ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN (AUTONOMOUS)

CHINNAKALAYAMPUTHUR PALANI – 624 615

DEPARTMENT OF PHYSICS

B.Sc Degree - Physics

SYLLABUS

UNDER CHOICE BASED CREDIT SYSTEM

2022

ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN

PALANI

B.Sc Physics

MISSION

- To motivate the students to equip with modern trend technical knowledge
- To visit state of the Electrical Electronic Industries and Astronomical Research Centers
- To encourage and guide research oriented Higher Studies through enriched curriculum
- To introduce career oriented Electives and Project works.
- To inculcate scientific attitude among younger generation through Hands on Training and Science Exhibitions.
- To incorporate discipline, dedication and committed work culture through Value Education.
- To Empower Revolutionary Excellence in electronic intelligence.

VISION

- Up gradation of UG Department to PG Department
- Introduction of current trend Electronic Technical Know-Hows in Curriculum
- Preparing Industry ready citizens
- Promoting Academic Excellence with Discipline

Programme Education Objectives:

- **PEO1:**
  - To provide the students with the basic foundation in Physics, the scientific method (especially the interplay of theory and experiment) and to motive scientific enthusiasm and curiosity and the joy of learning.
- **PEO2:**
  - To develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools.
- **PEO3:**
  - To provide students with the tools needed to analyze problems, apply mathematical formalism and experimentation, and synthesize ideas.
- **PEO4:**
  - To provide the students with employment and technical skills necessary for successful careers in Physics and related fields.
- **PEO5:**
  - To expertise the students in scientific or technical quantitative reasoning abilities.

Programme Outcome:

- **PO1:**
  - Students will demonstrate an understanding of core knowledge in Physics.
- **PO2:**
  - Students will show that they have learned laboratory skills, enabling them to take measurements in a Physics laboratoryand analyze the measurements to draw valid conclusions.
- **PO3:**
  - Students will demonstrate written and oral communication skills in communicating Physics-related topics.
- **PO4:**
  - Students will pursue their higher studies and undertake research work.
- **PO5:**
  - Students will take up future academic carrier and establish themselves in global scenario.

PSO: Programme Specific Objective

- Students will demonstrate an understanding of concepts of Physics
- Students will understand the interplay between theory and experiment
- Students will exhibit curiosity and enthusiasm for learning science
- Students will demonstrate an ability to analyze problems
- Student will successfully carry out experiments to arrive at scientific results
- Students will successfully apply computing tools to problems
- Students will communicate well orally and in writing in scientific context
- Students will be able to use laboratory devices and electronics in scientific applications.

Mapping of College Mission to PEO:

College Mission	PEO
Self-reliance	**PEO2, PEO3**
Women Empowerment	**PEO4**
Women Education	**PEO1**
Model Citizen	**PEO5**

Mapping of Department Mission to PEO:

Department Mission	PEO
To motivate students to equip with modern trend technical knowledge	**PEO1**
To visit state of the Electrical Electronic Industries and Astronomical Research Centers	**PEO2**
To encourage and guide research oriented Higher Studies through enriched curriculum	**PEO5**
To introduce career oriented Electives and Project works	**PEO4**
To inculcate Scientific attitude among younger generation through Hands on Training and Science Exhibitions	**PEO2**
To incorporate discipline, dedication and committed work culture through Value Education.	**PEO4**
To Empower Revolutionary Excellence in electronic intelligence.	**PEO3**

Mapping of PO &PEO :

PO	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	H	M	M	M
PO2	M	H	H	M	M
PO3	M	M	M	H	M
PO4	H	M	M	H	M
PO5	M	M	M	M	H

H-High **M-**Medium **L-**Low

Credit Distribution

Part I - Tamil	12
Part II - English	12
Core Subject (including Elective)	75
Allied I & II	20
Skill Based Courses	12
Environmental Studies	02
Value Education	02
Non- Major Elective	04
Extension Activities	01
Total Credit	**140**

SEMESTERWISE DISTRIBUTION WITH SCHEME OF EXAMINATION – (CBCS)

(For candidates admitted during the Academic year 2022 - 2023)

Class	Semester	Title of the course	Hours		Marks			Credit
			Theory	Practical	Int	Ext	Total	
I-B.Sc	I	**Part-I-**Tamil-I	6		25	75	100	3
		Part-II-English-I	6		25	75	100	3
		Part-III-Core Subjects						
		Core-I-Mechanics and Properties of Matter	4		25	75	100	4
		Core -II- Electricity	4		25	75	100	4
		Core Practical-I		2				
		Inter Department Course **(IDC)-** Mathematics-I	5		25	75	100	5
		Part-IV-Skill Based Course -I (SBC - I) Acoustics	2		25	75	100	2
		Part-IV-Value Based Education **(VBE)** Yoga & Meditation	1		25	75	100	2
		Total	**28**	**2**			**700**	**23**

class	Semester	Title of the Course	Hours		Marks			Credit
			Theory	Practical	Int	Ext	Total	
I-B.Sc	II	**Part-I-**Tamil	6		25	75	100	3
		Part-II-English	6		25	75	100	3
		Part-III -Core Subjects						
		Core- III- Electromagnetism	8		25	75	100	4
		Core Practical-I		3	40	60	100	4
		Inter Department Course (**IDC**) Mathematics-II	5		25	75	100	5
		Part-IV-Skill Based Course (SBC II) Computer Fundamentals and MS Office	2		25	75	100	2
		Total	**27**	**3**			**600**	**21**

Class	Semester	Title of the Course	Hours		Marks			Credit
			Theory	Practical	Int	Ext	Total	
II-B.Sc	III	**Part-I-**Tamil	6		25	75	100	3
		Part-II-English	6		25	75	100	3
		Part-III -Core Subjects						
		Core -IV- Optics	7		25	75	100	5
		Core Practical-II		2				
		Inter Department Course (**IDC**) Ancillary Chemistry-I	3		25	75	100	3
		Ancillary Practical		2				
		Part-IV-Skill Based Course (SBC III) Astro Physics	2		25	75	100	2
		Part-IV Non Major Elective-I-Fundamentals of Physics	2		25	75	100	2
		Total	**26**	**4**			**600**	**18**

Class	Semester	Title of the Course	Hours		Marks			Credit
			Theory	Practical	Int	Ext	Total	
II-B.Sc	IV	**Part-I-**Tamil	6		25	75	100	3
		Part-II-English	6		25	75	100	3
		Part-III -Core Subjects						
		Core -V-Analog Electronics	4		25	75	100	5
		Core -VI-Heat and thermodynamics	5		25	75	100	4
		Core Practical-II		2	40	60	100	4
		Inter Department course (IDC) Ancillary Chemistry **-II**	3		25	75	100	3
		Ancillary Practical		2	40	60	100	4
		Part-IV-Skill Based Course (SBC IV) Biomedical Instrumentation	2		25	75	100	2
		PART V - Extension Activities					100	1
		Total	**26**	**4**			**900**	**29**

Class	Semester	Title of the Course	Hours		Marks			Credit
			Theory	Practical	Int	Ext	Total	
III-B.Sc	V	**Part-III-**Core Subjects						
		Core -VII-Atomic and Nuclear Physics	6		25	75	100	5
		Core -VIII -Digital Electronics	6		25	75	100	4
		Core Practical-III		3				
		Core Practical- IV		3				
		Core Elective-I - Computer Programming in 'C'/ Spectroscopy	5		25	75	100	5
		Core Elective -II- Nano Physics / Basic Instrumentation	5		25	75	100	5
		Part-IV-Skill Based Course - **(SBC V)** Computer Programming in 'C' –Practicals		2	40	60	100	2
		Total	**22**	**8**			**500**	**21**

Class	Semester	Title of the Course	Hours		Marks			Credit
			Theory	Practical	Int	Ext	Total	
III-B.Sc	VI	**Part-III-**Core Subjects						
		Core -IX-Solid State Physics	7		25	75	100	5
		Core -X – Advanced Mechanics and Relativity	6		25	75	100	4
		Core Practical-III		3	40	60	100	4
		Core Practical- IV		3	40	60	100	4
		Core Elective-III- Laser and Fibre Optics / Mathematical Physics	5		25	75	100	5
		Part-IV- Skill Based Course (SBC VI) Group Project	2		75	25	100	2
		Part-IV Environmental Studies (EVS)	2		25	75	100	2
		Non Major Elective – II - Types of Energy and its Utilization	2		25	75	100	2
		Total	**24**	**6**			**800**	**28**

Total Marks - 4100 **Total Credit - 140**

EXTRA CREDIT COURSES:

Semester I	**Energy Harvesting - I**
Semester III	**Electrical appliances**
Semester V	**Energy Harvesting - II**

VALUE ADDED COURSE:

Semester II	**Lab equipment training**
Semester IV	**Designing & Fabrication of PCB**
Semester VI	**Opto electronic devices**

SEMESTER: I

Core Course I : MECHANICS AND PROPERTIES OF MATTER

Hours: 4 **Credit: 4**

Course Objectives:

On completion of the Course the student will be able to,

- Get the knowledge about forces keep the students in their daily life. The velocity and acceleration parameters give the knowledge about how vehicles move and understand the principle of rocket propulsion.
- The information will teach the students about the concepts of rolling objects.
- Learning the basic concepts of gravitation laws.
- Students will be able to identify the type of various forces, type of supports and the reactions.

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Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Understand the significance of the velocity and acceleration, force and energy in linear motion, Impulse and rocket motion	K1
CO2	Get knowledge of velocity and acceleration, force and energy in rotational motion	K2
CO3	Learn the basic concepts of gravitation laws and forces	K2
CO4	Apply the knowledge of properties of matter for elastic nature of materials	K3
CO5	Acquire the practical knowledge of surface tension and viscosity	K2

K1 - Remembering **K2-Understanding** **K3- Applying**

COURSE CONTENT

UNIT – I: CONSERVATION LAWS:

Impulse and momentum - Conservation of linear momentum- center of mass – collision: Direct and oblique – Final velocities - loss of Kinetic energy.

Rocket Motion:

Expression for thrust and velocity - multistage rocket – escape velocity.

Motion of Rigid Body:

Moment of inertia - Parallel and perpendicular axes theorems -M.I. of circular disc - solid sphere - hollow sphere and cylinder about all axes -compound pendulum - Torque and angular momentum - Relationship between them - K.E. of rotation – conservation of angular momentum - Top processional motion-gyroscopic motion and gyrocompass**.**

UNIT II - GRAVITATION

Kepler's laws of planetary motion and derivation of law of gravitation - Newton's universal law of Gravitation - Boy's method of determining G -Acceleration due to Gravity - compound pendulum - Bar pendulum - Minimum time period - variation of g with altitude and depth -variation of g with rotation of the earth - Difference between mass and weight - Gravitational field - Gravitational potential - Gravitational potential energy -Gravitational potential due to uniform solid sphere.

UNIT-III :ELASTICITY

Definitions: Yield point, Elastic limit,Elastic fatigue and Elastic moduli - Poisson's ratio-Determination of Poisson's ratio for rubber - work done in deforming a body - Relation between Elastic constants (Y, G, K and γ)- limiting value of γ – Torsion - Twisting of a cylinder-Torsion Pendulum- Bending of beams-Bending moment-Basic assumptions for theory of Bending-Cantilever-Determination of 'Y' by Uniform bending (Pin & Microscope)-Determination of 'Y' by Non -Uniform bending (Scale &Telescope)- I Section girders-Determination of elastic constants by Searle's method.

UNIT-IV:VISCOSITY

Introduction–Stoke's Law-Co-efficient of viscosity-Stream lined & Turbulent motion-Rate of flow–equation of continuity-Bernoulli's theorem: Statement & Proof-Applications: Ventruimeter and Pitot tube-Poiseuille's method for coefficient of viscosity-Stoke's formula for highly viscous liquid-Ostwald's viscometer.

UNIT-V- SURFACE TENSION

Introduction-surface tension-explanation of surface tension- pressure difference across a curved surface-examples of surface tension-surface energy and surface tension-capillarity-examples of capillarity -expression for surface tension-experiment to determine surface tension of water-Jaeger's method for determining surface tension of liquid at various temperatures.

Prescribed Text:

1. Brijlal and Subramaniam, Properties of Matter, Chandan Publishing House, 2010.

Books for Reference:

1. Mechanics, Properties of matter and Sound - R.Murugeshan
2. Elements of properties of matter - D.S.Mathur

Mapping of Course Outcome with POs:

Mechanics and Properties of Matter

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K1
CO2	H	H	M	M	M	K2
CO3	H	H	M	M	M	K3
CO4	H	H	M	H	M	K3
CO5	H	H	H	H	H	K2

H-High M-Medium L-Low

K2-Understanding, K3-Applying

SEMESTER I

Core Course - II ELECTRICITY

Hours: 4 **Credit: 4**

Course Objectives:

- To understand the basic concepts of Electricity such as field and Electric potential.
- To know the Gauss Law and its applications
- To acquire the knowledge of priniciple of capacitors and types of capacitors
- To know and understand the basic concept of Electric circuits
- To learn the basic laws of thermo e.m.f and its applications

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Learn the basic concepts of static electricity	K1
CO2	Understand the Gauss's Law and its applications	K1
CO3	Get the knowledge about principles and types of capacitors.	K2
CO4	Apply the Kirchhoff's Laws in the electrical devices	K3
CO5	Understand the laws of thermo emf , measurement and its applications.	K1

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT-I - STATIC ELECTRICITY

Introduction – Inverse Square Law – Cavendish's proof of inverse square Law – Experimental verification – Field due to a point charge – Field intensity at any point due to an electric dipole – Field of an infinite line of charge – Electric potential – Potential difference and the line integral of electric field – Electric field from electric potential – Potential due to a dipole – Potential due to a spherical shell (hollow sphere)

UNIT-II - GAUSS'S LAW AND APPLICATIONS

Introduction – Gauss's Law – Gauss's law proof – Experimental proof of Gauss's law – Coulomb's law from Gauss's law – Field due to uniform spherical charge – Field at a point outside the sphere – Field due to a plane sheet of charge – Field due to a charged conducting cylinder – Field near a charged conductor – Stress on the surface of a charged conductor.

