YADAVA COLLEGE

(An Autonomous Co-Educational Institution)

Affiliated to Madurai Kamaraj University

Govindarajan Campus, Thiruppalai, Madurai- 625014

DEPARTMENT OF PHYSICS

C.B.C.S- Pattern

DEPARTMENT OF PHYSICS

YADAVA COLLEGE (Autonomous), MADURAI – 14

On the successful completion of B.SC., Physics the students will be able to

PO	PROGRAM OUTCOME
PO-1	Promote and apply scientific knowledge for finding sustainable solution to solve the problems in physics
PO-2	Identify, analyze and formulate novel ideas to yield substantial results in the fields of research utilizing the principles of physical science
PO-3	Relate key concepts and scientific principles to various scientific phenomenon and their applications in day to day life.
PO-4	Cultivate unparalleled comprehension of fundamental concepts relevant to basic science leading to an individual progress and career advancement at the national levels.
PO-5	Communicate effectively their views and ideas.

PROGRAM SPECIFIC OUTCOME:

On the successful completion of B.SC., Physics the students will be able to

PSO	PROGRAM SPECIFIC OUTCOME
PSO-1	Understand the basic concepts of physics
PSO-2	Apply the various concepts to solve the problems in physical science
PSO-3	Learn to design an experiment using appropriate components and cultivate the research attitude by doing project work
PSO-4	Provide knowledge about material properties and its application for developing technology
PSO-5	Acquire knowledge about academic excellence for higher studies and research.

UNDER GRADUATE PROGRAMME IN PHYSICS

MAJOR

Sem	*Part*	*Subject*	*Subject Code*	*Title of the Paper*	*Teach. hrs*	*Exam hrs*	*Credits*	*Marks*			*Page No*
								Int	*Ext*	*Total*	
I	I	LANG. I	P1TA1	Tamil	5	3	3	25	75	100	-
	II	LANG. II	P2EN1	English	5	3	3	25	75	100	-
	III	CORE	P3CPY4	General Physics	4	3	4	25	75	100	1
			P3CPY5	Thermal Physics	4	3	4	25	75	100	3
				*Practical- I	3						
		ALLIED I	P3ACY1	Chemistry	3	3	2	25	75	100	-
				*Practical- I	2						
	IV	ENS	P4ES	Environmental science	2	3	2	25	75	100	-
		SBE	P4ECE1	Communicative English	2	3	2	25	75	100	-
II	I	LANG. I	Q1TA2	Tamil	5	3	3	25	75	100	-
	II	LANG. II	Q2EN2	English	5	3	3	25	75	100	-
	III	CORE	Q3CPY6	Optics & Spectroscopy	4	3	4	25	75	100	5
			Q3CPY7	Electromagnetism	4	3	4	25	75	100	7
			Q3CPYL1	Practical- I	3	3	3	40	60	100	9
		#SSP	Q3SPY3	Energy Physics	-	3	3	25	75	100	10
		ALLIED I	Q3ACY2	Chemistry	3	3	2	25	75	100	-
			Q3ACYL1	Practical- I	2	3	2	40	60	100	-
	IV	VAE	Q4VE	Value Education	2	3	2	25	75	100	-
		SBE	Q4ECE2	Communicative English	2	3	2	25	75	100	-

**Exams are conducted only at even semesters.*
 # Only for bright students.

DEPARTMENT OF PHYSICS

	CORE I - GENERAL PHYSICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P3CPY4**	**4**	**4**	**100**

Objectives

- *To understand the principles of motion of bodies and sound waves*
- *To acquire knowledge about mechanics, properties of matter and gravitation*
- *To appreciate the applications of conservation laws.*
- *To understand the mechanism of sound waves.*

Unit I Conservation laws:

Impulse-impact –fundamental principles of impact- oblique impact of smooth sphere on a fixed smooth plane – final velocity and loss of kinetic energy in the case of direct and oblique impact of two smooth spheres –rocket motion- principle and expression for thrust and velocity –specific impulse- multistage rocket .

Unit II Motion of rigid body:

Moment of inertia – parallel and perpendicular axes theorem - moment of inertia of rectangular lamina and triangular lamina - Routh's Rule - moment of inertia of a solid sphere about all axes - compound pendulum - period of oscillation-experimental determination -torque and angular momentum – relation between them – kinetic energy of a rotating body.

Unit III Gravitation:

Kepler's law of planetary motion – law of gravitation – Boy's method for G – expression for period – experiment to find g – gravitational potential – gravitational field at a point due to spherical shell - variation of g with latitude, altitude and depth.

Unit IV Elasticity:

Elastic moduli – Poisson's ratio – relation between angle of shear and linear strain - relation between volume strain and linear strain – work done in a strain – relation between elastic moduli – Torsion of a body – static torsion – expression for couple per unit twist – work done in twisting a wire – torsional oscillations of a body – Expression for bending moment — determination of Young's modulus by uniform and non-uniform bending – I section girders — – determination of E, G and γ by Searl's method –

Unit V Sound:

Simple harmonic motion–composition of two simple harmonic vibrations of equal time periods acting at right angles - properties of longitudinal progressive waves – velocity of

transverse waves along a stretched string – alternative method – laws of transverse vibration of string – verification of the laws of transverse vibration of strings – Melde's experiment – Doppler effect - observer at rest and source in motion - source at rest and observer in motion – when both the source and the observer are in motion – ultrasonic – production of ultrasonic waves – detection of ultrasonic waves.

