Physics , R L Singhal, Kedarnath Ram Nath& Co., Meerut (2003) 4. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India 5. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill 6. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning 7. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer 8. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India 9. Solid State Physics, M.A. Wahab, 2011, Narosa Publishing House, ND
REFERENCE BOOKS	1. Puri&Babber – Solid State Physics – S.Chand&Co. New Delhi. 2. Kittel - Introduction to solid state physics, Wiley and Sons, 7th edition. 3. Raghavan - Materials science and Engineering, PHI 4. Azaroff - Introduction to solids, TMH 5. S. O. Pillai - Solid State Physics, Narosa publication 6. A.J. Dekker - Solid State Physics, McMillan India Ltd. 7. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India 8. Solid State Physics, K. Ilangovan, 1st Edition, MJP Publishers, 2021.
WEBLINKS	1. https://nptel.ac.in/courses/115105099/ 2. https://nptel.ac.in/courses/115106061/

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Classify the bonding andcrystal 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:

Mapcourseoutcomes**(CO)**foreachcoursewithpogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**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 SEMESTERCORE - 10**
COURSETITLE	**DIGITAL ELECTRONICS AND MICROPROCESSOR 8085**
CREDITS	4
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	**Decimal, binary, octal, hexadecimal numbers systems and their conversions – codes**: BCD, gray and excess-3 codes –code conversions —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) –standard representation of logic functions (SOP & POS) – minimization techniques (Karnaugh map: 2, 3, 4 variables).
UNIT-II	**Adders:** half &full adder – subtractors: half &full subtractor – parallel binary adder – magnitude comparator – multiplexers (4:1) &demultiplexers (1:4), encoder (8-line-to-3- line) and decoder (3-line-to-8-line), BCD to seven segment decoder.
UNIT-III	**Flip-flops:** R-S 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 - ring counter and **up-down counter – A/D and D/A converter.**

UNIT-IV	**General memory operations**, ROM, RAM (static and dynamic), PROM, EPROM, EEPROM, EAROM. IC – logic families: RTL, DTL, TTL logic, CMOS NAND & NOR Gates, CMOS Inverter, Programmable Logic Devices – Programmable Logic Array (PLA), Programmable Array Logic (PAL).
UNIT-V	**8085 Microprocessor:**Introduction to microprocessor – pin configuration of 8085 – Flags – Registers (General and special purpose) –interrupts and its priority – instruction set of 8085 – addressing modes of 8085 - Assembly language programming using 8085 – programs for addition, subtraction, multiplication and division (8-Bit only).
TEXT BOOKS	1. M.Morris Mano, "Digital Design "3rd Edition, PHI, NewDelhi. 2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV) 3. S.Salivahana& S. Arivazhagan-Digital circuits and design 4. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar 5. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and GlenSA
REFERENCE BOOKS	1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" . McGraw Hill. 1985. 2. S.K. Bose. "Digital Systems". 2/e. New Age International.1992. 3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters: Fundamentals &Applications". TMH.1994. 4. Malvino and Leach. "Digital Principles and Applications". TMG HillEdition 5. Microprocessors and Interfacing – Douglas V.Hall 6. Microprocessor and Digital Systems – Douglas V.Hall
WEBLINKS	1. https://youtu.be/-paFaxtTCkI 2. https://youtu.be/s1DSZEaCX_g

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Learn about number systems, Boolean algebra, logical operation and logic gates
	CO2	Understand the working of adder, subractors, multiplexers and demultiplexers.
	CO3	Get knowledge on flip-flops and storage devices.
	CO4	Gain inputs on architecture of microprocessor 8085.
	CO5	Develop program writing skills .on microprocessor 8085.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithpogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**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

ELECTIVE COURSES (EC)