UNIT-III - CAPACITORS

Introduction – Principle of capacitor - parallel plate capacitor- capacity of a parallel plate capacitor with compound dielectric- Capacity of spherical capacitor – Capacity of a spherical condenser when the inner Sphere is earthed – Capacity of a cylindrical condenser – Energy of a charged condenser – Force between the plates of a condenser – Types of capacitors.

UNIT-IV-ELECTRIC CIIRCUITS

Kirchhoff's laws-application of Kirchhoff's law to Wheat stone's bridge-Sensitiveness of a Wheat stone's bridge – Carey Foster's Bridge – Potentiometer – Measurement of Potential and Calibration of voltmeter – Measurement of current and calibration of Ammeter – Measurement of Resistance.

UNIT –V – THERMO ELECTRICITY

Seebeck effect – Laws of thermo e.m.f – Measurement of E.M.F. of a thermo couple with a potentiometer – Thermoelectric power – Peltier effect – Demonstration of Peltier Effect – Peltier's co-efficient – Determination of the Peltier co-efficient at a junction – Thermodynamical consideration of Peltier effect – Thomson effect – Thomson co-efficient – Demonstration of Thomson effect – E.M.F generated in a thermo-couple taking both Peltier effects at the junctions and Thomson effect in the metals – Application of thermo –couple.

BOOKS FOR STUDY:

1.Electricity and Magnetism –M.Palaniappan (Unit I - IV)

2.Electricity and Magnetism-K.K.Tewari (Unit V)

BOOKS FOR REFERENCE:

1. Electricity and Magnetism – Brijlalsubramaniam
2. Electricity and Magnetism–Nagarathinam and Lakshmi Narayan

Mapping of Course Outcome with POs:

Electricity

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	H	M	M	K1
CO2	H	H	M	M	M	K2
CO3	H	H	M	H	M	K1
CO4	H	H	M	H	M	K3
CO5	H	H	M	M	H	K3

H-High M-Medium L-Low

K1 - Remembering **K2-Understanding** **K3-Applying**

SEMESTER I SBC I -ACOUSTICS Hours : 2 Credit : 2

Course Objectives:

- To introduce the basic concepts required for a mathematical description of oscillations and waves.
- To know the laws of transverse vibration of a stretched string
- To inculcate the various types of vibrations
- To give the basic ideas about production and applications of ultrasonic waves
- To motivate the students to know about acoustics of buildings.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Understand the significance of longitudinal and transverse waves	K1
CO2	Distinguish between the phase velocity of a travelling wave and the group velocity of a wave group	K2
CO3	Derive and solve the equations of motions for physical systems that undergo SHM.	K3
CO4	Demonstrate the laws of transverse vibration of a stretched string using sonometer	K2
CO5	Know the production and applications of ultrasonic waves, factors affecting acoustics of buildings	K2

K1 - Remembering K2-Understanding, K3-Apply

COURSE CONTENT

UNIT-I – SOUND

Classification of sound- characteristics of musical sound-Loudness-Weber Fechner law- Longitudinal and Transverse waves – Relation between wavelength, frequency and wave velocity – characteristics of progressive waves – Intensity of sound – Phase velocity and group velocity – Beats (definition only).

UNIT-II - THEORY OF TRANSVERSE VIBRATIONS

Theory of Transverse vibrations along a stretched string - Verification of I, II, and III laws using sonometer – Melde's string experiment**:** Frequency determination of an electrically maintained turning fork.

UNIT-III - SIMPLE HARMONIC MOTION

S.H.M – S.H.M as the projection of uniform circular motion – Composition of two S.H.Ms of the same periods at right angles to each other - Lissajou's figures – Free vibrations of a body – Damped vibrations – Forced oscillations.

UNIT-IV - ULTRASONICS

Ultrasonics – Properties- Production**:** Magnetostriction method**,** Piezoelectric method - Methods of Detection - Applications.

UNIT-V- ACOUSTICS OF BUILDINGS

Reverberation- Reverberation time-Sabine's formula(definition only)-Absorption coefficient and its determination- Factors affecting acoustics of buildings and their remedies.

BOOKS FOR STUDY:

- Mechanics, Properties of matter and Sound - R.Murugeshan
- Engineering physics - G. Senthil Kumar.

BOOKS FOR REFERENCE:

- Properties of matter and Acoustics - R.Murugeshan
- Waves, Vibrations and Sound – C.L.Arora
- A Text Book of Waves and Oscillations – Ashok K. Ganguli
- Waves and Oscillations -S.R.ShankaraNarayana.

Mapping of Course Outcome with POs:

Acoustics

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	M	M	M	K2
CO3	H	H	H	H	H	K3
CO4	H	H	M	H	H	K3
CO5	H	H	M	M	M	K2

H-High M-Medium L-Low

K2-Understanding K3-Applying

INTER DEPARTMENT COURSE (IDC)

I MATHS/ II CHEMISTRY

COURSE I-MECHANICS, PROPERTIES OF MATTER AND THERMAL PHYSICS

Hours : 3 **Credit : 3**

Course Objectives:

- To understand the concepts of acceleration, momentum, torque and moment of inertia.
- To understand the objects moving under the influence of gravitational force.
- To discuss properties of matter which includes Elasticity, Viscosity and Surface Tension.
- To study the fundamentals of conductive and convective heat transfer processes.
- To discuss black body radiation.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Can analyse the behavior of objects in circular and rotational motion	K2
CO2	Can understand the gravitational force and variation of 'g' with altitude and depth.	K2
CO3	Can understand various properties of matters and apply in experimental measurements	K3
CO4	Can acquire knowledge of heat transfer processes	K1
CO5	Can apply the heat transfer processes for day-today activities	K3

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT – I – ROTATIONAL MOTION AND GRAVITATION

Angular velocity - Normal acceleration (no derivation) – Centrifugal and centripetal force – Torque and angular acceleration – Work and Power in rotational motion. – Angular momentum – K.E of rotation – Moment of inertia – Laws of parallel and perpendicular axes theorems – Moment of inertia of circular ring, circular disc - Compound Pendulum expression for period – Experiment to find 'g'- variation of 'g' with attitude and depth – Artificial satellites.

UNIT – II – ELASTICITY

Elastic Modulii – Poison's ratio – Beams – Expression for bending moment – Determination of Young's modulus by uniform and non uniform bending section girders, Torsion – Expression for couple per unit twist – Work done in twisting – Torsion pendulum – Determination of rigidity modulus of the material of a wire.

UNIT-III-VISCOSITY & SURFACE TENSION

Derivation of Poiseiuille's formula (analytical method) – Bernoulli's theorem - Proof – Applications - Pitot tube –Venturimeter - Surface tension –Surface tension of water, Jaeger's method.

UNIT – IV- CONDUCTION & CONVECTION

Lee's disc method for conductivity of a bad conductor – Analogy between heat flow and electric current – Wiedmann –Franz law - Convection in atmosphere – Laps rate – Stability of atmosphere – Greenhouse effect – Atmosphere pollution.

UNIT – V – RADIATION

Stefan's law- Determination of Stefan's constant by filament heating method – Solar constant – Measurement – Water flow pyrheliometer – Temperature of the sun - Solar spectrum – Energy distribution in black body spectrum – Plank's law (no derivation) – Derivation of Wien's and Rayleigh Jeans laws from Plank's law.

BOOKS FOR STUDY

1. Ancillary Physics (Mechanics & Properties of matter) – M.Palaniappan
2. Ancillary Physics (Thermal Physics) – M.Palaniappan

BOOKS FOR REFERENCE

1. Ancillary Physics (Mechanics & Properties of matter) – Venkatachalam
2. Ancillary Physics (Thermal Physics) - N.Venkatachalam
3. Ancillary Physics (Mechanics & Properties of matter) – R.Murugeshan
4. Ancillary Physics (Thermal Physics) - R.Murugeshan

Mapping of Course Outcome with POs:

MECHANICS, PROPERTIES OF MATTER AND THERMAL PHYSICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	M	H	M	K3
CO4	H	H	M	H	M	K2
CO5	H	H	H	H	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER II

Core Course - III ELECTROMAGNTISM

Hours: 8 Credit: 4

Course Objectives:

- To understand the basic concepts and laws of Magnetic fields of electric currents.
- To acquire the knowledge of laws of electromagnetic induction and their applications
- To understand the alternating current and significance of power factor
- To acquire the knowledge of growth and decay of charge in LCR circuit
- To know the working of AC bridges for measuring inductance

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Understand the basic concepts and laws of magnetism	K1
CO2	Apply the laws of electromagnetic induction in determining the self inductance and mutual inductance	K3
CO3	Apply Maxwell's equations for electromagnetic wave propagation	K3
CO4	.Understand the circuit analysis using resistance,capacitance and inductance connected to A.C source	K1
CO5	Design, setup and carry out experiments and compare with theoretical predictions using A.C Bridges	K2

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT-I-MAGNETIC FIELDS OF ELELCTRIC CURRENTS

Magnetic fields – Magnetic Flux – BiotSavart law- Force on a current element in magnetic field- Torque on a current loop in a uniform magnetic field- Ampere's law- Moving coil Galvanometer,

Dead beat and Ballistic – Damping correction – Applications – Determination of figure of merit of dead beat Galvanometer – Experiment to determine chargesensitivity of ballistic galvanometer – Experiment to find absolute capacity of a condenser – Experiment to compare the capacities of condensers – Experiment to compare the electromotive forces of the cells.

UNIT- II- ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction-Introduction – self-inductance – Mutual inductance – Determination of self-inductance by using Rayleigh's method – Determination of Mutual inductance (M) – Comparison of Mutual inductances –coefficient of coupling- eddy current-uses-Maxwell's equations and electromagnetic theory.

UNIT – III- ALTERNATING CURRENT

Introduction – R.M.S or effective value of A.C – mean value of the alternative e.m.f – Phase difference – Resistance, Capacitance and Inductance are connected to A.C. source - L, C and R in series Resonance - Impedance of an Ac circuit – Circuit analysis with complex numbers – Parallel resonance circuit – AC applied to LCR in parallel – Q-factor – Power in AC circuit – Signification of power factor – skin effect – Power losses & uses. - Transformers – Detailed theory of Transformer – Transformer losses

UNIT – III- TRANSIENT PHENOMENA

` Growth and decay of current in a circuit containing inductance L and resistance R with steady emf – growth and decay of charge in a CR circuit – determination of high resistance by leakage – growth and decay of charge in LCR circuit- condition for the discharge to be oscillatory – frequency of oscillations**.**

UNIT – V - AC BRIDGES

AC bridges for measuring inductance – Maxwell's bridge – Owen's bridge – Anderson's bridge –Wien's Bridge for measuring capacitance –Desauty's bridge.

BOOK FOR STUDY

1. Electromagnetism – M. Palaniappan (Dec 92 Edition)
2. Electricity and Magnetism – BrijlalSubramaniam
3. Electricity and Magnetism – R.Muregesan

BOOK FOR REFERENCE

1. Electricity and Magnetism – K.K. Tewari
2. Electricity and Magnetism – Nagarathinam and Lakshmi Narayan.

Mapping of Course Outcome with POs:

Electromagnetism

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	H	M	M	K2
CO2	H	H	M	M	M	K1
CO3	H	H	M	H	M	K2
CO4	H	H	M	H	M	K1
CO5	H	H	M	M	H	K2

H-High M-Medium L-Low

KI-Remembering **K2-Understanding** **K3-Applying**

SEMESTER II

SBC II -COMPUTER FUNDAMENTALS & MS OFFICE

Hours : 2 **Credit : 2**

Course Objectives:

- To give an in-depth understanding of why computers are essential components in business, education and society.
- To introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software.
- To provide hands-on use of Microsoft Office Word, Create a document in Microsoft Word with formatting
- To indicate the names and functions of the Excel , Enter and edit data, Format data and cells, apply formulas, Create and modify charts etc.
- To teach the fundamentals of power point presentation

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Describe the usage of computers and why computers are essential components in business and society.	K1
CO2	Work with the basic features of Word, create high quality document designs and layouts.	K3
CO3	Modify worksheet data and structure and format data in a Worksheet	K1
CO4	Sort data, manipulate data using formulas and functions and add and modify charts in a worksheet	K3
CO5	Prepare power point presentation for a seminar	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT – I: COMPUTER FUNDAMENTALS

Introduction – History of computers – Characteristics of computers – Need for a computer – Computer applications – Concept of computer – Structure of computer (Block Diagram & components) – Classification of computers – Types of computer.

UNIT –II: INPUT & OUTPUT DEVICES

Input devices – Keyboard – Mouse –Trackball – Joystick – Electronic pen – Touch screen - data scanning devices – image scanner – optical character recognition (OCR) – Optical mark reader - Bar code Reader – Magnetic ink character recognition (MICR) - Output devices – Monitor – Printer Impact of non – impact printers – Main memory – RAM, ROM – Secondary storage devices. Magnetic tapes and disks - optical disks.

UNIT – III: MS WORD

Windows Layout – Menus – File : opening, typing and editing a file – Edit – copying, moving and inserting –formatting fundamentals: charactersand fonts – formatting paragraphs - Views in MS-Word – Insert tools – Tables –Windows – Saving & exiting – Spell check – Table creation – Inserting pictures- applying WordArt - Mail merge.

UNIT – IV: MS EXCEL

Building a Worksheet – Selecting Worksheet items – Using Autofill – Adding rows and columns – Copying and Moving information – Creating and Copying formulas –Naming ranges– Using functions – Improving the appearance of worksheet – Changing column Width – Formatting Text and Numbers – Using auto format – Spell Checking – Using Chart Wizard – Creating, Enhancing and Printing a chart.