Course Outcomes

On successful completion of the course the students will be able to

CO NO.	MAJOR CORE PAPER- GENERAL PHYSICS –(P3CPY4)
CO-1	Understand the principles of motion of bodies.
CO-2	Describe mechanics, properties of matter and gravitation.
CO-3	Recall the applications of conservation laws.
CO-4	Interpret the fundamentals of elasticity and torsion effects.
CO-5	Analyze the universal behavior of wave motion and Doppler effect.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, PPT

Textbooks:

1. *Mechanics Properties of matter and Sound; Thermal Physics, R.Murugeshan - First Edition (July 2002) – Unit I, II, III, IV*
2. *Textbook of sound by N Subrahmanyam Brijlal, Second Revised Edition, Reprint (2004), Vikas Publishing House PVT Ltd*
   Unit V - 1.3, 2.4, 4.8, 7.1 to 7.5, 8.1 to 8.4, 10.23 to10.25.

Reference book:

1. *Properties of matter by Brijlal N. Subramanian, Reprint 2004, S. Chand &Co. Ltd.,*
2. *Elements of Properties of matter by D.S. Mathur S.chand &Co.,New Delhi.*
3. *University physics by Sears Zemansky and young 6th Edition, Naresa publishing house, chennai.*

DEPARTMENT OF PHYSICS

	CORE II - THERMAL PHYSICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P3CPY5**	**4**	**4**	**100**

Objectives

- *To understand the different methods of heat transfer*
- *To recall the applications of kinetic theory of gases*
- *To recall the laws of thermodynamics*
- *To review the concepts of entropy*

Unit I Calorimetry:

Definitions-Regnault's method of mixtures-copper block calorimeter-Nernst vacuum calorimeter-Newton's Law of cooling- specific heat of a liquid-Joule's electrical Method – two specific heat capacities of a gas-Joly's differential steam calorimeter – Regnault's Method – continuous flow electrical method

Unit II Transmission of Heat:

Coefficient of thermal conductivity-Lee's method for bad conductors-spherical shell method-cylindrical flow of heat-thermal conductivity of rubber- -Wiedemann-Franz law-convection-applications of convection-convective equilibrium of the atmosphere-properties of thermal radiations- applications of heat radiations-Stefan's law- mathematical derivation of Stefan's law-derivation of Newton's law of cooling from Stefan's law –experimental verification of Stefan's law –determination of Stefan's constant(lab method)-solar constant-temperature of the sun

Unit III 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-Avagadro's hypothesis-degrees of freedom and Maxwell's law of equipartition of energy-atomicity of gases-Maxwell's law of distribution of velocity-experimental verification of velocity distribution – mean free path- transport phenomena-viscosity of gases-thermal conductivity of gases-Vanderwaal's equation of state- critical constants-critical coefficient-Joule-Kelvin effect-temperature of inversion

Unit IV T**hermodynamics:**

First law of thermodynamics-first law of thermodynamics for a change in state of a closed system-Isothermal - adiabatic -isobaric – isochoric processes - Gas equation during adiabatic

process-slopes of adiabatic and isothermals-work done during an isothermal process-work done during an adiabatic process-relation between adiabatic and isothermal elasticities-Clement and Desorme's method-determination of γ-Second law of thermodynamics-Carnot's reversible engine-Carnot's engine and refrigerator-Carnot's theorem.

Unit V Entropy:

Change in entropy in a reversible process-change in entropy in an irreversible process-third law of thermodynamics-temperature entropy diagram-entropy of a perfect gas- zero point energy-negative temperature-Maxwell's thermodynamical relation-Helmholtz function-thermodynamic potential or Gibb's function

Course Outcomes

On successful completion of the course the students will be able to

CO NO.	MAJOR CORE PAPER- THERMAL PHYSICS –(P3CPY5)
CO-1	Analyze the different types of calorimeter and specific heats.
CO-2	Demonstrate thermal conductivity and concept of specific heat capacity through practical experiments.
CO-3	Illustrate the importance of transport phenomena and Joule –Kelvin effects.
CO-4	Identify the laws of thermodynamics and analyze its application to heat engines.
CO-5	State and apply the concepts of entropy and the use of temperature scales.
CO-6	Apply Maxwell's thermodynamic equations to comprehend phase transitions.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, PPT

Text Book:

Heat and Thermodynamics by Brijlal and Subrahmanyam, 15th Edition, Reprint (1993), S Chand &Company

Unit I – 3.1-3.6, 3.10 -3.13

Unit II – 8.1, 8.2,8.8,8.11-8.13,8.17,8.20,8.21,8.24,8.27,8.28,8.35,8.36-8.38,8.43,8.44

Unit III – 5.13-5.19, 5.21-5.28, 5.36-5.37,5.39, 5.46

Unit IV – 6.8, 6.9, 6.11 to 6.20, 6.25-6.28

Unit V – 6 .44-6.54

Reference book:

1. University physics', Sears Zemansky and *Young, 6th Edition, Narosa publishing house, Chennai.*

2. Thermal Physics – A.B. Gupta, H.D.Roy, book and Allied (P) Ltd.Golden Jubillee year edition 2010.

3. Thermal Physics – R.Murugeshan third revised edition 2012, S.Chand Company.

DEPARTMENT OF PHYSICS

	CORE III - OPTICS AND SPECTROSCOPY			
SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
II	**Q3CPY6**	**4**	**4**	**100**

Objectives

- *To understand the concepts of dispersion and aberration.*
- *To know the phenomenon of interference, diffraction and polarisation.*
- *To identify the applications of laser.*
- *To gain knowledge about various spectroscopy.*

Unit I Geometrical Optics:

Dispersion through a prism – Cauchy`s Formula – achromatism in prisms – deviation without dispersion – dispersion without deviation – direct vision spectroscope. aberration in lenses: Introduction – spherical aberration in lenses – methods of minimizing spherical aberrations – condition for minimum spherical aberration of two thin lenses separated by a distance – eyepieces – Huygen's eyepiece – Ramsden's eyepiece – comparison of eyepieces.

Unit II Interference:

Theory of interference fringes- colors of thin films –production of colors in thin films – wedge shaped film – Newton rings – determination of wavelength of sodium light by Newton's rings – determination of refractive index of a liquid by Newton's rings – Michelson's Interferometer – uses of Michelsons Interferometer-Jamin's Interferometer.

Unit III Diffraction:

Fresnel`s explanation of rectilinear propagation of light – plane transmission diffraction grating – absent spectra with a diffraction grating –dispersive power of a grating – determination of wavelength of light using transmission grating (normal incidence) – resolving power of optical instruments – resolving power of a telescope – relation between magnifying power and resolving power of a telescope – resolving power of microscope-resolving power of a prism – resolving power of a plane diffraction grating- comparison of prism and grating spectra.

Unit IV Polarisation:

Polarisation by reflection- pile of plates –law of Malus – double refraction – Huygen's theory of double refraction in uniaxial crystals – Huygen's construction for double refraction in uniaxial crystals – Nicol prism-plane, circularly and elliptically polarized light – theory of production of elliptically and circularly polarized light – quarter wave plate – half wave plate-production and

detection of plane, circularly and elliptically polarized light – specific rotation – Laurent's half shade polarimeter – determination of specific rotation of sugar solution.

Unit V Spectroscopy:

Infrared spectroscopy –ultraviolet Spectroscopy – Rayleigh scattering – Raman effect – experimental study of Raman effect – quantum theory of Raman effect – applications – lasers: Induced absorption, spontaneous emission, stimulated emission, Ruby laser – Helium neon laser – semiconductor laser, properties of laser beam.

Course Outcomes

On successful completion of the course the students will be able to

CO NO.	MAJOR CORE PAPER- OPTICS AND SPECTROSCOPY-(Q3CPY6)
CO-1	Illustrate the concept of dispersion, aberration in lenses.
CO-2	Realize the concept of interference in optics and to apply in designing optical elements useful in day to day life.
CO-3	Analyze and apply the knowledge of diffraction in the laboratory experiments.
CO-4	Identify the concept of polarization and Nickel prism and to study the laws of optical activity and specific rotation.
CO-5	Demonstrate the laser principles, laser behavior, different types of lasers and its applications.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, PPT

Text Book:

Optics and Spectroscopy by R. Murugeshan, Second Edition 1998, S.Chand & Company Ltd.,

Unit I –1.7 to 1.11,1.15 to 1.18,1.25 to 1.28

Unit II – 2.1,2.2,2.5 to 2.13

Unit III – 3.1,3.2,3.12 to 3.14,3.17,3.19 to 3.25

Unit IV – 4 .1 to 4.8,4.10 to 4.14,4.19 to 4.21

Unit V – 5.1 to 5.8,5.13 to 5.17

Reference Books:

1. *A Text Book of Optics by N.Subrahmnanyam, Brijlal, M.N. Avadhanulu, First Multicolor Edition (2006), S.Chand & Company Ltd.,*
2. *A text book of Optics (Revised edition) Dr.N.Subramanyam, Brijlal , Dr.M.N.Aradhanulu S.Chand Company, 25th revised edition, 2012.*
3. *Modern Optics _ A.B.Gupta, Second edition 2010, Books and Allied (P) Ltd.,*

Laser Techniques and applications _ BMK Prasad, Ancillary books (P) Ltd.,

DEPARTMENT OF PHYSICS

	CORE IV - ELECTROMAGNETISM				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q3CPY7**	**4**	**4**	**100**

Objectives

- *To understand the concepts of magnetic effects of current*
- *To rejuvenate the magnetic properties of material*
- *To recall the laws of electromagnetic induction*
- *To understand the effects of alternating currents*

Unit I Magnetic effects of currents:

Biot Savart law – Magnetic Induction at a point due to a straight conductor – Circular coil-solenoid – Definition of B – Lorenz force- Force on current and between two parallel currents – Torque – Moving coil B.G – Damping correction – Measurements of figure of merit – Absolute capacity of capacitor – Comparision of capacitances and emf's.

Unit II Electromagnetic induction and transient currents:

Faraday's law – lens law – self-induction – Rayleigh's method – Anderson bridge- mutual induction – experimental determination of growth and decay of current – containing L and R - growth and decay of charge of a capacitor through R – measurement of high resistance by leakage.