STUDENTS CAN CHOOSE ANY OF THESES SUBJECTS IN SEMESTER VI

EC 4. Energy Physics
EC 5. Material Science
EC 6. Nanoscience and Nanotechnology

SIXTH SEMESTER –ELECTIVE COURSE (EC -4)	
ENERGY PHYSICS	
Learning Objective: To get the understanding of the conventional and non-conventional energy sources, their conservation and storage systems.	
UNITS	**COURSE DETAILS**
UNIT-I	**INTRODUCTION TO ENERGY SOURCES:** World **reserve of** energy sources – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits, demerits **and applications of fossil fuels**.
UNIT-II	**SOLAR ENERGY:** Introduction – solar constant – solar radiation at the Earth's surface–solar energy storage and storage systems – solar pond – solar cooker – solar water heater – **solar crop dryer -** solar greenhouse – types of greenhouses – **Merits and demerits of solar energy**
UNIT-III	**WIND ENERGY: I**ntroduction - **Classification and description** of Wind Energy Conversion Systems (WECS) – **Principle and working of wind energy collectors - Ocean Thermal Energy Conversion (OTEC)-** tidal energy - advantages and disadvantages of WECS, **OTEC and Tidal energy**
UNIT-IV	**BIOMASS ENERGY:** Introduction – classification – biomass conversion technologies – **Thermochemical and biochemical conversion** – biogas generation –classification of biogas plants – **floating drum plant – fixed dome type plant -** advantages & disadvantages.
UNIT-V	**ENERGY STORAGE:** Importance of energy storage- batteries - lead acid battery -nickel-cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells.

TEXT BOOKS	1. G.D.Rai, Non-Conventional Sources of Energy, Khanna Publishers, 2009, 4th Edn. 2. S P Sukhstme, J K Nayak, Solar Energy, Principles of Thermal Collection and Storage, McGraw Hill, 2008, 3rd Edn. 3. D P Kothari, K P Singal, RakeshRajan, PHI Learning Pvt Ltd, 2011, 2nd Edn.
REFERENCE BOOKS	1. John Twidell& Tony Weir, Renewable Energy Resources, Taylor & Francis, 2005, 2nd Edn. 2. S.A. Abbasi and NasemaAbbasi, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd, 2008. 3. M. P. Agarwal, Solar Energy, S. Chand & Co. Ltd., New Delhi,1982 4. H. C. Jain, Non-Conventional Sources of Energy, Sterling Publishers,1986.

METHOD OF EVALUATION:

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

SIXTH SEMESTER –ELECTIVE COURSE (EC -5)	
MATERIALS SCIENCE	
Learning Objective: To learn imperfections in crystals, deformation of materials and testing of materials. To get knowledge on behavior of a material, under the action of light and their applications. To know the applications of crystal defects.	
UNITS	**COURSE DETAILS**
UNIT-I	**CRYSTAL IMPERFECTIONS:** introduction – point defects: vacancies**(***problems***)**, interstitials, impurities, electronic defects –point defects –line defects: edge dislocation**(***problems***)**, screw dislocation – surface defects: extrinsic defects – intrinsic defects: grain boundaries, tilt &twist boundaries, twin boundaries, stacking faults – volume defects – effect of imperfections.
UNIT-II	**MATERIAL DEFORMATION: i**ntroduction – elastic behavior of materials – atomic model of elastic behavior –modulus as a parameter in design – rubber like elasticity – inelastic behavior of materials – relaxation process – viscoelastic behavior of materials.
UNIT-III	**PERMANENT DEFORMATION AND STRENGTHENING METHODS OF MATERIALS:** introduction –plastic deformation: tensile stress-strain curve – plastic deformation by slip – creep: mechanism of creep – creep resistant materials – strengthening methods: strain hardening, grain refinement – solid solution strengthening.
UNIT-IV	**OPTICAL MATERIALS:** introduction – optical absorption in metals, semiconductors and insulators – NLO materials and their applications – display devices and display materials: fluorescence and phosphorescence – light emitting diodes –liquid crystal displays.
UNIT-V	**MECHANICAL TESTING:** destructive testing: tensile test, hardness test – nondestructive testing (NDT): radiographic methods – thermal methods of NDT: thermography – equipment used for NDT:

	metallurgical microscope
TEXT BOOKS	1. Materials science and Engineering, Raghavan V, Prentice Hall of India, Sixth Edition, 2015 2. Materials science, V. Rajendran, McGraw Hill publications2011
REFERENCE BOOKS	1. William D. Callister, Jr., Material Science & Engineering – An Introduction, 8th Edition, John Wiley & Sons, Inc., 2007 2. W. Bolton, "Engineering materials technology", 3rd Edition, Butterworth & Heinemann, 2001. 3. Donald R. Askeland, Pradeep P. Phule, "The Science and Engineering of Materials", 5th Edition, Thomson Learning, First Indian Reprint, 2007. 8. William F. Smith, "Structure and Properties of Engineering Alloys", Mc-Graw-Hill Inc., U.S.A, 2nd edition, 1993.

METHOD OF EVALUATION:

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

SIXTH SEMESTER –ELECTIVE COURSE (EC -6)	
NANOSCIENCE AND NANO TECHNOLOGY	
Learning Objective: This course aims to provide an overall understanding of Nanoscience and Nanotechnology and introduces different types of nanomaterials, their properties, fabrication methods, characterization techniques and a range of applications.	
UNITS	**COURSE DETAILS**
UNIT-I	**NANOSCIENCE AND NANOTECHNOLOGY:** Introduction Nanoscale. **Nanostructures:** 0D, 1D,2D– surface to volume ratio– size effect – excitons – quantum confinement– metal based nanoparticles (metal and metal oxide) – nanocomposites (non-polymer based) – carbon nanostructures – fullerene –SWCNT and MWCNT
UNIT-II	**PROPERTIES OF NANOMATERIALS:** Introduction –mechanical behavior –elastic properties – hardness and strength – ductility and toughness– optical properties – surface plasmon resonance – electrical properties – dielectric materials and properties – magnetic properties – super paramagnetism – properties of CNTs.
UNIT-III	**FABRICATION METHODS AND VACUUM TECHNIQUES:** Top-down and bottom-up approaches – electrochemical method – chemical & physical vapour depositions (CVD & PVD) – thermal evaporation. **Lithography**: photolithography – sol-gel methods – synthesis of CNT.
UNIT-IV	**CHARACTERIZATION TECHNIQUES:** Atomic force microscopy – scanning electron microscopy – transmission electron microscopy. **Powder XRD method**: determination of structure and grain size analysis – UV-visible and photoluminescence spectroscopy.
UNIT-V	**APPLICATIONS OF NANOMATERIALS:**

	Medicine: drug delivery – photodynamic therapy**Energy:** fuel cells – rechargeable batteries – supercapacitors. **Sensors:** nanosensors based on optical and physical properties – **Nanoelectronics:** CNTFET – display screens– GMR read/write heads —applications of CNTs .
TEXT BOOKS	1. K.K.Chattopadhyay and A.N.Banerjee, (2012), Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt. Ltd., 2. M.A. Shah, Tokeer Ahmad (2010), Principles of Nanoscience and Nanotechnology, Narosa Publishing House Pvt Ltd. 3. Mick Wilson, et al (2005) Nanotechnology, Overseas Press.
REFERENCE BOOKS	1. Richard Booker and Earl Boysen, (2005) Nanotechnology, Wiley Publishing Inc. USA 2. J.H.Fendler (2007) Nano particles and nano structured films; Preparation, Characterization and Applications, John Wiley & Sons 3. B.S.Murty, et al (2012) Textbook of Nanoscience and Nanotechnology, Universities Press.

METHOD OF EVALUATION:

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

COURSE	**SIXTH SEMESTER – CORE PRACTICAL 7**
COURSETITLE	**PHYSICS PRACTICAL VII**
CREDITS	2
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.