UNIT – V: MS POWER POINT

About power point: Starting power point-creating a presentation using auto content wizard- creating a design template- creating a blank presentation-opening an existing presentation- saving and closing a presentation- view, insert & edit in presentations-formatting in presentations.

BOOKS FOR STUDY:

1. MS Office 2000 for every one – Sanjay Saxena
2. MS Office-C.Nellai Kannan

BOOKS FOR REFERENCE:

1. Computer Fundamentals**-** Anita Goel
2. Computer Basics- Seema Sirpal
3. Microsoft Office Excel-Torben Lage Frandsen.

Mapping of Course Outcome with POs:

Computer Fundamentals and MS Office

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	M	H	H	K3
CO3	H	H	M	H	H	K3
CO4	H	H	M	H	H	K3
CO5	H	H	H	H	H	K3

H-High M-Medium L-Low
K2-Understanding K3-Applying

SEMESTER I & II CORE PRACTICAL COURSE-I

Hours : 3 **Credit :4**

Course Objectives:

- To introduce the methods of experimental physics.
- To emphasize the laboratory techniques such as accuracy of measurements and data analysis.
- To make the students which they learnt in the lecture sessions will be translated to the laboratory sessions
- To provide a hands-on learning experience such as in measuring the basic concepts in properties of matter, Sound and Electricity.
- To acquire practical knowledge to design the basic electrical circuits

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems	K3
CO2	Understand the usage of basic laws and theories to determine various properties of the materials given.	K3
CO3	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	K1
CO4	Understand the application side of the experiments	K2
CO5	Use standard methods to calibrate the given low range voltmeter and ammeter and to measure resistance of the given coil	K3

K1 - Remembering K2-Understanding, K3-Applying

List of Experiments (Any Twelve Experiments)

1. Young's Modulus – uniform bending- pin and microscope.
2. Young's Modulus - uniform bending – optic lever and telescope
3. Young's Modulus – Non uniform bending – pin and microscope
4. Young's Modulus – Non uniform bending –optic lever and telescope
5. Acceleration due to gravity – Compound pendulum
6. Rigidity modulus of wire 'G'- Torsion pendulum
7. Moment of inertia of the disc 'I' – Torsion pendulum
8. Rigidity modulus of material of a rod- Static torsion method
9. Estimation of Errors
10. Frequency of tuning fork – Sonometer
11. Surface tension of water – Capillary rise method
12. Resistance and resistivity – Carey-Foster's bridge
13. Thermal conductivity of bad conductor – Lee's disc method
14. Viscosity of liquid – Burette method
15. Calibration of low range voltmeter- Potentiometer
16. Calibration of low range ammeter - Potentiometer

INTER DEPARTMENT COURSE (IDC)

I MATHS/ II CHEMISTRY

COURSE II – ELECTRICITY, ELECTRONICS AND OPTICS

Hours :3 **Credit : 3**

Course Objectives:

- To provide the basic ideas of electric field, electric potential, capacitance and its types.
- To impart knowledge of basic concepts of electricity and logic gates
- To familiarize the student with basic electronic devices
- To teach the principles of geometrical optics
- To provide knowledge of the fundamentals of physical optics

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Gain deeper understanding of electrostatics	K1
CO2	Acquire knowledge on elementary ideas of electricity and logic gates	K2
CO3	Understand the working of Junction diode , Zener diode and transistor	K2
CO4	Use the electronic devices for doing experiments in the laboratory	K3
CO5	Demonstrate fundamental knowledge and insight into geometrical optics in the areas of lenses, aberrations and physical optics.	K2

K1 - Remembering K2-Understanding, K3-Applying

COURSE CONTENT

UNIT – I - ELECTROSTATICS

Gauss law (No proof) – Applications – Field due to a charged sphere and an infinite plane sheet – Field near a charged conducting cylinder – Coulomb's Theorem – Electric potential – relation between potential and field – capacitors – Expression for 'C' of parallel plate, spherical (outer sphere earthed) and cylindrical capacitors – Energy of charged capacitors – Loss of energy due to sharing of charges.

UNIT – II - CURRENT ELECTRICITY AND LOGIC CIRCUITS

Application of Wheat stone's network in Carey Foster's bridge – Measurement of resistance and Temperature Coefficient of resistance.

Boolean algebra – De Morgan's theorem – Basic gates OR, AND and NOT gates – Inverters NOR and NAND gates - NOR and NAND gates as universal building blocks – XOR gate.

UNIT – III – ELECTRONIC DEVICES

Junction diode characteristics –Zener diode characteristics – bridge rectifier with π filters – transistor characteristics in CE mode – single stage amplifier – feed back principle - oscillators – Hartley oscillator (Principle and circuit only).

UNIT –IV-GEOMETRICAL OPTICS

Lenses- Refraction through lenses- Aberration – Chromatic aberration-Spherical aberration- minimization of aberration- Coma- Astigmatism.

UNIT –V-PHYSICAL OPTICS

Interference in thin films – Air wedge – Newton's rings (reflected beam only)- Theory of plane transmission grating (normal incidence only) – Experiment to determine wavelength- Brewster's law - Double refraction – Nicol prism – construction, action and uses

BOOKS FOR STUDY

1. Ancillary Physics (Electricity and Electronics) – M.Palaniappan
2. Ancillary Physics (Optics and Modern Physics) – M.Palaniappan

BOOKS FOR REFERENCE

1. Ancillary Physics (Electricity and Electronics) –N.Venkatachalam
2. Ancillary Physics (Electricity and Electronics) –R.Murugeshan
3. Ancillary Physics (Optics and Modern Physics) – R.Murugeshan
4. Ancillary Physics (Optics and Modern Physics) – N.Venkatachalam

Mapping of Course Outcome with POs:

ELECTRICITY, ELECTRONICS AND OPTICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	M	H	M	K2
CO4	H	H	H	H	H	K3
CO5	H	H	H	H	H	K2

H-High M-Medium L-Low

K2-Understanding K3-Applying

II – B.Sc CHEMISTRY / I – B.Sc MATHS
ANCILLARY PHYSICS PRATICALS
Hours :2 **Credit :4**

Course Objectives:

- To enable the student to gain practical knowledge.
- To make the students to design the basic electrical circuits using diodes, transistors.
- To make the students which they learnt in the lecture sessions will be translated to the laboratory sessions.
- To provide a hands-on learning experience in properties of matter, optics and electricity.
- To acquire practical knowledge to design the basic electrical circuits.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables.	K1
CO2	Understand the given concepts and its physical significance	K2
CO3	Have a deep knowledge of fundamentals of optics and electric circuits	K1
CO4	Use standard methods to calibrate the given low range voltmeter and ammeter and to measure resistance of the given coil and various physical quantities	K3
CO5	Apply the theory to design the basic electrical circuits	K3

K1 - Remembering K2-Understanding, K3-Applying

LIST OF EXPERMENTS (Any Twelve Experiments)

1. Estimation of errors
2. Compound pendulum- Acceleration due to gravity
3. Torsion pendulum- Rigidity Modulus of a wire
4. Young's Modulus-Uniform bending – Pin and Microscope
5. Young's Modulus-Uniform bending – Scale and telescope
6. Young's Modulus-Non - uniform Bending – pin and microscope
7. Young's Modulus-Non - uniform Bending – scale and telescope
8. Diode characteristics
9. Potentiometer – Calibration of Ammeter
10. Air wedge – thickness of a wire
11. Carey Foster's Bridge – Resistance and Resistivity
12. Potentiometer – Calibration of low range voltmeter
13. Newton's Rings-Radius of curvature of a lens
14. Zener diode characteristics
15. AND, NOT, NAND logic gates using discrete components
16. OR, NOT, NOR logic gates using discrete components.

SEMESTER III
CORE COURSE – IV – OPTICS
Hours: 7 **Credit : 5**

Course Objectives:

- To give a sound knowledge of lenses and aberrations.
- To understand the working of eyepieces and the phenomenon of dispersion and rainbows.
- To cover the concepts of interference and interferometers.
- To discuss the phenomenon of diffraction and its types and the theory of diffraction grating.
- To discuss the physical phenomenon of polarization elaborately.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Know about lenses and different defects arising in using lenses.	K1
CO2	Know to use lenses in constructing eyepieces and the formation of rainbows.	K1
CO3	Understand the function of interferometers.	K2
CO4	Understand the concept of diffraction and the theory of diffraction grating.	K2
CO5	Understand the phenomenon of polarization and apply the concept of optical activity in polarimeters.	K2 & K3

K1 - Remembering **K2-Understanding,** **K3-Applying**

COURSE CONTENT

UNIT – I –LENSES AND ABBRATIONS:

Lens – Refraction through a thin lens- equivalent focal length of two thin lenses separated by a distance – definitions of cardinal points and respective planes - Aberrations: Chromatic aberration –longitudinal & lateral chromatic aberration- condition for achromatism of two thin lenses placed in contact and for two lenses separated by a distance- Spherical aberration – Minimization of Spherical aberrations –condition for minimum spherical aberration of two lenses separated by a distance – Aplanatic lens- Coma & its removal– Astigmatism and its minimization.

UNIT- II - EYEPIECES, DISPERSION AND RAINBOWS

Eyepiece - Ramsden's eyepiece – Huygen's eyepiece – comparison of eyepieces – Oil immersion objective – Dispersion – Dispersion through a prism –deviation without dispersion- dispersion without deviation– direct vision spectroscope- constant deviation prism- Cauchy's dispersion formula – Theory of Rainbows – Primary and Secondary Rainbows.

UNIT – III –INTERFERENCE

Interference in thin films - colour of thin films – Air wedge –Determination of diameter of thin wire – Testing of planeness - Newton's rings – Determination of λ and μ of a liquid - Michelson interferometer – Types of fringes - visibility of fringes –Applications: Determination of wavelength of monochromatic light and determination of difference in wavelengths of two spectral lines

UINT – IV – DIFFRACTION

Fresnel and Fraunhofer classes of diffraction – Fresnel's explanation for the rectilinear propagation of light – Zone plate - Fresnel's diffraction at a straight edge – Fraunhofer diffraction at single slit, double slit and circular aperture – Theory of diffraction grating – Determination of wavelength – Dispersive power of a grating - Rayleigh's criterion for resolving power of a grating.

UNIT – V– POLARISATION

Double refraction –brewester's law – law of Malus - double refraction - Huygen's explanation –Nicol prism : construction workingand applications –theory of Plane, Circularly and Elliptically polarized light - Production, Detection and Analysis of Plane, Circularly and

Elliptically polarized light – Quarter and Half wave plates – Optical rotation – Fresnel's theory of optical rotation - Biot's laws for optical rotation– Laurent's half shade Polari meter.

BOOK FOR STUDY:

1. Optics – Brijlal and Subramaniam

BOOK FOR REFERENCE:

1. Optics – S.P. Singh and J.P. Agarwal
2. Optics– Sathyaprakash
3. Optics & Spectroscopy–R. Murugeshan.

Mapping of Course Outcome with POs:

Optics

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	M	H	M	K2
CO4	H	H	M	H	M	K2
CO5	H	H	M	M	H	K2&K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

Semester III

SBC III - ASTROPHYSICS

Hours :2 Credit :2

Course Objectives:

- To provide foundational knowledge of astrophysics and related fields
- To enable the students to understand about astronomical instruments.
- To make the students acquire an understanding of solar systems
- To comprehend the types of stars and Hertzsprung-Russel diagram
- To make the students to know about our milkyway galaxy

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Learn fundamental concepts in astrophysics that will equip them to better understand new scientific discoveries made in the coming years	K2
CO2	Apply basic physical principles from a broad range of topics in physics to astronomical situations	K3
CO3	Come to view science as a constantly evolving process instead of a static set of rules and equations	K1
CO4	Clearly understand about stars and our galaxy	K2
CO5	Understand astrophysics as a way to describe our real physical world	K1

K1 - Remembering K2-Understanding, K3-Applying

COURSE CONTENT

UNIT – I : INTRODUCTION TO ASTRONOMY

Birth of Modern Astronomy – Celestial Sphere – Celestial Coordinates – Geocentric theory – Heliocentric theory – Planets: Terrestrial and Jovian Planets – Asteroids – Comets – Meteors.

UNIT – II : ASTRONOMICAL INSTRUMENTS

The orientation of Earth in Space – Arc and Time Units – Local Time – Standard time – Kinds of Optical Telescopes: Refracting Telescope and Reflecting Telescope – Radio Telescope.

UNIT – III: SOLAR PHYSICS

Introduction – Physical Properties of the Sun – Structure of the Sun – Sun spots – Solar Wind – Auroras – Solar Flares – Space weather effects.

UNIT – IV : STELLAR PHYSICS

Classification of stars – Hertzsprung – Russell diagram – Luminasity of a star – Stellar evolution; Birth of a star, maturity, ageing stars, death of a star – White dwarfs – Neutron stars – Black holes.

UNIT – V : GALAXIES

Galaxy Nomenclature – Types of Galaxies: Elliptical, Spiral, Barred Spiral and Irregular galaxies – Milky Way Galaxy – Star Clusters – Galactic Clusters – Pulsars – Supernova explosion.

BOOKS FOR STUDY

- Introduction to Astrophysics – Dr. A. MUJIBER RAHMAN Theni – Edition 2018.
- Astronomy – S. KUMARAVELU & SUSHEELA KUMARAVELU, Muruga Bhavonam, Chidambaranagar, Nagercoil.

BOOKS FOR REFERENCE

- Discovering Astronomy – R.D. CHOPMAN, W.H. FREEMAN CO., 1989.
- The Frontier Between Physics and Astronomy - J.V. NARLIKER,IIT, Madras series 1989.