Unit III Magnetic properties of material:

Magnetic induction-Magnetization-Relation between three magnetic vectors – Susceptibility – Determination of susceptibility – Permeability – Properties of dia, Para, Ferro – Electron theory – Langevin's theory and diamagnetism, Para magnetism – Weiss's theory of ferromagnetism.

Unit IV Electrical Measurements:

Carey foster bridge – Theory and experiment to find temperature coefficient and specific resistance – Potentiometer– Calibration of ammeter and voltmeter – Measurement of thermo emf.

Unit V Alternating current:

Emf induced in a coil rotating in a magnetic field – Mean value – Root mean square value – Form factor – Series LCR circuit – Resonance – Q factor – Parallel resonance circuit – Power – Wattless current – Chock coil – Transformer – Skin effect-Three phase AC generator-Distribution of three phase alternating current-AC dynamo.

Course Outcomes

On the completion of the course the students will be able to

CO NO.	MAJOR CORE PAPER- ELECTROMAGNETISM-(Q3CPY7)
CO-1	Uunderstand the concept of Biot Savart Law, Lorentz force, torque, moving coil ballistic galvanometer and absolute capacity of capacitor
CO-2	Recall the Faraday's law, Len's law and Rayleigh's method
CO-3	Classify the properties of dia, para and ferro magnetic materials.
CO-4	Recall theory and experimental to find temperature coefficient and specific resistance.
CO-5	Describe LCR series and parallel circuit's concepts and distribution of three phase alternating current.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, PPT

Textbook:

Electricity and Magnetism by R. Murugeshan, 1999 Edition, Chand & Company Ltd.
Unit I –Chapter – 10.1 to10.4, 10.6 to 10.8,10.10,10.11, & 10.13 to 10.16
Unit II – Chapter – 11.1, 11.3,11.5 to 11.7 & 11.9, Chapter – 12.1 to 12.4.
Unit III – Chapter – 15.1 to 15.8, 15.10 to 15.13 & 15.18.
Unit IV – Chapter – 7.1,7.2, Chapter – 8.3,
Unit V – Chapter – 13.1 to 13.8, 14.1-14.3.

Reference books:

1. *Electricity and Magnetism by Brijlal N. Subramanityam – First Edition (1964), 20thRevised edition (1994), Ratan Prakashan Mandir Educational & University Publishers.*
2. *Electricity and Magnetism by Sehgal Chopra Sehgal,Reprint(2002), Sultan chand & sons company Ltd.*
3. *Fundamentals of Electricity and Magnetism-Basudev Ghosh First published-2006 second Edition-2009 Revised Reprint -2010. Publisher-Arunabha son Book & Allied(p) Ltd.*

	CORE V - PRACTICAL I				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q3CPYL1**	**3**	**3**	**100**

ANY FIFTEEN EXPERIMENTS

1. Estimation of Errors
2. Young's Modulus – uniform bending – Pin and Microscopic method
3. Young's Modulus – uniform bending – Optic lever method
4. Young's Modulus – non-uniform bending - Pin and Microscopic method.
5. Young's Modulus – non uniform bending – Optic lever method
6. q, n, σ - Searle's apparatus
7. Torsional Oscillations –Rigidity Modulus and Moment of Inertia.
8. Compound Pendulum – g and k
9. Spectrometer – Dispersive power of prism
10. Spectrometer – Grating minimum deviation
11. Potentiometer – Calibration Low range Voltmeter
12. Melde's string – Frequency of tuning fork
13. Potentiometer – Ammeter calibration
14. Potentiometer –Resistance & Resistivity of a wire
15. Lee's disc – Thermal Conductivity of a cardboard
16. Stoke's method – Coefficient of viscosity of a liquid
17. Sonometer – Laws verification

Course Outcomes

On successful completion of the course the students will be able to

CO NO.	PRACTICAL – I – Q3CPYL1
CO-1	Demonstrate the use of potentiometer for the calibration of electrical meters.
CO-2	Apply the concepts of moduli of elasticity in a series of experiments
CO-3	Illustrate the underlying concepts of fluid dynamics and mechanics of rigid bodies and compare the results to the standard values.
CO-4	Demonstrate the laws of vibration through various experimental procedure.
CO-5	Apply the phenomenon of dispersion and the concept of refractive index with the use of suitable optical setup.

DEPARTMENT OF PHYSICS

	SELF STUDY PAPER I - ENERGY PHYSICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q3SPY3**	**------**	**3**	**100**

Objectives

- *To understand various energy sources.*
- *To understand the concept of solar energy.*
- *To understand conversion of light energy into electrical energy.*
- *To understand uses of solar equipments.*

Unit I Energy sources

World's resrve of commercial energy sources and their availability – Various forms of energy – Renewable and conventional energy systems – Comparision.

Unit II Solar Energy

Renewable energy sources – Solar energy – Nature of solar radiation – Components– Solar heaters – Crop dryers – Space cooling.

Unit III Applications of Solar Energy

Solar ponds – Solar cookers – Water desalination – Photovoltaic generation basis – Merits and demerits of solar energy.