GENERAL PHYSICS EXPERIMENTS - II

Minimum of Six Experiments from the list:

1. Spectral response of photo conductor (LDR).
2. Potentiometer –Resistance and Specific resistance of the coil.
3. Potentiometer – E.M.F of a thermocouple.
4. Carey Foster's bridge - Temperature coefficient of resistance of the coil..
5. Conversion of Galvanometer into Voltmeter and Ammeter
6. Young's Modulus – Hyperbolic Fringes
7. Potentiometer – Temperature Coefficient of Resistance
8. Spectrometer - Hartmann's interpolation formula
9. Self-inductance – Rayleigh's Bridge
10. Impedance and power factor – LR Circuit
11. Comparison of mutual inductance M1 / M2 - Ballistic Galvanometer
12. Moment of Magnet - Tan C position

METHOD OF EVALUATION:

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

COURSE	**SIXTH SEMESTER – CORE PRACTICAL 8**
COURSETITLE	**PHYSICS PRACTICAL 8**
CREDITS	2
COURSE OBJECTIVES	To perform basic experiments on characteristics of electronic devices and then get into the applications such as amplifiers, oscillators, counters, multivibrators. Perform fundamental experiments on microprocessor 8085 and learn to write programs by themselves.

ELECTRONICS EXPERIMENTS - II

Minimum of Six Experiments from the list:.

1. Operational amplifier – Voltage follower
2. Operational amplifier - differentiator and integrator.
3. Wein's Bridge Oscillator using IC 741
4. Hartley oscillator - transistor.
5. Study of gate ICs – NOT, OR, AND, NOR, NAND, XOR
6. Verification of De Morgan's theorem using ICs –NOT, OR, AND
7. Verification of Boolean Algebra (any four)
8. NAND as universal building block.
9. NOR as universal building block.
10. Half adder / Full adder using ICs
11. Monostable Multivibrator suing 555 Timer
12. Seven Segment Display using IC7490 and IC 7447
13. Microprocessor 8085 – addition (8 bit only)
14. Microprocessor 8085 – subtraction (8 bit only)

METHOD OF EVALUATION:

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

COURSE	**ALLIED PAPER**
COURSETITLE	**ALLIED PHYSICS – I**
CREDITS	3
COURSE OBJECTIVES	To impart basicprinciplesof Physics that which would be helpful for students who have taken programmes other than Physics.

UNITS	COURSE DETAILS
UNIT-I	**WAVES, OSCILLATIONS AND ULTRASONICS:** simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonic inmedical field.
UNIT-II	**PROPERTIES OF MATTER:** *Elasticity*: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum *Viscosity*: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula *Surface tension*: definition – molecular theory – droplets formation– shape, size and lifetime– drop weight method
UNIT-III	**HEAT AND THERMODYNAMICS:** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible
UNIT-IV	**ELECTRICITY AND MAGNETISM:** potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit - fuses and circuit breakers in houses
UNIT-V	**DIGITAL ELECTRONICS AND DIGITAL INDIA:** logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification – overview of Government initiatives: semiconductor laboratories under Dept. of Space – an introduction to Digital India
TEXT BOOKS	1. R.Murugesan (2001), AlliedPhysics,S. ChandandCo,NewDelhi. 2. BrijlalandN.Subramanyam (1994), WavesandOscillations,VikasPublishing House,NewDelhi. 3. BrijlalandN.Subramaniam (1994), PropertiesofMatter,S.ChandandCo.,NewDelhi. 4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8^{th} edition), S.ChandandCo.,New Delhi. 5. R.Murugesan(2005), OpticsandSpectroscopy,S.ChandandCo,NewDelhi.