Mapping of Course Outcome with POs:

Astrophysics

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K1
CO2	H	H	H	M	M	K3
CO3	H	H	H	H	H	K3
CO4	H	H	M	H	M	K2
CO5	H	H	M	M	H	K2 & K3

H-High M-Medium L-Low

K1 - Remembering K2-Understanding, K3-Applying

SEMESTER-III NON MAJOR ELECTIVE -I
FUNDAMENTALS OF PHYSICS
Hours : 2 Credit : 2

Course Objective:

- To introduce some basic concept of physics like measurements of physical quantities, state of matter
- To impart knowledge on kinds of energies and energy sources
- To emphasize the importance of optical devices

Course Outcomes:

On completion of the Course the student will be able to

CO	Statement	Blooms Taxonomy level
CO1	Learn fundamental concepts of measurements of physical quantities	K2
CO2	Know the types of matter and applications of plasma	K1
CO3	Understand the various kinds of Energy	K3
CO4	Familiarize renewable and non- renewable energy sources	K2
CO5	Understand the basics of optical devices like mirror and lens and its applications	K3

K1 - Remembering K2-Understanding, K3-Applying

COURSE CONTENT

UNIT 1

S.I. Units – measurements of length, mass, time and other physical quantities – dimensional formula for area, volume, density and force - Uses of dimension.

UNIT 2

Matter - Solid, Liquid, Gas and Plasma - Application of Plasma - change of state - specific heat capacity - specific latent heat of ice and steam.

UNIT 3

Kinds of energy – Mechanical energy, Thermal energy, Optical energy, Sound energy, Electrical energy, Atomic and nuclear energy, (Examples) – conservation of energy.

UNIT 4

Renewable and non - renewable energy – Fossil fuel – coal- Oil – Wind – Biomass – OTEC.

UNIT 5

Mirror – Laws of reflection – Image formation (Concave and Convex mirror) Lens – Laws of refraction - Image formation (Concave and Convex lens) - Defects of eye and rectification.

BOOK FOR STUDY

1. First Year B.sc Physics - B.V. Narayan Rao, New Age International (P) Lt, 1998.

REFERENCE BOOKS

1. Mechanics – D.S .Mathur – S.Chand& Co., 2002.
2. Properties of matter – D.S. Mathur – S. Chand & Co., 2002
3. Properties of matter – Brijlal Subramanian – S. Chand & Co.,2006

Mapping of Course Outcome with POs:

FUNDAMENTALS OF PHYSICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	H	H	H	K3
CO4	H	H	M	H	M	K2
CO5	H	H	M	M	H	K3

H-High M-Medium L-Low

K2-Understanding, K3-Applying

SEMESTER – IV

CORE COURSE V - ANALOG ELECTRONICS

Hours : 4 **Credit : 5**

Course Objectives:

- To make the students understand the fundamentals of electronic devices.
- To train them to apply these devices in mostly used and important applications.
- To observe characteristics of electronic devoices
- To study basic electronic components
- To expose students to the functions and applications of the diode, transistor UJT.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Apply the knowledge of basic semiconductors physics.	K2
CO2	Analyze the characteristics of various electronic devices like diode transistor etc,	K2
CO3	Classify and analyze the various circuits configurations of transistors.	K1
CO4	Analyze simple circuits like rectifiers, amplifiers, oscillators etc,	K3
CO5	Become aware of the latest technological developments in electronic devices.	K1

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT – I – SEMICONDUCTOR PHYSICS

Semiconductor-Intrinsic Semiconductor-Extrinsic Semiconductor-N type semiconductor-P type semiconductor- Majority and minority carriers- Donor and acceptor impurities- Fermi level-PN junction- Properties of PN junction- Biasing a PN junction - Current flow in a forward Biased PN junction-V-I characteristics of PN junction.

UNIT – II – SEMICONDUCTOR DIODE AND REGULATED POWER SUPPLIES

Introduction – Semiconductor diode- Crystal diode as a Rectifier- Half wave Rectifier- Full wave Rectifier- Bridge Rectifier - Theory of tunnel diode- Avalanche and Zener breakdown- Zener diode-Zener voltage regulators-Three terminal regulated power supplies-Choke input filter-Capacitance input filter-RC and LC filters-voltage multipliers-clipping and clamping circuits.

UNIT – III –TRANSISTORS

Transistors – biasing the transistor for active region – Transistor action- relation connecting α and β of a transistor – three modes of transistor connection - transistor characteristics in CE, CB and CC modes – load line – Quiescent point – Fixed bias – universal divider bias – emitter feedback bias. Field Effect Transistors (FET) –Junction Field Effect Transistors (JFET) – P channel and N channel JFET - Characteristics of an N channel JFET – applications of JFET –metal oxide semiconductor FET (MOSFET) – types – characteristics – applications – Uni junction transistor (UJT) and its characteristics.

UNIT – IV - AMPLIFIERS

Amplifiers – CE, CB, CC amplifiers – calculation of voltage gain, current gain, input and output impedance in each case – power amplifiers – class A and class B push pull amplifiers – frequency response of amplifiers.

UNIT –V - OSCILLATORS& MULTIVIBRATERS

Feedback – types of feedback – advantage of negative feedback – Barkhausen criterion – Hartley, Colpitt's and Phase shift oscillators – multivibrators using transistors (Astable, Monostable, Bistable) - relaxation oscillators using UJT.

BOOKS FOR STUDY:

1. Elements of solid-state electronics – Ambrose and Devaraj[Unit I,II, IV&,V]
2. Electronics – G.Jose Robin &Ubald Raj[Unit I,II, III,IV&V]
3. Electronics I – M.Palaniappan.[Unit V]

BOOKS FOR REFERENCE

1. Electronics – Gupta Kumar
2. Electronics – B.L. Theraja

Mapping of Course Outcome with POs:

ANALOG ELECTRONICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	M	M	M	K2
CO3	H	H	M	H	M	K2
CO4	H	H	H	H	H	K3
CO5	H	H	M	M	H	K3

H-High M-Medium L-Low

K2-Understanding, K3-Applying

SEMESTER IV

CORE COURSE VI - HEAT AND THERMODYNAMICS

Hours :5 **Credit :4**

Course objectives:

- To recognize the difference between heat and temperature
- To explore varies application for low temperature physics
- To acquire knowledge of convection, conduction and radiation
- To learn the knowledge of zeroth and first law of thermodynamics
- To develop working knowledge of the second and third laws

Course Outcomes:

On completion of the Course Students will be able to

CO	Statement	Blooms Taxonomy level
CO1	Apply equation theorem and counts number of degrees of freedom of a thermo dynamical system	K3
CO2	Apply the concepts of low temperature physics in liquefaction of gases	K3
CO3	Apply the concepts and laws of thermo dynamics to solve problems in thermo dynamics systems such as gases, heat engines etc.,	K3
CO4	Use the concepts and principles of black body radiation to analyse radiation process in thermo dynamics systems.	K2
CO5	Become familiarize with the properties of systems close to absolute zero	K1

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT-I - KINETIC THEORY OF GASES AND VANDERWALL'S EQUATION

Introduction-Postulates of kinetic theory of gases-Expression for the pressure of a gas- Kinetic energy per unit volume of a gas-Kinetic interpretation of temperature-Derivation of gas equation-Derivation of gas laws-Degrees of freedom and Maxwell's law of equi-partition of energy-Atomicity of gases-Maxwell's law of distribution of velocity(no derivation) –Zartmann-Ko's method to verify Maxwell's law of velocity distribution-Mean free path-Expression for mean free path-Transport phenomena: Viscosity and thermal conductivity of gases -Behavior of Gases at high pressure-Vander wall's equation of state.

UNIT – II - LOW TEMPERATURE PHYSICS

Inter molecular attraction- Porous plug experiment with theory-Joule Kelvin effect-Temperature of Inversion-Liquefaction of Gases**:** Air, Oxygen& Helium – Properties of Liquid Helium-I & II-Production of low temperatures using adiabatic demagnetization.

UNIT-III-TRANSMISSION OF HEAT

Conduction- Co- efficient of Thermal conduction-Rectilinear flow of Heat along a Bar- Cylindrical flow of heat -Thermal conductivity of Glass-Heat flow through a compound wall-Accretion of ice in ponds- Thermal conductivity of a bad conductor using Lee's method -Wiedmann-Franz 's law- Applications of conduction.

Convection-Lapse rate: definition, expression -convective equilibrium of the atmosphere -Applications of convection.

Radiation-Black body-Stefan's law of radiation-Mathematical derivation of Stefan's law-Determination of Stefan's constant (Laboratory method)-Derivation of Newton's law of cooling from Stefan's law- Distribution of Energy in the spectrum of a black body: Wien's law and Rayleigh Jeans law-Planck's formula for blackbody radiation-deduction of Wien's law and Rayleigh Jeans law from Planck's formula –applications of radiation-Solar constant – determination of solar constant using water flow pyrheliometer - Temperature of the sun -Solar spectrum.

UNIT-IV-THERMODYNAMICS:

Thermodynamic system-Thermal Equilibrium and concept of Temperature (Zeroth law of thermodynamics)-concept of Heat-comparison of Heat and Work-First law of thermodynamics -First law of thermodynamics for a change in state of a closed system-

Applications of first law of thermodynamics-Isothermal and adiabatic process-Gas equation during Adiabatic process- -Reversible and Irreversible process.

UNIT-V-SECOND AND THIRD LAWS OF THERMODYNAMICS:

Second law of thermodynamics-Carnot's reversible engine-Carnot's engine and Refrigerator-Carnot's theorem-Entropy and the second law of thermodynamics-Entropy changes of a closed system during an irreversible process-entropy change in reversible and irreversible process.

Third law of Thermodynamics-Temperature-Entropy diagram-Entropy of a perfect gas-Maxwell's Thermo dynamical relations-Helmholtz function- Gibb's function-enthalpy-Cp, Cv and γ-Joule Kelvin coefficient-Equilibrium between liquid and its vapour -First order Phase Transitions.

BOOKS FOR STUDY

1. Heat and Thermodynamics-Brijlal&Subramaniam (Unit I-V)

BOOKS FOR REFERENCE

1. A text book of heat - J.B. Rajam
2. Thermodynamics and Statistical Mechanics-Sears and Salinger
3. Treatise on Heat-Saha&Srivastava
4. Heat and Thermodynamics-D.S.Mathur.

Mapping of Course Outcome with POs:

HEAT AND THERMODYNAMICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K3
CO2	H	H	H	M	M	K3
CO3	H	H	M	H	M	K3
CO4	H	H	M	H	H	K2
CO5	H	H	M	M	M	K2

H-High M-Medium L-Low

K2-Understanding, K3-Applying

SEMESTER – IV
SBC IV-BIOMEDICAL INSTRUMENTATION
Hours : 2 Credit : 2

Course objectives:

- To understand the design and functioning of various medical equipments.
- To acquire the knowledge of various types of transducers.
- To know the characteristics of biopotential recording systems.
- To understand the design and functioning of various medical equipments.
- To aware on recent medical applications in physics.

Course Outcomes:

On completion of the Course Students will be able to

CO	Statement	Blooms Taxonomy level
CO1	Become familiarize with the physics of human body.	K1
CO2	Apply knowledge of Electricity and Electromagnetism in medicine.	K3
CO3	Apply knowledge of sound and light in medicine.	K3
CO4	Apply the concepts of X-ray spectra in medical instruments.	K3
CO5	Apply the skills about diagnostic methods and recording setups of EEG, EMG and CT scanner in every day life.	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT–I - SAFETY INSTRUMENTATION

Introduction – Radiation safety instrumentation – physiological effects due to 50 Hz current passage – Micro shock and macro shock – Electrical accidents in hospitals – Devices to protect against electrical hazards.

UNIT- II - ADVANCES IN BIOMEDICAL INSTRUMENTATION

Introduction – Computer in medicine – Lasers in medicine – Endoscopes – Cryogenic surgery – Nuclear imaging Techniques – Thermography – ultrasonic imaging systems – Magnetic Resonance imaging (MRI) – imaging processes – MRI instrumentation – positron emission Tomography.

UNIT- III - SPECIALISED MEDICAL EQUIPMENT

Introduction – Blood cell counter – Electron microscope – Radiation detectors – Photometers and colorimeters – Digital thermometer – Audiometers – X-ray tube – X-ray machine – Radiography and fluoroscopy – image intensifiers – Angiography – Applications of X-ray.

UNIT –IV- BIO-POTENTIAL RECORDERS

Characteristics of basic recording system – Electro cardio Graphy (ECG) - Block diagram – E.C.G leads – unipolar and bipolar – ECG recording setup – Electro Encaphalo graph (EEG) – Origin – Block diagram of EGG unit – Electro myograph EMG. Block diagram EMG recorders – Digital thermometer – Computer to myography (CT) principle – Block diagram of CT scanner.

UNIT – V – PHYSIOLOGICAL ASSIST DEVICES

Introduction – pacemakers – methods of stimulation – Different modes of operation – Ventricular synchronous pace makers – pacemaker batteries – Artificial Heart values – Heart-lung machine – kidney machine.

BOOKS FOR STUDY

1. Biomedical Instrumentation - Dr.M.Arumugam

BOOK FOR REFERENCE

1. Hand book of Biomedical Instrumentation –
2. R.S. Khandpur 1999 Tata Mecraw - Hill

Mapping of Course Outcome with POs:

BIOMEDICAL INSTRUMENTATION

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	H	H	K3
CO3	H	H	M	H	H	K3
CO4	H	H	M	H	M	K3
CO5	H	H	H	H	H	K3

H-High M-Medium L-Low
K1- Remembering, K2-Understanding, K3-Apply

SEMESTER III & IV
CORE PRACTICAL COURSE -II
Hours : 3 **Credit :4**

Course Objectives:

- To make the students introduced to the methods of experimental Physics.
- To emphasize the laboratory techniques such as accuracy of measurements and data analysis.
- To enable the students acquire practical knowledge with lecture sessions translated to the laboratory sessions.
- To provide a hands-on learning experience such as in measuring the basic concepts in Sound, Optics and Electricity.
- To acquire practical skills in designing the basic electrical circuits.