Unit I V Uses of Energy

Conservation of energy – Patterns of energy consumption in domestic, Industrial, transportation and agricultural sectors – Conservation principles in these sectors.

Unit V Energy Storage

Energy crisis and possible solutions – Energy options for the developing countries – Energy storage and hydrogen as a fuel (basics) – impacts due to non-conventional energy sources – global warming.

Course Outcomes

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

CO NO.	SELF STUDY PAPER- ENERGY PHYSICS –Q3SPY3
CO-1	Acquire knowledge on various energy sources.
CO-2	Understand the concept of solar energy.
CO-3	Study the photovoltaic generation basis and their merits and demerits of solar energy.
CO-4	Demonstrate industrial transportation and agricultural sectors.
CO-5	Learn the energy storage for the developing countries.

Reference Books:

1. Solar energy utilization by G.D. Rai, Ed.V.1995.
2. Non conventional energy sources by G.D. Rai, Ed.IV.1997
3. Solar energy by S.P.Sukhatme, Tata McGraw Hill publishing Company, Ed.II.1997
4. Energy technology by S.Rao and Dr.B.B.Parulekar, Ed.II.1997

Allied for Maths & Chemistry Majors

Semester	Subject Code	Title of the paper	Hours		Credits	Marks			Page No
			Teach.	Exam		Int	Ext	Total	
I	P3APY3	Fundamental Physics	3	3	2	25	75	100	12
		*Practical – I	2						
II	Q3APY3	Heat &Thermodynamics	3	3	2	25	75	100	14
	Q3APYL1	Practical – I	2	3	1	40	60	100	16

***Exams conducted only at even semester**

DEPARTMENT OF PHYSICS

	PAPER I - FUNDAMENTAL PHYSICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P3APY3**	**3**	**2**	**100**

Objectives

- *To acquire the basic knowledge about mechanics.*
- *To understand the concept of Moment of Inertia.*
- *To gather interesting information about artificial satellites.*
- *To understand the various properties of matter.*

Unit I Impulse and Impact

Impulse-impact –fundamental principles of impact- oblique impact of smooth sphere on a fixed smooth plane – final velocity and loss of kinetic energy in the case of direct and oblique impact of two smooth spheres –rocket motion- principle and expression for thrust and velocity – specific impulse- multistage rocket

Unit II Rotational Motion

Angular velocity – normal acceleration (no derivation) – centrifugal and centripetal forces – 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 – M. I. of circular ring, circular disc, solid sphere, hollow sphere and cylinder

Unit III Gravitation

Kepler's laws of planetary motion – law of gravitation – Boy's method for G – compound pendulum – expression for period – experiment to find g – variation of g with latitude, altitude and depth – artificial satellites

Unit IV Elasticity and Viscosity

Elastic moduli – Poisson's ratio – beams – expressions for bending moment – determination of Young's modules by uniform and non-uniform bending – I section girders, torsion – expression for couple per unit twist – work done in twisting – Torsional pendulum. Derivation of Poiseuille's formula (analytical method) – Bernoulli's theorem – Proof – Applications – Venturimeter – Pitot tube

Unit VSound

Simple harmonic motion – progressive waves – properties – composition of two S.H.M. and beats – Stationary waves – properties – Melde's experiment – transverse and longitudinal modes – Acoustics – Ultrasonic – Piezo-electric generator – Properties and applications

Course Outcomes:

On successful completion of the courses the students will be able to

CO NO.	ALLIED PAPER I -FUNDAMENTAL PHYSICS-P3APY3
CO-1	Gain the knowledge about the principle of rocket.
CO-2	Understand the basics of properties of matter, young's modulus and rigidity modulus.
CO-3	To understand the principle of 'g'.
CO-4	Study the general equation of wave motion in general and TM waves in stretched strings and longitudinal waves.
CO-5	Recall the properties and uses of ultrasonic waves.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment.

Text Book:

1. *Mechanics Properties of matter and Sound; Thermal Physics, R.Murugeshan - First Edition (July 2002) – Unit I*
2. *Ancillary Physics - R. Murugeshan, First edition, August 2006 (Units – II, III, IV, V)*

Reference Books:

1. *Mechanics – N.Basu S.Nanda, P.C.Nayak, Copyright1999, Narosa Publication.*
2. *Properties of mater – D. S. Mathur, First Edition (1949), Reprint 2008 – S. Chand & Co.*
3. *Newtonian Mechanics-A.P.French Edition-2003.Publisher-w.w.Norton & company ltd,London,uk.*

DEPARTMENT OF PHYSICS

	PAPER II - HEAT AND THERMODYNAMICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q3APY3**	**3**	**2**	**100**

Objectives

- *To understand the laws of thermodynamics.*
- *To study the phenomenon of entropy.*
- *To analyze the various methods of heat transfer.*
- *To understand the kinetic theory of gases.*

Unit I Thermal Expansion

Expansion of crystals – determination of α by air wedge – expansion of anisotropic solids – solids of low expansivity and their uses – anomalous expansion of water – thermostat-isothermal and adiabatic changes – derivation of equation for both C_v and C_p of a gas – relation between them – experimental determination of C_v by Joly's method – determination of C_p by Regnault's method

Unit II Conduction and Convection

Conduction: Lee's disc method for conductivity of bad conductor (air and cardboard) – analogy between heat flow and electric current – Wiedmann – Franz law