	6. A.Subramaniyam, AppliedElectronics2nd Edn.,NationalPublishingCo.,Chennai.
REFERENCEBOOKS	1. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11th edition),JohnWilleyand Sons, Asia Pvt.Ltd., Singapore. 2. V.R.KhannaandR.S.Bedi (1998), TextbookofSound1st Edn. KedharnaathPublishandCo, Meerut. 3. N.S.KhareandS.S.Srivastava (1983), ElectricityandMagnetism10th Edn.,AtmaRamandSons, New Delhi. 4. D.R.KhannaandH.R. Gulati(1979). Optics,S. Chand andCo.Ltd.,New Delhi. **5.** V.K.Metha(2004).Principlesofelectronics6th Edn. S.Chandandcompany.
WEB RESOURCES	1. https://youtu.be/M_5KYncYNyc 2. https://youtu.be/ljJLJgIvaHY 3. https://youtu.be/7mGqd9HQ_AU 4. https://youtu.be/h5jOAw57OXM 5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPMhttps://www.youtube.com/watch?v=9mXOMzUruMQandt=1shttps://www.youtube.com/watch?v=m4u-SuaSu1sandt=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Explain types of motion and extend their knowledge in the study of variousdynamicmotionsanalyzeand demonstrate mathematically. Relate theory with practical applications in medical field.
	CO2	Explaintheirknowledgeofunderstandingaboutmaterialsandtheir behaviorsandapplyittovarioussituationsinlaboratoryandreal life. Connect droplet theory with Corona transmission.
	CO3	Comprehend basic concept of thermodynamics concept of entropyand associated theorems able to interpret the process of flowtemperaturephysicsinthebackgroundofgrowthof this technology.
	CO4	Articulate the knowledge about electric current resistance,capacitance in terms of potential electric field and electric correlatetheconnectionbetweenelectricfieldandmagneticfieldan danalyzethemmathematicallyverifycircuitsandapplytheconcepts toconstructcircuitsandstudythem.

	CO5	Interpret the real life solutions using AND, OR, NOT basiclogicgatesandintendtheirideastouniversalbuildingblocks. InferoperationsusingBoolean algebra andacquireelementaryideasofICcircuits.Acquire information about various Govt. programs/ institutions in this field.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

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

COURSE	**ODD SEMESTER**
COURSETITLE	**ALLIED PRACTICAL– I**
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

Minimum of SIX Experiments from the list:

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by uniform bending using optic lever,scale and telescope
3. Rigidity modulus by torsional oscillations without mass
4. Verification of Newton's Law of Cooling
5. Co-efficient of viscosity - Stoke's method
6. Surface tension and interfacial Surface tension – drop weight method
7. index of prism using spectrometer
8. Verification of laws of transverse vibrations using sonometer
9. Calibration of low range voltmeter using potentiometer
10. Thermo emf using potentiometer
11. Thickness of a wire using air wedge
12. Construction of AND, OR, NOT gates using diodes and transistor

Note : Use of digital balance, digital screw gauge, digital calipers are permitted

METHOD OF EVALUATION:

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

COURSE	**EVEN SEMESTER ALLIED PAPER**
COURSETITLE	**ALLIED PHYSICS –II**
CREDITS	3
COURSE OBJECTIVES	To understand the basic concepts of optics, modern Physics, concepts of relativity and quantumphysics, semiconductorphysics, and electronics.

UNITS	COURSE DETAILS
UNIT-I	**OPTICS: i**nterference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries
UNIT-II	**ATOMIC PHYSICS:** atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – Bohr magneton – Stark effect –Zeeman effect
UNIT-III	**NUCLEAR PHYSICS:** nuclear models – liquid drop model – magic numbers– nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses nuclear fission – chain reaction – critical reaction – critical size-atom bomb - introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.
UNIT-IV	**INTRODUCTION TO RELATIVITY** Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation –
UNIT-V	**SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger
TEXT BOOKS	1. R.Murugesan (2005), AlliedPhysics,S.ChandandCo,NewDelhi. 2. K.ThangarajandD.Jayaraman(2004), AlliedPhysics,Popular BookDepot,Chennai. 3. BrijlalandN.Subramanyam(2002), TextbookofOptics,S.ChandandCo,NewDelhi. 4. R.Murugesan (2005), ModernPhysics,S.ChandandCo,NewDelhi. 5. A.SubramaniyamAppliedElectronics, 2nd Edn.,NationalPublishingCo.,Chennai.
REFERENCE BOOKS	1. ResnickHallidayandWalker (2018), FundamentalsofPhysics, 11th Edn.,JohnWilleyandSons, Asia Pvt.Ltd.,Singapore. 2. D.R.KhannaandH.R. Gulati (1979).Optics, S.ChandandCo.Ltd.,New Delhi.