Course Outcomes:

On completion of the course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.	K3
CO2	Understand the usage of basic laws and theories to determine various properties of the materials given.	K3
CO3	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables.	K1
CO4	Understand the application side of the experiments by using spectrometers, Microscopes and learned to construct electrical bridges.	K2
CO5	Acquire practical knowledge about many theories related to lenses, aberrations, refractive indices, wavelengths, capacitances and resistances.	K3

K1 - Remembering **K2-Understanding** **K3-Applying**

List of Experiments **(Any Twelve Experiments)**

1. Thickness of wire- Air wedge
2. Radius of curvature- Newton's rings
3. Refractive index of material of the lens- Newton's rings
4. Calibration of high range voltmeter- Potentiometer
5. Comparison of EMF's – B .G
6. Comparison of capacitances – B.G
7. Resistance and resistivity – Potentiometer
8. Charge sensitivity – B.G
9. Voltage sensitivity and current sensitivity – B.G
10. Comparison of capacitances- B.G
11. Refractive index -A & D –Spectrometer
12. Dispersive power of prism – Spectrometer
13. Frequency of electrically maintained tuning fork – Melde's String
14. Comparison of capacitances- Desauty's bridge
15. AC frequency – Sonometer
16. Resolving power of a Telescope

SEMESTER V

CORE COURSE - VII –ATOMIC AND NUCLEAR PHYSICS

Hours :6 **Credit : 5**

Course Objectives:

- To have an idea about critical potentials and experimental determination of Critical potentials
- To have a brief discussion on atom models
- To make the students to study about nuclear size, spin and parity including their binding energy and theories of nuclear composition.
- To understand the energy released in fission and fusion reactions.
- To study various types of accelerators and detectors.

Course Outcomes:

On completion of the course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Understand the critical potentials and their experimental determination	K2
CO2	Acquire knowledge about the structure of atom models	K1
CO3	Gain a clear picture of nuclear composition	K2
CO4	Have a deep knowledge about Radio activity, nuclear Fission and Nuclear Fusion	K2
CO5	Become familiar with different particle accelerators and working of detectors	K4

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT- I - CRITICAL POTENTIALS

Excitation of atoms -Critical potentials: Excitation and Ionization potential- Methods of excitation of atoms: Electronic Bombardment, Collisions of atoms and high temperatures and Irradiation of atoms with light- Experimental determination of critical potentials: Franck and Hertz's method and Davis &Goucher's method.

UNIT- II - ATOM MODELS

Review of Bohr atom model - Sommerfield's relativistic model – vector atom model – various quantum numbers – LS and JJ coupling – Pauli's Exclusion principle – Periodic classification of elements – Magnetic dipole moment due to orbit and spin motion – Bohr Magneton – Stern and Gerlach experiment-Fine structure of Sodium D lines-Zeeman effect: Normal and Anomalous-Experimental set up-Quantum theory of normal Zeeman effect-Paschen-Back effect –Stark effect.

UNIT- III - NUCLEUS

Nuclear size – nuclear mass –nuclear charge **-** Nucleus spin- nuclear denstiy-Magnetic dipole moment - Electric quadruple moment - effect on spectral lines (Hyper fine structure).

Binding energy - Nuclear stability –packing fraction - Theories of nuclear composition – Proton – Electron – Hypothesis – Proton-Neutron hypothesis - Nuclear forces - Yukawa's theory - Discovery of meson - models of the nuclear structure.

UNIT- IV - NUCLEAR ENERGY

Nuclear fission – energy released in fission – Explanation on the basis of liquid drop model. Nuclear fusion - Thermonuclear reactions - Proton- proton cycle - Carbon nitrogen cycle - Energy release in controlled thermo nuclear reaction –Design of thermonuclear reactor.

UNIT- V - PARTICLE ACCELEARATORS AND DETECTORS

Particle accelerators and detectors – Synchrocyclotron - Betatron - Electron Synchrotron - Proton synchrotron (Betatron).Ionization chamber - The Wilson cloud chamber - Bubble chamber - Photographic emulsion technique - G.M.counter.

BOOKS FOR STYDY

1. Modern Physics – R.Murugesan.

BOOKS FOR REFERENCE

1. Modern Physics - J.B.Rajam

2. Modern Physics - Sehgal, Chopra, Sehgal.

Mapping of Course Outcome with POs:

ATOMIC AND NUCLEAR PHYSICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	M	M	M	K2
CO4	H	H	M	H	H	K3
CO5	H	H	M	H	H	K3

H-High M-Medium L-Low

K2-Understanding, K3-Applying

SEMESTER V – CORE COURSE - VIII

DIGITAL ELECTRONICS

Hours : 6 **Credit : 4**

Course Objectives

- A detailed discussion on number systems is given in this Course.
- To get the concepts of logic gates and their working
- The construction and working of multivibrators is discussed in detail in this Course.
- To understand the function of counters and registers
- The fundamental ideas of operational amplifier and the working of
- Op-amp in different applications also discussed**.**

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Students are able to understand the basic concepts of number system.	K2
CO2	They will get the knowledge of logic gates and the applications of logic gates in different digital circuits.	K2
CO3	Students gain the know-how of multivibrators	K1
CO4	They are able to construct counters and registers using flip flops.	K2
CO5	They come to know basic concepts of operational amplifier and their applications.	K3

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT – I –NUMBER SYSTEM

Binary addition – Binary to Decimal conversion – Decimal to Binary conversion – Binary Subtraction – Multiplication – 4 bit BCD codes – Hexadecimal code.

UNIT – II – LOGIC GATES

OR, AND & NOT gates – Positive and negative logic – their implementation – calculation of output voltages - OR, AND, NOT gates – Boolean logic diagrams and truth tables for these – Boolean equations of logic circuits – NOR, NAND gates – DeMorgan's theorem – NAND, NOR as universal building blocks – laws and theorems of Boolean algebra – two input TTL NAND gates – DTL, RTL circuits – logic cards – Experimental investigation of equivalence of Boolean expressions of exclusive OR function and investigation of logical properties of the exclusive OR - Half adder and Full adder properties and their implementation with EX-OR.

UNIT – III – MULTIVIBRATORS USING ICS

The RS Flip Flop - clocked RS Flip Flop, JK Flip Flop- JK master slave flip flop – D flip flop - IC 555 schematic diagram -Monostablemultivibrator and Astablemultivibrator using IC 555- working (No derivations) and uses - Duty cycle.

UNIT – IV – COUNTERS AND REGISTERS

Binary counter – 3 bit serial counter - decade counter – four bit binary counter Ic 7493 A – shift register – ring counter –digital to analog convertor (DAC) - D A performance characteristics – Analog to Digital convertor (ADC) – AD performance characteristics.

UNIT – V - OPERATIONAL AMPLIFIER

OP-AMP – block diagram – pin diagram – equivalent circuit of an op amp - characteristics of an ideal op amp – common mode rejection ratio – CMR – slew rate – open loop and closed loop operation – concept of virtual ground - – expression for gain (inverting mode only) –application as adder (summing amplifier) andsubtractor (differential amplifier).

BOOKS FOR STUDY:

1. Digital Electronics – A. Ubal Raj &G.Jose Robin[Units- I, II & V]
2. Digital Principles and computer design – Malvino and Leach [Units III & IV]

BOOKS FOR REFERENCE:

1. Integrated electronics – Milman&Halkins
2. Digital Principles and computer design – Morris Mano.

Mapping of Course Outcome with POs:

Digital Electronics

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	H	H	H	K3
CO4	H	H	H	H	M	K2
CO5	H	H	H	M	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER V CORE ELECTIVE - I

COMPUTER PROGRAMMING IN C

Hours:5 **Credit:5**

Course Objectives:

- To understand the basic concepts of 'C' programming.
- To make the students write algorithm and draw flow charts for a given problem.
- To enable them write simple programs in 'C'.
- To understand the concepts of functions control statements and looping statements.
- To get a clear knowledge of arrays, structure and union. To understand the

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Students get a basic knowledge of fundamental concepts of 'C' programming language	K1
CO2	Students become bale to write algorithm and are able to draw flow charts.	K2
CO3	They come to know how to write simple programmes in 'C'	K3
CO4	They gained thorough knowledge of various control statements, if, if-else, do-while, while switch case. They understand how to use 'for' loops to create iteration	K2
CO5	They are able to write programs with structure, union and pointers	K3

K1 - Remembering **K2-Understanding** **K3-Applying**

COURSE CONTENT

UNIT – I INTRODUCTION TO C

The C character set – Identifiers and keywords - data types – Constants – Variables – Declaration – Expressions - Various types of Operators – Bit wise operations - Input and output functions and writing simple programs.

Conditional and unconditional control statements – Branching, Looping - Nested control structures – Switch – Break – Continue – Goto.

Sum of n-natural numbers – To find the Fibonacci series – To find the roots of a quadratic equation $ax^2+bx+c=0$. To find and print Armstrongnumbers - To find simple interest and Compound interest.

UNIT – II– FUNCTION

Over view – Defining a function – Accessing a function – Passing arguments to a function – Recursion – Library function – the preprocessor directives. Storage classes - Scope of the variables – Automatic variables – Global variables – Static variables – Register variables.

To determine the factorial of a given number – check whether given number is odd or even.

Using function to sum integer values between 1-N using recursion techniques.

UNIT – III – ARRAYS

Defining, initialization rules and processing of arrays and subscripted variables – Passing arrays to functions – Multi dimensional arrays – Arrays and strings.

To arrange the given set of numbers in ascending order – To arrange given set of numbers in descending order - To find the largest number in the given set of numbers – To multiply two matrices of order (l x m) And (m x n) – To add and subtract two matrices.

UNIT – IV- POINTERS & FILES

Fundamentals – Declaration - Accessing a variable – Pointers and Arrays – Dynamic memory allocation – Pointers and functions – Pointers and strings.

Introduction – Defining and Opening file – Closing a file – Input & Output operations on files.

UNIT –V – STRUCTURES AND UNIONS

Introduction – Defining and initializing a structure – accessing and giving values to member – structure within structures – arrays of structures – arrays within structures.

Union – declaration and initializing a union – To prepare the salary bill for employees of a company.

BOOK FOR STUDY

1. Programming in C and Application by D. Arulselvam

BOOKS FOR REFERENCE

1. Programming in C – E. Balagurusamy.
2. Computer programming in C – Jayasree.

Mapping of Course Outcome with POs:

Computer Programming in 'C'

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	H	H	K2
CO3	H	H	M	H	H	K3
CO4	H	H	M	H	H	K2
CO5	H	H	M	H	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER V CORE ELECTIVE - I SPECTROSCOPY	
Hours : 5	**Credit : 5**

Course objective

To understand atomic and molecular spectra and the instrument techniques.

Course Outcome

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	To impart the broad knowledge of Microwave Spectroscopy	K2
CO2	To gain knowledge and understanding of the Infrared Spectroscopy	K1
CO3	To familiarize with the Raman Spectroscopy and the experimental techniques.	K2
CO4	To get the idea about experimental setup and arrangement of electronic spectroscopic instruments	K3
CO5	To apply the knowledge of Instrumentation and Techniques in Infrared spectroscopy	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

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 –Polyatomic Molecules – Symmetric Top molecules – Asymmetric Top molecules -Techniques and Instrumentation – Chemical analysis by Microwave spectroscopy.

UNIT II : INFRARED SPECTROSCOPY

I.R. Spectroscopy – Vibrating diatomic molecules – Simple Harmonic Oscillator - Anharmonic oscillator – Diatomic vibrating rotator – IR Spectrum of carbon monoxide - Interaction of rotations and vibrations – Vibration of Polyatomic molecules – Analysis by IR techniques.

UNIT III : RAMAN SPECTROSCOPY

Raman effect: Discovery – Quantum theory of Raman effect – Classical theory of Raman Effect –Pure rotational Raman Spectra- Linear molecules – Raman Spectrum of symmetric top molecules - Vibrational Raman spectra – Rule of mutual exclusion – Overtone and Combination Vibrations - Rotational Fine Structure – Polarization of light and the Raman Effect - Structure determination from IR and Raman spectroscopy.

UNIT IV : ELECTRONIC SPECTROSCOPY

Born - Oppenheimer approximation – Vibrational coarse structure: Progressions – Frank-Condon principle – Dissociation energy and Dissociation products – Rotational Fine Structure of Electronic Vibration Transitions - Fortrat diagram - Predissociation – Diatomic molecules.

UNIT V : INSTRUMENTATION

Instrumentation and Techniques in Infrared spectroscopy – Sources – monochromators – Sample cells – Detectors – Single beam Infra red spectrometer – Double beam Infra red spectrometer

BOOK FOR STUDY :

1. Fundamentals Of Molecular Spectroscopy - Colin N Banwell Elaine- M MccashFifth Edition

BOOK FOR REFERENCE:

1. 1.Molecular structure and spectroscopy - G. Aruldhas, PHI Learning Pvt. Ltd, India.
2. 2.Hand book of Analytical Instruments -R.S. Khandpur, Tata MC Grow Hill Ltd

Mapping of Course Outcome with POs:

SPECTROSCOPY

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	H	H	K2
CO3	H	H	M	H	H	K2
CO4	H	H	M	H	H	K3
CO5	H	H	M	H	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER V CORE ELECTIVE - II NANO PHYSICS Hours : 5 Credit : 5

Course Objectives:

- To provide foundational knowledge of Nanomaterials.
- To make the students acquire an understanding the basics of Carbon nanotubes and its synthesis techniques
- To know the significance of Molecular Nanotechnology.
- 4. To comprehend the principles and applications of Nanosensors and Nanorobotics.
- To help them understand the applications of nanotechnology

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Learn about the background on Nanoscience and synthesis of nanomaterials	K1
CO2	Impart the basics of Carbon nanotubes and its synthesis techniques	K2
CO3	Learn about nanomolecular self assembly	K1
CO4	Apply their learned knowledge to develop Nanosensors & Nanorobotics	K3
CO5	Apply the applications of Nanotechnology in various fields	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT I –NANOMATERIALS

Introduction to Nanoscience & Nanotechnology- nanomaterials – different forms of nanaomaterials – synthesis of nanomaterials- top-down and bottom-up approach- Techniques for synthesis of nanomaterials: Ball milling, Plasma arcing, chemical vapour deposition, Sol gel and Electrodeposition-Properties of nanophase particles: Physical, Magnetic, Mechanical and Optical properties-

UNIT II – CARBON NANOTUBES (CNT)

Carbon – carbon nanotubes (CNT) – types of CNT- fabrication of carbon nanotubes – electric arc discharge method – pulsed laser deposition – chemical vapour deposition- Properties of CNT: Electrical, Mechanical, Physical, Chemical and Thermal properties- Applications of CNT: Electrical and Electronics, Computer, Chemical, Mechanical and Battery technology

UNIT III – MOLECULAR NANOTECHNOLOGY (MNT)

Introduction - principle of molecular assembly - nanomolecular self assembly-new self assembly system-components of self assembly - equilibrium and nano equilibrium self assembly - AFM (Atomic Force Microscope) – working (no theory) – Imaging modes – force - distance measurement –identification of individual surface atoms – advantages and disadvantages of AFM.