Convection**:** convection in atmosphere – lapse rate – stability of atmosphere – green house effect – atmospheric pollution

Unit III Radiation

Radiation: Stefan's law – determination of Stefan's constant by filament heating method – solar constant measurement – water flow pyroheliometer – temperature of the sun – solar spectrum – energy distribution in black body spectrum – Planck's Law (No derivation). Derivation of Wien's and Rayleigh Jeans laws from Planck's law

Unit IV Kinetic theory of gases

Kinetic theory of gases **-** mean free path –transport phenomena – diffusion, viscosity and thermal conductivity – Maxwell's law of distribution of molecular speed (No derivation) – experimental verification – degree of freedom – Boltzmann's law of equipartition of energy – calculation of "γ" for mono atomic and diatomic gases

Unit V Thermodynamics

Thermodynamics: Carnot's theorem - efficiency – second law of thermodynamics – entropy – changes of entropy in Carnot's cycle – change of entropy in conversion of ice into steam - JK effect – simple theory of porous plug experiment – adiabatic demagnetization – Curie's law – superconductivity

Course Outcomes

On successful completion of the courses the students will be able to

CO NO.	**ALLIED PAPER II HEAT AN D THERMODYNAMICS-Q3APY3**
CO-1	Demonstrate thermal conductivity and concept of specific heat capacity.
CO-2	Understand the concept of thermodynamics and their laws.
CO-3	Understand the law of radiation.
CO-4	Illustrate the Boltzmann law of radiation and emissivity relation.
CO-5	Know the concept of entropy, heat and other important thermodynamics properties for ideal gas.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment

Text Book:

Ancillary Physics - R. Murugeshan, First Edition September (2007).

Reference Books:

Heat and Thermodynamics - Brijlal & N. Subramaniyam – fifteenth Edition (1993) S. Chand & Co

DEPARTMENT OF PHYSICS

	PAPER III - PRACTICAL-I				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q3APYL1**	**2**	**1**	**100**

ANY FIFTEEN EXPERIMENTS

1. Young's modulus – Uniform Bending – Pin and microscopic method
2. Potentiometer – Low range voltmeter calibration
3. Young's modulus – Uniform Bending – optic lever method
4. B.G – Comparison of emf
5. Compound pendulum – 'g' and radius of gyration
6. Estimation of errors
7. Searle's apparatus -q, n, σ
8. Newton's law of cooling
9. Young's modulus – Non Uniform Bending – Optic lever method
10. Torsion pendulum –G and I
11. Young's modulus – Non-Uniform Bending - Pin and microscopic method
12. Potentiometer – Ammeter calibration
13. Potentiometer – Resistivity and resistance
14. Melde's string – Frequency
15. B.G – Comparison of Capacitance
16. Lee's disc – Thermal conductivity of cardboard
17. Sonometer – Laws verification

Course Outcomes

On successful completion of the courses the students will be able to

CO NO.	**ALLIED PRACTICAL I –Q3APYL1**
CO-1	Perform experiments on any material to identify the elastic nature of the given object.
CO-2	Understand the principles of Newton's law of cooling.
CO-3	Calculate the value of 'g' using compound pendulum.
CO-4	Calibrate voltmeter and ammeter using potentiometer
CO-5	Perform the experiments on Melde's string to calculate the frequency of different modes.

POST GRADUATE PROGRAMME IN PHYSICS
M.SC., PHYSICS

Sem	*Subject*	*Subject Code*	*Title of the Paper*	*Hours*		*Credits*	*Marks*			*Page No*
				Teach.	*Exam*		*Int*	*Ext*	*Total*	
I	CORE	P6CPY6	Mathematical Physics-I	6	3	4	25	75	100	17
		P6CPY7	Classical Mechanics	6	3	4	25	75	100	19
		P6CPY8	Applied Electronics	6	3	4	25	75	100	21
			* Practical –I Electronics	4						
			*Practical-II General Experiments	4						
	#SSP	P6SPY3	Communication System	-	3	3	25	75	100	23
	ELECT. I	P6EPY3	Programming in C++	4	3	5	25	75	100	25
		P6EPY2	Numerical Methods							27
II	CORE	Q6CPY8	Mathematical Physics-II	6	3	4	25	75	100	29
		Q6CPY10	Thermodynamics and Statistical Mechanics	6	3	4	25	75	100	31
		Q6CPY9	Electromagnetic theory	6	3	4	25	75	100	34
		Q6CPYL3	Practical –I Electronics	4	4	6	40	60	100	42
		Q6CPYL2	Practical-II – General Experiments	4	4	6	40	60	100	44
	#SSP	Q6SPY4	Bio Medical Instrumentation	-	3	3	25	75	100	36
	ELECT. II	Q6EPY5	Instrumentation	4	3	5	25	75	100	38
		Q6EPY4	Medical Physics							40

***Exams conducted only at even semesters.**

DEPARTMENT OF PHYSICS

	CORE I- MATHEMATICAL PHYSICS I				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P6CPY6**	**6**	**4**	**100**

Objectives

- *To apply vectors to hydrodynamics*
- *To know significant theorems of matrices*
- *To study the special functions*
- *To understand the properties of Fourier and Laplace transforms*

Unit I Vectors:

Gradient – The Divergence and Gauss's Theorem – The curl of a vector field and Stokes theorem – Successive applications of the operator delta – Orthogonal curvilinear coordinates – Application to Hydrodynamics – Equation of heat flow in solids – The Gravitational Potential – Maxwell's Equation – The Wave Equation.