	3. A.Beiser (1997), ConceptsofModernPhysics,TataMcGrawHillPublication,NewDelhi. 4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, NewDelhi. 5. V.K.Metha(2004), Principlesofelectronics, 6th Edn. ,S.Chandand Company, New Delhi.
WEB RESOURCES	1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318andv=D38BjgUdL5Uandfeature=emb_logo 2. https://www.youtube.com/watch?v=JrRrp5F-Qu4 3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/ 4. https://www.atoptics.co.uk/atoptics/blsky.htm - 5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

METHOD OF EVALUATION:

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

COURSE OUTCOMES:

Attheendofthe course the studentwillbeableto:

COURSEOUTCOMES	**CO1**	Explaintheconceptsof interferencediffractionusingprinciplesof superpositionofwaves and rephrase the concept of polarization based on wave patterns
	CO2	Outline the basic foundation of different atom models and variousexperiments establishing quantum concepts. Relate the importanceofinterpretingimprovingtheoreticalmodelsbasedonobservation.Appreciateinterdisciplinarynatureofscience and in solar energy related applications.
	CO3	Summarizethepropertiesofnuclei, nuclearforcesstructureofatomicnucleusandnuclear models. Solveproblems on delayratehalf-lifeand mean-life.Interpret nuclear processes likefission and fusion. Understand the importance of nuclear energy, safety measures carried and get our Govt.agencies like DAE guiding the country in the nuclear field.
	CO4	Todescribethebasicconceptsofrelativity like equivalenceprinciple, inertialframes and Lorentz transformation. Extend their knowledge on concepts ofrelativityandviceversa. Relate this with current research in this field and get an overview of research projects of National and International importance,
	CO5	Summarize the working of semiconductor devices like junction diode, Zenerdiode, transistors and practical devices we daily use like USB chargers.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**), MEDIUM (**M**)andLOW (**L**).

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

METHOD OF EVALUATION:

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

COURSE	**EVEN SEMESTER -**
COURSETITLE	**ALLIED PRACTICAL– II**
CREDITS	3
COURSE OBJECTIVES	Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

Minimum of SIX Experiments from the list:

1. Radius of curvature of lens by forming Newton's rings
2. Spectrometer-grating—normal incidence method
3. LCR Series resonance circuit
4. LCR Parallel resonance circuit
5. Determination of AC frequency using sonometer
6. Thermal conductivity of poor conductor using Lee's disc
7. Determination of figure of merit table galvanometer
8. Characterisation of Zener diode
9. Construction of Zerner regulated power supply
10. Verification of truth tables of basic logic gates using ICs
11. Verification of De Morgan's theorems using logic gate ICs.
12. Deflection Magnetometer (Tan A)

Note : Use of digital balance, digital screw gauge, digital calipers are permitted

METHOD OF EVALUATION:

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

COURSE	Students who failed in the Naan Muthalvan examination in Second Semester can write the paper Basic Physics
COURSE TITLE	**Basic Physics**
CREDITS	2
COURSE OBJECTIVES	To impart basic principles of Physics.