UNIT IV – NANOSENSORS & NANOROBOTICS

Nanosensors: Nanosensor applications-existing Nanosensors- production methods-economic impact-& Nanorobotics: & Nanorobotics theory- Scanning Probe Microscopes(SPM)-Nanomanipulation with SPM- The SPM as a Robot-Challenges.

UNIT V – APPLICATIONS OF NANOTECHNOLOGY

Chemistry and Environment – Energy applications of nanotechnology- Information and Communication- Heavy industry-Consumer goods- Nanomedicine - Medical application of Nanotechnology.

BOOKS FOR STUDY

1. Engineering Physics–II by Dr.P.Mani (Unit I & II)
2. Origin and Development of NanoTechnology by P.K.Sharma (III & Unit IV)
3. Nanotechnology by Manoj Bhatia (Unit V)

BOOKS FOR REFERENCE

1. Basics of Nano Physics – G.P.Singh
2. Nanotechnology and Micromachines - Dr.N.L. Kaushik.

Mapping of Course Outcome with POs:

Nano Physics

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	M	H	H	K3
CO4	H	H	M	H	H	K3
CO5	H	H	H	H	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER V CORE ELECTIVE - II BASIC INSTRUMENTATION Hours : 5 Credit : 5

Course Objective:

To get exposure with various aspects of instruments and their usage through hands-on mode.

Course Outcome :

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	To impart the broad knowledge of basic measurements techniques	K2
CO2	To gain knowledge and understanding of the Cathode Ray Oscilloscope	K2
CO3	To familiarize with the Signal Generators and Analysis Instruments	K1
CO4	To apply the knowledge of Impedance Bridges & Q-Meters.	K3
CO5	To get the idea about experimental setup and arrangement of digital instruments.	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT 1: BASIC OF MEASUREMENT:

Instruments accuracy, precision, sensitivity, resolution range etc - Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance - Specifications of a multimeter and their significance. Electronic Voltmeter: Advantage- Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/Multimeter and their significance - AC millivoltmeter Type of AC millivoltmeters.

UNIT 2: CATHODE RAY OSCILLOSCOPE:

Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment) - Time base operation, synchronization. Front panel controls - Use of CRO for the measurement of voltage (dc and ac frequency, time period).

UNIT 3: SIGNAL GENERATORS AND ANALYSIS INSTRUMENTS:

Block diagram, explanation and specifications of low frequency signal generators - pulse generator, and function generator - Brief idea for testing – specifications - Distortion factor meter - wave analysis.

UNIT 4: IMPEDANCE BRIDGES & Q-METERS:

Block diagram of bridge - working principles of basic (balancing type) RLC bridge - Specifications of RLC bridge - Block diagram & working principles of a Q- Meter - Digital LCR bridges.

UNIT 5: DIGITAL INSTRUMENTS:

Principle and working of digital meters - Comparison of analog &digital instruments - Characteristics of a digital meter - Working principles of digital voltmeter - Digital Multimeter: Block diagram and working of a digital multimeter-Working.

BOOKS FOR STUDY:

1. A text book in Electrical Technology - B L Theraja - S Chand and Co.
2. Performance and design of AC machines - M G Say ELBS Edn.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.

BOOKS FOR REFERENCE:

1. Logic circuit design, Shimon P. Vingron, 2012, Springer.
2. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
3. Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill.

Mapping of Course Outcome with POs:

BASIC INSTRUMENTATION SKILL

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	H	H	K2
CO3	H	H	M	H	H	K2
CO4	H	H	M	H	M	K3
CO5	H	H	H	H	H	K3

H-High M-Medium L-Low

K2-Understanding 3-Applying

SEMESTER V

SBC – V COMPUTER PROGRAMMING 'C' PRACTICALS

Hours : 2 Credit : 2

Course Objectives:

- To write C program for simple applications of real life using structure.
- To train the students to write C programs using function.
- To make the students to write C programs using conical statements
- To train the students to write C programs using Arrays
- To train them to write simple programmes in 'C'

Course Outcome :

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	write simple programme in 'C'	K2
CO2	use control statements and simple if else statements in writing programmes	K3
CO3	write programs using switch case	K3
CO4	write programe using for loop	K3
CO5	write programe using functions	K3

K1 - Remembering K2-Understanding K3-Applying

Any ten programmes

1. Arranging data in ascending / descending order.
2. Finding area of a triangle.
3. Finding standard deviation of a collection of data.
4. Fahrenheit to Celsius conversion.
5. Upper and lowercase conversion.
6. Sum of the digits.
7. Sum of the given series. Sum = $x+x^2+x^3+\ldots+x^{15}$.
8. Reversing the numbers.
9. Reversing the string.
10. Compound interest calculation.
11. Simple interest calculation using function.
12. Factorial of a number.

Mapping of Course Outcome with POs:

Computer Programming in 'C' –Practicals

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	H	H	K3
CO2	H	H	H	H	H	K3
CO3	H	H	M	H	H	K3
CO4	H	H	M	H	H	K2
CO5	H	H	M	H	H	K2

H-High M-Medium L-Low

K2 Understanding K3-Applying

SEMESTER – VI – CORE COURSE - IX

SOLID STATE PHYSICS 6 hours 5 Credit

Course Objectives

- To know about the basic concepts of crystalline lattices, planes and different structures of different crystals
- To know the various defects in solids
- To get an idea of specific heat capacity of crystals
- To get a detailed study of all types of magnetic materials
- To discuss the concepts of superconductivity, types of super conducting materials and applications of superconductivity

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	A detailed study of crystallography is given to the students through this Course.	K2
CO2	The study of defects in solids make the students to understand the structural defects of crystals.	K2
CO3	The students are able to get a knowledge of lattice vibrations in crystals.	K1
CO4	They get a detailed ideas of the properties of different magnetic materials.	K2
CO5	The students get thorough knowledge of superconductors and superconducting materials and their applications.	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT- I - CRYSTAL STRUCTURE

Introduction – Basic concepts of crystallography - Symmetry elements – Bravais lattice – Crystal planes and Miller indices – Reciprocal lattice– Classification of crystal systems- Basic definitions of crystal structure – Simple cubic (SC) structure – Body centered cubic (BCC) structure - Face centered cubic (FCC) structure – Hexagonal close packed (HCP) structure – Determination of crystal structure: The Laue method of X – ray diffraction -The rotating crystal method – The powder method (Debye – Scherrer method).

UNIT-II- DEFECTS IN SOLIDS

Crystal Imperfections-point defects:Schottky Defect, Frankel defect, impurity defects and Electronic defects-Line defects: edge dislocation-Surface defects:Grain Boundaries, Tilt boundaries, Twin boundaries and Stacking faults-Volume defects: effects of crystal imperfections

UNIT-III – SPECFIC HEAT CAPACITY OF SOLIDS

Lattice vibrations – Vibrations of monoatomic one dimensional lattice – Vibrations of diatomic one dimensional lattice – Phonons – Basic definitions – Dulong and Petit's law – Classical theory of specific heat capacity – Einstein's theory of specific heat – Debye's theory of specific heat.

UNIT- IV – MAGNETIC MATERIALS

Introduction – Basic definitions – Classification of magnetic materials – Diamagnetic materials – Classical theory of diamagnetism (Langevin theory) - Paramagnetic materials - Langevin theory of Para magnetism – Weiss theory of Paramagnetism - Ferromagnetic materials - Weiss theory of Ferromagnetism - Domain theory of ferromagnetism - distinction between magnetic materials.

UNIT – V - SUPERCONDUCTIVITY

Introduction – Properties of superconductors – Critical temperature - Critical field - Isotope effect - Meissner effect – Entropy – Specific heat - Types of superconductors - Type-I superconductors – soft superconductors - Type-II superconductors – hard superconductors – Intermediate or vortex state – BCS theory of superconductors – Electron – Lattice – Electron interaction – Cooper pair – Existence of energy gap - London equations – First order London equation – Second order London equation – penetration depth – Josepson Effect – DC Josepson effect - AC Josepson effect – Superconducting materials – Applications of superconductors.

BOOKS FOR STUDY:

1. Solid state Physics – Dr.K.Illangovan[Unit I, II & III]
2. Solid state Physics - S.O.Pillai[Unit IV& V]

BOOKS FOR REFERENCE:

1. Solid state Physics - C.M. Kachhava
2. Solid state Physics - C.Kittal

Mapping of Course Outcome with POs:

Solid State Physics

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	M	M	M	K2
CO3	H	H	H	H	H	K3
CO4	H	H	M	H	M	K2
CO5	H	H	H	H	H	K3

H-High M-Medium L-Low

K2 -Understanding K3-Applying

SEMESTER VI CORE COURSE - X

ADVANCED MECHANICS AND RELATIVITY

6-hours - 4 – Credit

Course Objectives:

- To study the fundamental concepts of dynamics - Lagrangian equation and its application
- To learn the Hamiltonian equation and its applications to two body problem
- To learn the basic concepts of matter waves and uncertainty principle
- To study the basic principles of quantum mechanics, Schrodinger equation and their applications
- To introduce the students basic concepts of special theory of relativity.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Define and demonstrate the different formalism in classical dynamics of a system.	**K2**
CO2	Apply the formalism to obtain equations of motion for simple systems.	K3
CO3	Understand the matter waves and the uncertainty relation	K2
CO4	Understand the idea of wave function and to solve schrodinger equation for simple potential	K2
CO5	Understand the concepts of constant relative motion of different bodies in different frame of reference	K2

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT – I – CLASSICAL MECHANICS-LAGRANGIAN

Generalized coordinates – Generalized velocities – Generalized momentum – Degrees of freedom under constraints – D'Alembert principle – Lagrangian function – Lagrangian equation (Derivation)

Applications of Lagrangian's equation – simple pendulum – compound pendulum – Atwood's machine- Simple Harmonic Oscillator.

UNIT – II – CLASSICAL MECHANICS-HAMILTONIAN

Hamiltonian- Hamiltonian equation with derivation-Physical significance of Hamiltonian function- General features of motion under inverse square law- Kepler's problem

Applications of Hamiltonian equations of motion- simple pendulum – compound pendulum-Linear Harmonic Oscillator –motion of a particle in a central field.

UNIT – III – WAVE MECHANICS

Matter waves – De Broglie's theory – De Broglie wavelength – experimental verification – Davission and Germar experiment – G.P.Thomson's experiment with relativistic correction.

Wave velocity and group velocity – particle velocity and group velocity – Heisenberg's uncertainty principle – illustration (i) diffraction of electron in a grating (ii) electron viewed through a microscope.

UNIT – IV – QUANTUM MECHANICS

Basic postulates of wave mechanics – Momentum operators – Energy operators - The Schrodinger wave equation – wave function(Ψ) – interpretations of Ψ – Application: particle in one dimensional box – Linear harmonic oscillator – zero point energy – the barrier penetration problem and tunnel effect.

UNIT- V- THEORY OF RELATIVITY

Concepts of Space, Time and Mass- Frames of Reference: Inertial and Non- Inertial frames –Newtonian Relativity- Galilean transformation equations -Michelson-Morley

experiment – Interpretation of the Michelson-Morley experiment- Postulates of Special theory of relativity– The Lorentz transformation equations –Length contraction – Time dilation- Time dilation – Illustration of timedilation and length contraction – The twin paradox–Variation of mass with velocity– Mass-energy equivalence.

BOOK FOR STUDY

1. Elements of Theoretical Physics – R.Murugeshan
2. Modern Physics – R.Murugesan [Unit V].
3.

BOOKS FOR REFERENCE

1. Classical Mechanics – Gupta Kumar
2. Quantum Mechanics – Schiff
3. Classical Mechanics – Goldstein
4. Thermal Physics – Garg Bansal & Gosh

Mapping of Course Outcome with POs:

ADVANCED MECHANICS AND RELATIVITY

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K3
CO3	H	H	M	H	M	K3
CO4	H	H	M	H	H	K4
CO5	H	H	M	M	M	K2

H-High M-Medium L-Low

K2-Understanding K3-Applying K4- Analysing

SEMESTER VI CORE ELECTIVE – III

LASER AND FIBER OPTICS

5 Hours - 5 Credit

Course Objectives:

- To familiarize the students with fundamental concepts of Laser
- To provide the theoretical knowledge of producing various laser types
- To study the applications of Laser in various fields
- To provide deep understanding of the fundamental and salient features of fibre optics technology
- To introduce the experimental methods of fibre optics sensors

Course Outcomes:

On completion of the Course, the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Explore the Laser fundamentals	K2
CO2	Understand the types of Lasers	K3
CO3	Get adequate knowledge about Industrial and medical applications of laser for day-to-day applications	K2
CO4	Recognize and classify the structure of Optical fibre	K1&K2
CO5	Understand the Optical sensors and their applications	K2&K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT- I - LASER

Introduction – Attenuation of light in an optical medium – thermal equilibrium – Interaction of light with matter – absorption – Spontaneous emission – Einstein's prediction – stimulated emission – Einstein relations – light Amplification - condition for stimulated emission to dominate spontaneous emission to dominate absorption transition – population inversion – active medium – pumping - meta stable states- principle - pumping schemes – optical resonant cavity.