Unit II Matrices:

Vectors as Matrices and Vector Spaces – Solution of linear equations – Linear transformations – Orthogonal and Unitary transformations – Similarity transformations – Eigen values, Eigen vectors; Characteristic equation of a matrix – Caley - Hamilton theorem – Some important theorems of Eigen values and Eigen vectors – Diagnolization of matrices

Unit III Special functions I:

Bessel's differential equation – The Bessel's function of order n of the second kind – Recurrence formulas for $J_n(x)$ - Expression for $J_n(x)$ when n is half an odd integer – Differential equation whose solutions are expressible in terms of Bessel's function – Modified Bessel's function – Bessel's coefficient

Unit IV Special functions II:

Legendre's differential equation – Rodrigues formula for the Legendre's polynomial – Legendre's functions of second kind – The generating function for $P_n(x)$ – The Legendre's coefficients- n th orthogonality $P_n(x)$ – Expansion of an arbitrary function in a series of Legendre's polynomial – Gamma functions – The value of ½ graph of Gamma function -Beta function – The connection of the Beta and Gamma function.

Unit V Fourier and Laplace transforms:

Introduction – Fourier's transform – Properties of Fourier's Transform – Fourier Transform of a Derivative – Fourier sine and cosine Transforms of Derivatives – Laplace Transform – Properties of Laplace Transforms – Laplace Transforms of the Derivative of a Function – Laplace Transform of Integral

Course Outcomes

On successful completion of the course the students will be able to

CO NO.	**CORE PAPER- MATHEMATICAL PHYSICS-I-P6CPY6**
CO-1	Learn about gradient, divergence and curl and their applications in physics.
CO-2	Learn about special type of matrices that are relevant in physics
CO-3	Solve Bessel differential equation
CO-4	Learn to solve Legendre differential equation and get introduced to special functions like Beta function and Gamma function.
CO-5	Interpret the fundamentals and properties of Fourier and Laplace transforms.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Books:

1. Applied Mathematics for Engineers and Physicists - Pipes and Harvill – III Edition

McGraw Hill International Book Company (1970)

Unit I: Chapters 8,9,10,11,12,13,14,15,16,17, Appendix E

Unit III: Chapters 2, 4, 6, 7, 9, 10, 13, Appendix B

Unit IV: Chapters 14,15,16,17,18,19,20,22,24,25,26, Appendix B

2. Mathematical Physics - Satya Prakash, First Edition, Reprint (2005), Sultan chand and sons Educational Publishers, New Delhi

Unit II –Chapter 2 – 2.26 to 2.34

Unit V –Chapter 9 – 9.1 to 9.5, 9.9 to 9.12

Reference Books:

1. *Mathematical Physics – H.K. Dass, Seventh Revised Edition 2014, S. Chand&company*
2. *Mathematical Physics – B.D.Gupta, Third Edition (2004), Vikas Publishing House, PVT Limited*
3. *Matrices and Tensors in Physics – A.W. Joshi, III Edition Reprint 2005, New Age International Publishers*

DEPARTMENT OF PHYSICS

	CORE II – CLASSICAL MECHANICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P6CPY7**	**6**	**4**	**100**

Objectives

- *To understand Lagrangian methods*
- *To learn about the central field motion*
- *To study the Hamiltonian formulations*
- *To analyse the mechanics of small oscillations*

Unit I Lagrangian Methods:

System of Particles – Conservation of energy – Work energy theorem – Conservative forces – Examples – Generalized coordinates – Degrees of freedom under constraints – D'Alamberts principles – Lagrangian function – Lagrange's equation – Application of Lagrange's equation.

Unit II Central field motion:

Reduction to the equivalent one-body problem – The equation of motion and first integrals – The equivalent one-dimensional problem, and classification of orbits – The virial theorem – The differential equation for the orbit, and integrable power-law potentials – Conditions for closed orbits (Betrand's theorem) – The Kepler problem: Inverse square law of force – The motion in time in the Kepler problem – The Laplace-Runge-lenz vector – Scattering in a central force field – Transformation of the scattering problem to laboratory coordinates.

Unit III Hamiltonian methods:

Hamiltonian equations of motion – Cyclic coordinates and Routh's procedure – Physical significance of the Hamiltonian – Hamiltonian's equation from variational principle – The principle of least action.

Canonical Transformations: The equation of canonical transformations – Examples of canonical transformation – Lagrangian brackets – Poisson brackets – Equations of motion in Poisson bracket notation.

Unit IV Small Oscillations:

Formulation of the problem – The Eigen Value equation and the principal axis transformation – Frequencies of free vibration and normal coordinates – Free Vibrations of a linear triatomic molecule.