UNITS	**COURSE DETAILS**
UNIT-I	**Elasticity** Stress and Strain, Elastic Limit & Hooke's law, Young's Modulus, Bulk Modules & Modulus of Rigidity, Poisson's Ratio.
UNIT-II	**Motion** Circular Motion and Rectilinear Motion- Motion under Constant Velocity - Motion under Constant Acceleration - Motion under Gravity - Newton's Laws of Motion.
UNIT-III	**Properties of Liquids** Surface Tension - Angle of Contact - Streamline & Turbulent Flow- Reynold Number- Viscosity - Stoke's law
UNIT-IV	**Transfer of Heat** Idea of Conduction, Convection & Radiation - Thermal Conductivity - Black Body- Kirchoff's Laws -Stefan Boltzmann Law
UNIT-V	**Principles of Optics** Concept of mirrors- lenses- reflection & refraction of light- refractive index- Power of lens- astronomical telescope
TEXT BOOKS	**7.** Principles of Physics, N. Subrahmanyam, Brijlal , S.Chand & Co. **8.** Applied Physics Vol.-I Hari Harlal, NITTTR **9.** Applied Physics Vol.-II Hari Harlal, NITTTR **10.** A Text Book of Applied Physics N.S. Kumar
REFERENCE BOOKS	6. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11th edition),JohnWilleyand Sons, Asia Pvt.Ltd., Singapore. 7. V.R.KhannaandR.S.Bedi (1998), TextbookofSound1stEdn. KedharnaathPublishandCo, Meerut. 8. N.S.KhareandS.S.Srivastava (1983), ElectricityandMagnetism10thEdn.,AtmaRamandSons, New Delhi.

COURSE	Students who failed in the Naan Muthalvan examination in Third Semester can write the paper **INSTRUMENTATION PHYSICS - I**
COURSE TITLE	**INSTRUMENTATION PHYSICS - I**
CREDITS	2
COURSE OBJECTIVES	This course provides an understanding of basic electronic instrumentation and measurements techniques. The paper needs a basic knowledge in basic physics and technology .

UNITS	**COURSE DETAILS**
UNIT-I	**MEASUREMENT** Definition - Units of measurement; systems of units - Length, mass, and time measurements - Accuracy and precision
UNIT-II	**ERROR** Definition - Types of error (Gross error, Systematic error, Random error) - Statistical analysis (Arithmetic mean, Deviation from the mean, Average deviation, Standard deviation) - Probability of errors (Normal distribution of errors, Probable error) - Limiting errors.
UNIT-III	**ELECTRODES** Electrode potential - Purpose of the electrode paste - Electrode material - Types of electrodes - Microelectrodes (metal microelectrode) - Surface electrodes
UNIT-IV	**SPECIALIZED IN MEDICAL INSTRUMENTS** Angiography - Digital thermometer - Endoscopes - EEG - ECG – Computed Tomography (CT scan)
UNIT-V	**DISPLAYS** Classification of displays - Display devices - Liquid Crystal Diode – Incandescent display -Liquid vapour display – Light Emitting Diode (LED)
TEXT BOOKS	1. Albert D. Helfrick and William D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice-Hall of India Pvt. Limited, Reprint 2002. 2. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies, Reprint 2002. 3. H.S.Kalsi, Electronic Instrumentation, Tata McGraw Hill Education Pvt. Limited, Reprint 2012.
REFERENCEBOOKS	1. P. Mani, A text book of Engineering Physics-I, Dhanam Publications, Reprint 2013. 2. G. Jose Robin and A. Ubald Raj, Applied Physics, Indira Publications, Marthandam, 1998

COURSE	Students who failed in the Naan Muthalvan examination in Fourth Semester can write the paper INSTRUMENTATION PHYSICS - 2
COURSE TITLE	**INSTRUMENTATION PHYSICS – 2**
CREDITS	2
COURSE OBJECTIVES	The paper provides a basic knowledge in basic physics and some advance technology in medical instruments.