UNIT – II – TYPES OF LASER

Types of laser – ruby laser – Nd – YAG laser –He - Ne laser – CO_2 laser –theory of LED-LED materials- types of LED –laser diode –Ga-As –laser – Ga-Al-As - Laser – comparison chart for all the lasers**.**

UNIT – III –APPLICATIONS OF LASER

Lasers in Mechanical Industry – drilling, cutting, welding- Lasers in Electronic Industry- Laser scribing, soldering, trimming, photolithography- Lasers in Medicine-dermatology, ophthalmology, dentistry- material processing - holography – difference between a photography & holography.

UNIT – IV – FIBRE OPTICS

Introduction – Optical fiber – features of optical fibers – principle and propagation of light in optical fibers.- acceptance angle and numerical aperture-– fabrication of fiber using double-crucible technique- types of optical fibers- single and multimode fibers – difference between single and multimode fiber – step index and graded index (grin) fibers – differences between step – index fiber and graded index fiber – splicing-splices-connectors- Losses in optical fibers-distortion and dispersion.

UNIT–V-FIBRE OPTIC COMMUNICATION SYSTEM, SENSORS AND APPLICATIONS

Light sources for fiber optics -- detectors- PIN Photo diode-fiber optics communication system —fiber optics sensors – phase and polarization fiber sensors – liquid level sensors – laser Doppler velocimeter sensor – displacement sensor- medical endoscope-engineering, medical and industrial applications of optical fibers

BOOKS FOR STUDY

- A Text Book of Optics- N.Subrahmanyam Brij Lal, M.N.Avadhanulu [Unit I]
- Engineering Physics – I – G. Senthil Kumar [Unit II, IV & V]
- LASERS-Theory, Principles and Applications-Dr.Manjeet Singh [Unit III]

BOOKS FOR Reference:

- Engineering Physics – I – P.Mani

Mapping of Course Outcome with POs:

LASER AND FIBER OPTICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	H	K2
CO2	H	H	H	M	H	K3
CO3	H	H	M	H	H	K4
CO4	H	H	M	H	H	K2& K3
CO5	H	H	M	M	H	K3& K4

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER VI CORE ELECTIVE – III

MATHEMATICAL PHYSICS

5 Hours - 5 Credit

Course Objectives:

- To introduce students to methods of mathematical physics.
- To familiarize the students with a range of methods that are essential for solving advanced problems in theoretical physics.
- To acquire skills to solve problems in quantum mechanics and electrodynamics.
- To work with vectors and tensors.
- To apply methods of functions of complex variables for calculations of integrals.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Solve ordinary and partial differential equations in physical sciences.	K3
CO2	Use Green Functions	K2
CO3	Use Fourier series and integral transformations and understand the basic theory of vectors and tensors.	K1
CO4	Understand the functions of complex variables and elements of distribution theory	K2
CO5	Analyze Fourier series	K3

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT –I - VECTORS

Introduction – representation of vectors – kinds of vectors- addition of vectors – subtraction of vectors – multiplication of vectors - vectors space or linear space – conditions for a physical quantity to be represented by a vector – resolution of vectors – linear combination of vectors – product of four vectors – reciprocal system of vectors – vector equations – simple applications of vectors to mechanics.

UNIT –II- VECTOR ANALYSIS

Differentiation of vectors – rules for differentiation – partial differentiation of vectors – rules for partial differentiation – the scalar and vector fields – directional derivatives – level surfaces – the gradient of a scalar field – the gradient of sum of two scalar point functions – the gradient of product of two scalar point functions – the divergence of a vector – point function – the divergence of sum of two vector functions – the divergence of product – the curl or rotation of a vector point function - curl of the sum of gradient of scalar product in terms of curl – to express divergence of vector product in terms of curl.

UNIT –III- MATRICES

Definitions and notations – equality of matrices – addition of matrices and its properties - multiplication of matrices and its properties - partitioning of matrices – product of matrices by partitioning – special matrices with their properties – rank of a matrix - theorem on rank – solutions of linear equations – Cramers rule – characteristic matrix and characteristics equations of a matrix.

UNIT – IV- BETA AND GAMMA FUNCTION

Definition – symmetry property of beta function – evaluation and transformation of Gamma function - relation between beta and Gamma function.

UNIT- V- DIFFERENTIAL EQUATION

Introduction – solution of differential equations of first order – solution of second order differential equations with constant co-efficient -power series solution- Frobenius' method.

BOOK FOR STUDY:

- Mathetical Physics – B.D. Gupta [Unit I, II & III]
- Mathematical Physics – SathyaPrakash [Unit IV & V]

Mapping of Course Outcome with POs:

MATHEMATICAL PHYSICS

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	H	K3
CO2	H	H	H	M	H	K2
CO3	H	H	M	H	H	K2
CO4	H	H	M	H	H	K2
CO5	H	H	M	M	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

SEMESTER – V & VI
CORE PRACTICAL - COURSE III
(Suggestive – Minimum any Twelve)
3 Hours – 4 Credit

Course Objectives:

- To make the students introduced to the methods of experimental Physics.
- To emphasize the laboratory techniques such as accuracy of
- measurements and data analysis.
- To enable the students acquire practical knowledge with lecture sessions
- translated to the laboratory sessions.
- To provide a hands-on learning in Resonant circuits, AC and DC bridges in determining self inductance.
- To acquire practical skills in using small angled prism and diffraction grating.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	To impart the broad knowledge of experimental methods and measurements	K2 & K3
CO2	To gain knowledge and understanding the components and handling equipments	K2 & K3
CO3	To familiarize with the experimental techniques	K2 & K3
CO4	To get the idea about experimental setup and arrangement of devices	K3
CO5	To verify the experimental results with theoretical values	K3

K2-Understanding, K3-Applying

List of Experiments

1. LCR – Series resonance circuit
2. LCR – Parallel resonance circuit
3. Self inductance of a coil L – Maxwell's bridge
4. Resolving power of a prism – Spectrometer
5. Refractive index - Small angled prism – Spectrometer
6. N & λ – Grating – Normal incidence method
7. Absolute capacity of a condenser – B.G
8. Boltzmann's constant using transistor
9. Impedance and power factor - LR circuit
10. Refractive index of prism – i-d curve – Spectrometer
11. Refractive index of prism – i-i' curve – Spectrometer
12. N & λ – Grating – Minimum deviation method
13. Resolving power of a grating – Spectrometer
14. High resistance by leakage – Spot galvanometer
15. Internal resistance of a cell – Spot galvanometer
16. Self inductance of a coil L – Owen's bridge

SEMESTER – V & VI
CORE PRACTICAL - COURSE IV
(Suggestive – Minimum any Twelve)
3 Hours – 4 Credit

Course objectives :

- To understand the characteristics of semiconductor devices such as diodes and transistors.
- To study the function of oscillators.
- To study the applications of operational amplifier.
- To study the applications of IC7400 series.
- To apply the knowledge of diodes in constructing and studying the performance of bridge rectifier and voltage multipliers.

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Remember the applications of semiconductor devices	K1
CO2	Gain the idea and principles of electronics practically	K2 & K3
CO3	Access the action of electronic devices such as diode, transistor etc.,	K2 & K3
CO4	Impart the broad knowledge of experimental methods and measurements	K3
CO5	Gain knowledge and understanding the components and handling equipments	K3

K1 - Remembering K2-Understanding K3-Applying

List of Experiments

1. Logic gates using Discrete components
2. Bridge rectifier
3. Junction diode characteristics
4. Zener diode characteristics
5. Voltage doubler using diodes
6. Verification of truth tables of logic gates using ICs
7. Integrator using IC 741
8. Differentiator using IC 741
9. Transistor characteristics – CE mode
10. Transistor characteristics – CB mode
11. NAND as universal gate
12. NOR as universal gate
13. Boolean components – IC logic gates
14. XOR & X-NOR using ICs
15. Hartley oscillator
16. Collpitt's oscillator.

Group Project Work

Programme : B.Sc.,

Subject : Physics

Semester : VI

Course : Group Project

Course type : Part IV- SBC-VI

Credit : 2

Contact hours : 2 hours/week

CE : 25

CIA : 75

SEMESTER VI - NME–II

TYPES OF ENERGY & THEIR UTILIZATION 2- hours 2 - Credit

Course Objectives:

- To provide basic knowledge on work, energy and power
- To make the students understand the conventional energy sources and their availability
- To equip the students to understand the applications of solar energy in day-today life.
- To inculcate renewable source of energy like wind energy, energy from hydropower, ocean etc.,
- To create awareness on disadvantages of fossil fuels and effect of radioactive elements

Course Outcomes:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	Learn fundamental concepts of energy	K2
CO2	Impart the usage of non-renewable energy sources	K3
CO3	Apply basic characteristics of renewable sources of energy and technologies for their utilization.	K2
CO4	Give review on utilization trends of renewable sources of energy	K1
CO5	Interpret the advantages and disadvantages of different renewable and non-renewable sources of energy	K2

K1 - Remembering K2-Understanding K3-Applying

COURSE CONTENT

UNIT-I-INTRODUCTION TO ENERGY

Introduction -work-energy-exchange of energy-power-units for energy.

UNIT-II-CONVENTIONAL ENERGY SOURCES AND THEIR AVAILABILITIES

Introduction-fossil fuels-coal-petroleum-searching petroleum source-refining petroleum-agricultural and organic wastes-magneto hydrodynamic generation.

UNIT-III-NONCONVENTIONAL ENERGY SOURCES -I

Introduction-solar energy-heating of building -cooling of building-solar electric power generation: stream generation-solar photovoltaic cell.

UNIT-IV-NONCONVENTIONAL ENERGY SOURCES -II

Energy from biomass and biogas-wind energy-energy from hydropower-energy from ocean –tidal energy-ocean thermal energy-geothermal energy-storage of energy.

UNIT-V-ENERGY AND ENVIRONMENT

Introduction-disadvantage of fossil fuels –burning of fuels-effect of emission of Co_2 & Co-pollution due to heating effects-effect of radioactive element.

BOOKS FOR STUDY

Non Conventional Energy Sources – G.D.RAI.

Mapping of Course Outcome with POs:

Types of Energy & their Utilization

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K3
CO3	H	H	H	H	H	K3
CO4	H	H	M	H	M	K4
CO5	H	H	M	M	H	K5

H-High M-Medium L-Low

K2-Understanding, K3-Applying

Semester I – Extra Credit Course I

ENERGY HARVESTING - I

Course Objective: To make the students understand the basic principles and applications of different forms of energy.

UNIT-I ELECTRICAL ENERGY

Application of heating effect of electricity: Electric heater– Electric radiation and Electric Iron – Electric welding and electric furnace –Carbon arc – Electric Lamp – Efficiency of a Lamp – Measurement of Electric Power - Principle of production of A.C. – A.C generators – D.C generators -D.C Motors.

UNIT – II MAGNETIC ENERGY

Magnetic field (B), magnetization (M), magnetic field intensity H, Magnetic flux and flux density, magnetic materials and magnetization, Induction heater-magnetic hysteresis.

UNIT- III PHOTOVOLTAICS & MICROWAVES

The photovoltaic effect -analysis of photovoltaic cells-efficiency of solar cells-design of photovoltaic system-single crystal and polycrystalline cells-Reflex Klystron- Magnetron - Microwave oven.

UNIT - IV THERMAL ENERGY

Distribution of Energy in the thermal spectrum – Lummer and Pringsheim Experiment and its Results – Wien's Displacement Law and Radiation Law – Rayleigh Jean's Law -Planck's Radiation Law – Deduction of Wien's Law and Rayleigh – Jean's Law from Planck's law-Kirchoff's Law of radiation and its proof.

UNIT - V MOLECULAR ENERGY & NUCLEAR ENERGY

Maxwell's law of equipartition of Energy – Molar Specific heat capacity at constant volume and constant pressure – Total Internal Energy and Ratio of Heat capacities in monoatomic gas, Diatomic gas. Chain reaction-Controlled & uncontrolled Nuclear fission, energy released in atom bomb . Nuclear fusion-Thermo nuclear reactors- Hydrogen bomb.

BOOKS FOR STUDY:

1. Heat & Thermodynamics Units I, &II Brijlal Subramaniam, Heat & Thermodynamics, Heat & Thermodynamics, Units I, & II, 2012, 16th edition.
2. Dennis Roddy &John Coolen, Electronic Communication, (Unit III), Prentice Hall India, 1995, 4th Edition.
3. Subir Kumar Sarkar, Optical Fibre and Fibre optic communication systems (Unit III) S Chand & Co, 2001, 2nd edition.
4. Singhal.S.S, Agarwal. J.P. and Sathya prakash, Heat, Thermodynamics and Statistical Physics, Units I, &II, Pragati Prakashan, 1985, 9th Edition.
5. Subrahmaniam. N & Brijlal S, Atomic & Nuclear Physics, Unit V, Chand & Company Ltd, 2008, 3rd Edition

Semester III – Extra Credit Course II

ELECTRICAL APPLIANCES

Objective: To enable the students to apply the principles of Physics in electrical appliances.

UNIT I

1. Electric oven
2. Washing machine

UNIT II

1. Refrigerators
2. Air conditioner – general principles and working

UNIT III

1. Electrical bell
2. Room heater

UNIT IV

1. Induction stove
2. Lightning conductor

UNIT V

Introduction – Wiring Materals and accessories – types of wiring – Basic principles of earthing – types of earthing

BOOKS FOR STUDY

1. Instrumentation – K.Arumugam
2. Electricity and magnetism – R.murugesan
3. How things work –the universal encyclopedia of mechines.