UNITS	**COURSE DETAILS**
UNIT-I	**BASIC ELECTRONIC & DIGITAL INSTRUMENTS** Electronic multimeters – Q meters – Vector meters – RF voltage and power measurements - Comparison of analog and digital techniques – digital voltmeter – digital multimeters
UNIT-II	**TRANSDUCERS** Active transducers: Piezoelectric type transducers and Photovoltaic type transducer Passive transducer - Photoelectric type resistive transducers - Inductive transducer.
UNIT-III	**MICROSCOPE** Optical and Electron microscope - Comparison between optical and electron microscope – Resolving power - Magnification power - Types of electron microscope - TEM – SEM - Comparison between TEM and SEM.
UNIT-IV	**ADVANCES IN MEDICAL INSTRUMENTS** X-ray machine - Comparison of Fluoroscopy and Radiography - Lasers in medicine - Cryogenic surgery MRI (basics and instrumentation).
UNIT-V	**OSCILLOSCOPE** Oscilloscope - Basic principle - CRT features – Block diagram of oscilloscope - Simple cathode ray oscilloscope.
TEXT BOOKS	1. Albert D. Helfrick and William D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice-Hall of India Pvt. Limited, Reprint 2002. 2. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies, Reprint 2002. 3. H.S.Kalsi, Electronic Instrumentation, Tata McGraw Hill Education Pvt. Limited, Reprint 2012.
REFEREN CEBOOKS	1. David A. Bell, Electronic Instrumentation, and measurements, Prentice Hall of India Pvt Ltd, 2003 2. B.C. Nakra and K.K. Choudhry, Instrumentation, Measurement and Analysis, 2nd Edition, TMH, 2004

COURSE	Students who failed in the Naan Muthalvan examination in Fifth Semester can write the paper MODERN PHYSICS
COURSE TITLE	**MODERN PHYSICS**
CREDITS	2
COURSE OBJECTIVES	The paper provides a basic knowledge in basic physics and some advance technology in semiconductor

UNITS	**COURSE DETAILS**
UNIT-I	**Waves and vibrations** Waves- Generation of waves by vibrating particles- Types of wave motion, transverse, and longitudinal wave motion- Simple harmonic motion- Vibration of spring mass system.
UNIT-II	**Electrostatics** Coulomb's Law - Intensity of Electric Field - Intensity due to a Point Charge- Electric Flux - Electric Potential - Electric Potential due to a Point Charge
UNIT-III	**Electricity** Ohm's law- Resistance of a conductor - specific resistance- Heating effect of current and concept of electric power.
UNIT-IV	**Semiconductor physics** Energy bands - intrinsic and extrinsic semiconductor - p-n junction diode – characteristics of diode.
UNIT-V	**Super conductivity** Phenomenon of super conductivity - Type I super conductor - Type II super conductor – applications of super conductor.
TEXT BOOKS	1. Modern Physics,R. Murugesan & Kiruthiga Sivaprasath, S. Chand & Co. 2. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan) 3. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
REFERENCEBOOKS	1. A Text Book of Applied Physics: Egale Parkashan, Jullandha.

COURSE	Students who failed in the Naan Muthalvan examination in Sixth Semester can write the paper APPLIED PHYSICS
COURSE TITLE	**APPLIED PHYSICS**
CREDITS	2
COURSE OBJECTIVES	This paper enables the students to understand variable energy sources and the need for finding alternate energy source..

UNITS	**COURSE DETAILS**
UNIT-I	**Conventional energy sources** Conventional energy sources –world's reserve of conventional energy sources–various forms of energy-renewable and conventional energy systems- comparison
UNIT-II	**Fossil fuels** Fossil fuels – coal, oil, and natural gas-availability-statistical details-applications-merits and demerits.
UNIT-III	**Biomass energy:** Biomass energy-biomass classification-biomass conversion process-biogas plants- wood gasification-advantages and disadvantages of biomass
UNIT-IV	**Renewable energy sources** Renewable energy sources-solar energy - importance - storage of solar energy - applications of solar energy -solar pond - solar water heater-solar crop dryers-solar cookers- solar cell.
UNIT-V	**Geothermal energy** Geothermal energy-Geothermal power plant-wind energy and wind farms- wind mills.
TEXT BOOKS	1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi 2. Solar energy - M P Agarwal - S Chand & Co. Ltd. 3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd., New Delhi. .