Semester - V
Extra Credit Course III
ENERGY HARVESTING - II

Objective: This Course aims to introduce the different nonconventional energy sources and the methods of harnessing energy from them.

UNIT I SOLAR ENERGY

Solar radiation – Solar radiation outside the earth's atmosphere Solar radiation at the earth's surface – Solar Thermal Energy – Solar Thermal devices and systems:Solar water heater – Sub components of solar water heater – Solar Cooker and its merits and demerits.

UNIT II WIND ENERGY

Power in the wind – Types of wind energy systems –Horizontal axis wind Turbine – Vertical axis wind Turbine.

UNIT III OCEAN ENERGY

Tidal Energy – Ocean Thermal Energy Conversion (OTEC) – Closed Cycle OTEC system – Open Cycle OTEC System.

UNIT IV ENERGY FROM BIOMASS

Biomass feedstock-water material-energy crops-important properties of biomass-conversion of biomass to gaseous fuels-anaerobic digestion-thermal gasification.

UNIT V GEOTHERMAL ENERGY

Introduction- Estimates of Geothermal power – Nature of Geothermal fields – Geothermal sources – Advantages and Disadvantages of geothermal energy - Applications of geothermal energy.

BOOKS FOR STUDY

1. Sukhatme S.P, Solar Energy, (Unit I), Wiley publications, 1975, 1st edition.
2. Rai. G.D, Non Conventional Sources of Energy, Khanna Publishers, 2009, 1st edition.
3. Rai. G.D, Non Conventional Sources of Energy, Khanna Publishers, 1987, 1st edition.
4. Yogi.D Goswami, Frank Krieth and Jan F. Krelder, Principles of Solar Engineering (Units IV & V), Tailor & Francis, 2003, 1st edition.

VALUE ADDED COURSES

Programme: UG **Sem: II**

Course Type: Value Added Course - I **Course: Laboratory Equipment Training**

Contact Hours: 30 Hours **CIA:** 100

Course Objectives:

- To understand basic concepts of measuring instruments.
- To discuss the working principles of electrical and electronic instruments.
- To give the basic principles of power supplies.
- To discuss the theory, types and uses of transformers.
- To give the basic concepts of oscillators.

Course Outcome:

On completion of the Course the student will be able to,

S.No	Description	Blooms' Taxonomy Level
COI	Gaining knowledge of the basic concepts of measurement of physical quantities.	K2
CO2	Gaining knowledge of the basic principles of transformers	K2
CO3	Applying the principles of power supplies in various circuits.	K3
CO4	Designing and analyzing electrical and electronic instruments	K4
CO5	Analyzing the frequency responses in various circuits using oscillators	K4

K2-Understanding K3-Applying K4-Analysing

COURSE CONTENT

UNIT – I: MEASURING INSTRUMENTS

Vernier Calipers –Least Count – Zero Error and Zero correction –Positive & Negative Zero Errors - Screw Gauge –Least Count – Zero Error and Zero correction - Travelling Microscope – Design & Working - Telescope – Design & Working - Spectrometer – Design & Working – Initial Adjustments.

UNIT – II: ELECTRICAL & ELECTRONIC INSTRUMENTS

DC Ammeter – DC Voltmeter –AC Voltmeter- AC Ammeter – Multimeters: Analog and Digital – Digital Frequency Meter – Galvanometers: Table & Spot Reflecting Galvanometer .

UNIT – III: POWER SUPPLY

Introduction – Regulated power supply – Three Terminal Regulated Power Supply – Fixed Positive Voltage Regulators - Fixed Negative Voltage Regulators – Adjustable Voltage regulators –Dual Power Supply.

UNIT – IV: TRANSFORMERS

Introduction –Step down transformers – Step up Transformers -Construction – Theory – Energy Losses – Uses.

UNIT – V: OSCILLATORS

Introduction – Basic Principles –Sine, Square and Triangular Wave Generator – Principle and working – Fixed Frequency Oscillator.

LIST OF EXPERIMENTS:

- Estimation of errors
- Young's modulus – Scale & Telescope
- Young's modulus – Microscope
- Calibration of low range voltmeter
- Calibration of ammeter
- Adder / Subtractor –Op Amp
- Minimum Deviation - Spectrometer
- Bridge Rectifier
- LCR circuit

BOOKS FOR REFERENCE:

1. J.Gnanavadivel, C.Senthil Kumar, P.Priyalatha, P.Manikandan, DR.C.Nagarajan. Measurements and Instrumentation. Anuradha Publications, Chennai.
2. Albert D.Helfrick, William D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India Pvt. Limited, New Delhi, 2004.
3. G.Senthil Kumar, "Physics Laboratory Manual".
4. G. Jose Robin, A.Ubald Raj, Basic Electronics and Applied Electronics, Indira Publications.

Mapping of Course Outcome with POs:

Laboratory Equipment Training

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	M	M	M	K2
CO2	H	H	H	M	M	K2
CO3	H	H	H	H	H	K3
CO4	H	H	M	H	H	K4
CO5	H	H	H	H	H	K4

H-High M-Medium L-Low

K2-Understanding, K3-Applying K4 -Analysing

VALUE ADDED COURSES

Programme: UG **Sem : IV**

Course Type: Value Added Course - II **Course: Designing & Fabrication of PCB**

Contact Hours: 30 Hours **CIA:** 100

Course Objectives:

- To provide foundational knowledge of PCB, parts and materials used.
- To make the students acquire an understanding the types of PCB.
- To enable the student to explore the field of Layout and Artwork.
- To comprehend the principles of Lamination and Photoprinting.
- To help them understand the concept of Etching and Soldering.

Course Outcome:

On completion of the Course the student will be able to,

S.No	Description	Blooms' Taxonomy Level
CO1	Gaining knowledge of the basics of PCB	K2
CO2	Comprehending the different types of PCB	K2
CO3	Applying the gained knowledge to develop Layout	K3
CO4	Applying the gained knowledge and developing Etching and Soldering	K4
CO5	Analyzing the concept of laminates and printing	K4

K2-Understanding K3-Applying K4-Analysing

COURSE CONTENT

UNIT – I: PRINTED CIRCUIT BOARD (PCB)

Introduction – Different parts of PCB-Pad-Trace-Layers-different types of Layer-PCB materials- classification according to reinforced materials and types of resin - PCB Material Properties

UNIT – II: TYPES OF PCB

Single sided, double sided, Multilayer - through holes technology- Benefits of Surface Mount Technology (SMT)- Limitation of SMT-Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's.

UNIT – III: LAYOUT AND ARTWORK

Layout Planning: General rules of Layout, Resistance, Capacitance and Inductance, Conductor Spacing, Supply and Ground Conductors, Component Placing and mounting, Cooling requirement and package density, Layout check. Basic artwork approaches, Artwork taping guidelines-General artwork rules: Artwork check and Inspection.

UNIT – IV: LAMINATION AND PHOTO PRINTING

Properties of laminates, Types of Laminates, Manual cleaning process, Basic printing process for double sided PCB's, Photo resists, wet film resists, Coating process for wet film resists, Exposure and further process for wet film resists, Dry film resists.

UNIT – V: ETCHING AND SOLDERING

Introduction, Etching machine, Etchant system. Principles of Solder connection, Solder joints, Solder alloys, Soldering fluxes. Soldering, Desoldering tools and Techniques.

BOOKS FOR REFERENCE:

- Robert Boylstead and Louis Nashelsky, Electronic Devices and Circuit Theory, IX Ed, 2013.
- Paul B. Zbar, Electronics Text Lab Manual.
- Joeseph Edminister, Electric Circuits, Schaum Series.
- N.N. Bhargava, D.C. Kulshresta and D.C Gupta, Basic Electronics and Linear Circuits, TMH.
- David A Bell, Electronic Devices, Reston Publishing Company/DB Tarapurwala Publ.
- Walter C.Bosshart, PCB Design and Technology, Tata McGraw Hill Publications, Delhi, 1983. Clyde F.Coombs, Printed circuits Handbook III Ed, McGraw Hill.

Mapping of Course Outcome with POs:

Designing & Fabrication of PCB

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	M	H	M	H	K2
CO2	H	H	H	M	H	K2
CO3	M	H	H	H	M	K3
CO4	H	H	H	H	M	K4
CO5	H	H	H	H	H	K4

H-High M-Medium L-Low

K2-Understanding, K3-Applying K4 -Analysing

VALUE ADDED COURSE - III

Programme : UG **Sem : VI**

Course Type: Value Added Course - III **Course : Optoelectronic Devices**

CIA : 100 **Contact Hours: 30 Hours**

Course Objectives:

- To learn about the concepts of LEDs their working, advantages and Applications.
- To cover the concepts of LCDs their working, advantages and Applications.
- Understand the function of different semiconductor opto devices.
- To discuss the concept of different photo detecting devices.
- To learn about the working of CRO and its applications.

Course Outcome:

On completion of the Course the student will be able to,

CO	Statement	Blooms Taxonomy level
CO1	To understand LEDs their working, advantages and applications	K2
CO2	To know about LCD, their working and uses	K3
CO3	Understand the function of different semiconductor opto devices	K2
CO4	To discuss the concept of different photo detecting devices	K2
CO5	To learn about the working of CRO	K3

K2-Understanding K3-Applying

COURSE CONTENT

UNIT- I - LIGHT-EMITTING DIODES - LED

Introduction – types of Light-emitting diodes – construction – working principle - I-V characteristics – different coloured LEDs – advantages – disadvantages - applications of LED.

UNIT – II - LIQUID CRYSTAL DISPLAY - LCD

Introduction – construction – working principle - types of liquid crystal display and their working - characteristics – advantages - disadvantages– applications of LCD.

UNIT-III - LIGHT DETECTING DEVICES I

Photodiodes - introduction – construction – principle of working – working modes - critical performance parameters of photodiodes – advantages – disadvantages - applications - phototransistors- introduction – construction – working- advantages – disadvantages - applications - photomultipliers – introduction – construction – working - applications.

UNIT –IV - LIGHT DETECTING DEVICES II

Photodetector or photoresistor or light dependent resistor (LDR) –- introduction – construction – working - types of LDR - advantages – disadvantages – applications.

UNIT –V - CATHODE-RAY OSCILLOSCOPE - CRO

Cathode-ray oscilloscope (CRO) – introduction –block diagram – construction - principle of working – types of CRO – applications.

BOOKS FOR STUDY

1. Elements of solid-state electronics – Ambrose and Devaraj
2. Electronics – G.Jose Robin & Ubald Raj
3. Electronics I – M.Palaniappan
4. Optoelectronic Devices and Systems: Volume 1 – S.C.Gupta.
5. Semiconductor Optoelectronic Devices 2nd Editionn – Pallab Bhattacharya

BOOKS FOR REFERENCE

1. Electronics – Gupta Kumar
2. Electronics – B.L. Theraja
3. Optoelectronics and Photonics: Principles and Practices - Safa Kasap

Mapping of Course Outcome with POs:

Optoelectronic Devices

CO	PO1	PO2	PO3	PO4	PO5	Blooms Taxonomy level
CO1	H	H	H	H	H	K2
CO2	M	H	H	M	H	K3
CO3	H	H	H	H	M	K2
CO4	H	H	M	H	H	K2
CO5	M	H	H	H	H	K3

H-High M-Medium L-Low

K2-Understanding K3-Applying

B.Sc Physics Degree Course *(Semester)*

Pattern of question Course for Physics Core, Core Elective and Ancillary subjects for the Academic Years **2022-25**

SUMMATIVE EXAMINATION

Time: 3hrs **Max.Mark**:75

Section – A - 10 x 1 = 10 ---------- No Choice
Section – B - 5 x 5 = 25 ---------- 5 Questions (either or type)
Section – C - 4 x 10 = 40 ---------- 4 Out of 6 Questions(open choice)

INTERNAL (Theory)

Test	:	15marks
Seminar	:	5marks
Assignment	:	5marks
Total	:	25marks

INTERNAL - PATTERN OF QUESTION COURSE

Duration – 2 hour **Total Marks -** 30

Section – A - 6 x 1 = 6 ---------- No Choice
Section – B - 2 x 4 = 8 ---------- 2 either or type Questions
Section – C - 2 x 8 = 16 ---------- 2 Out of 4 Questions – Open choice questions

B.Sc Physics (Semester) Degree Course

B.Sc Physics

Part – IV – SBC & NME

SECTION – A

SUMMATIVE EXAMINATION

Time: 3hrs **Total.Mark**:75

Section – A - 5 x 3 = 15 ---------- 5 Out of 8 Questions
Section – B - 5 x 6 = 30 ---------- 5 Out of 8 Questions
Section – C -3 x 10 =30 ---------- 3 Out of 5 Questions

INTERNAL - PATTERN OF QUESTION COURSE

Duration – 1 hour **Total Marks** - 15

Section – A - 2 x 2 = 4 ---------- 2 out of 3 Questions
Section – B - 1 x 4 = 4 ---------- 1 out of 2 Questions
Section – C - 1 x 7 = 7 ---------- 1 out of 2 Questions

B.Sc Physics (Semester) Degree Course

B.Sc Physics

VALUE ADDED COURSE – (VAC)

SUMMATIVE EXAMINATION

Time: 3 hrs **Total Mark: 100**

Section – A - 4 x 20 = 80 ---------- 4 Out of 8 Questions
Section – B - 1 x 20 = 20 ---------- 1 Out of 2 Questions
(based on practical Knowledge)

B.Sc Physics (Semester) Degree Course

B.Sc Physics

EXTRA CREDIT COURSE

SUMMATIVE EXAMINATION

Time: 3 hrs **Total Mark: 100**

Section – A - 5 x 20 = 100 ---------- 5 Out of 9 Questions