Unit V Hamilton – Jacobi Theory:

The Hamilton-Jacobi equation for Hamilton's principal function – The Harmonic oscillator problem as an example of the Hamilton-Jacobi method – The Hamilton – Jacobi equation for Hamilton's characteristic function – Separation of variables in the Hamilton – Jacobi equation – Action-angle variables in systems of one degree of freedom – Action-angle variables for completely separable systems – The Kepler problem in action-angle variables.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	CORE PAPER- CLASSICAL MECHANICS- P6CPY7
CO-1	Formulate the mechanics of system of particles at the advanced level and the exposure to Lagrangian equation.
CO-2	Explore the shape of the orbit in Kepler's problem from the inverse square law.
CO-3	Describe the significance of Hamiltonian and Canonical transformations.
CO-4	Understand the small oscillations in detail along with basis of free vibrations.
CO-5	Know the classical background of quantum mechanics and get familiarized with Hamiltonian Jacobi equation.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Books:

1. *Classical Mechanics – Herbert Goldstein Second Edition, (1980), Adison Wesly, World Student Edition.*

   Unit I – Chapter 1 – 1.1, 1.2, 1.3, 1.4, 1.6

   Unit II – Chapter 3 – 3.1 to 3.11

   Unit III – Chapter 8,9 – 8.1, 8.2, 8.3, 8.5, 8.6,9.1, 9.2, 9.4, 9.5

   Unit IV – Chapter 6 – 6.1, 6.2, 6.3, 6.4

   Unit V – Chapter 10 –10.1 to 10.7

Reference Books:

1. *Classical Mechanics – Gupta Kumar Sharma, Edn (2005). Pragati Prakashan, Meerut.*
2. *Classical Mechanics – J.C.Upadhyaya Second Edition(2005),Himalaya Publishing House*
3. *Introduction to Classical Mechanics – R.G. Takwale and P.S.Puranik Edition (2004), Tata McGraw – Hill Publishing Company Limited, New Delhi.*
4. *Classical Mechanics – K.Sankar Rao, Edition (2005) PHI Private Ltd, New Delhi.*

DEPARTMENT OF PHYSICS

	CORE III - APPLIED ELECTRONICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P6CPY8**	**6**	**4**	**100**

Objectives

- *To understand the basis of communication systems*
- *To make awareness on various modulation techniques*
- *To review Boolean laws and theorems*
- *To develop wide knowledge about A/D and D/A converters*

UNIT I Communication systems:

Amplitude modulation theory: Frequency spectrum of AM wave, Representation of Am, Power relations in the AM wave, Generation of AM: Basic Requirements, Grid and Plate Modulated Class C Amplifications – Modulated Transistor Amplifiers, Single-Side band Techniques- Evolution and description of SSB, Suppression of carrier, Suppression of side band – Extensions of SSB.

UNIT II Frequency Modulation:

Description of frequency and phase modulation – Mathematical representation of FM – Frequency spectrum of the FM wave – Phase modulation – Intersystem comparisons – Effects of noise on carrier – Pre emphasis and de-emphasize – Other forms of interference – Comparison of wide band and narrow band FM – Stereophonic FM multiple system.

UNIT III Counters:

Asynchronous counters – Synchronous counters – counter modulus – mod- 3 counter – mod – 6 counters – Decade counter – Shift counter – mod 10 shift counter with decoding – Digital clock.

UNIT IV Logic circuits:

Boolean laws and theorems – Sum of products methods – Truth table to Karnaugh maps-Pairs, Quads and Octets – Karnaugh simplifications – Don't Care Conditions-Product of sums method – Product of sums simplification.

Data Processing Circuits: Multiplexers – Demultiplexers –1-OF-16 Decoder – BCD-TO-DECIMAL Decoders – Seven-Segment Decoders – Encoders.

UNIT V D/A and A/D Conversions:

Variable-Resistor networks – Binary ladders – D/A Converters – D/A Accuracy and resolution – A/D converter – Simultaneous conversion – A/D Converter counter method-Continuous A/D Conversion – A/D Techniques-Dual Slope A/D Conversion – A/D Accuracy and resolution

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	CORE PAPER- APPLIED ELECTRONICS-P6CPY8
CO-1	Understand the frequency spectrum of AM wave band techniques.
CO-2	Know the various modulation techniques.
CO-3	Handle asynchronous counters , synchronous counter and digital clock
CO-4	Know the basic concepts of logic circuits and K map
CO-5	Understand the D/A and A/D conversions

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Books:

1. *Applied Electronics by Davis Kennedy, Fourth edition, Tata MC Graw Hill Ltd.,*

   Unit I – Chapter – 3 & 4

   Unit II-Chapter 5.1 and 5.2

2. *Digital Principles and Application by Malvino Leach, Fifth edition, (2005), TATA Mc Graw Hill.*

   Unit III-Chapter 10 – 10.1, 10.3, 10.4, 10.5, 10.7, 10.8, 10.9,

   Unit IV -Chapter 3, 4.1 to 4.6

   Unit V- Chapter 11

Reference Books:

1. *Digital Electronics – V.K.Puri, Third Edition,Tata MC Graw Hill Publication.*
2. *Applied Electronics by R.S.Sedha, First Edition, (2006), S.Chand Pub. Ltd.*
3. *Basic Electronics B.L.Theraja S.Chand First Multi colour Edition 2005 Reprint 2007.*

DEPARTMENT OF PHYSICS

	SELF STUDY PAPER I COMMUNICATION SYSTEMS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P6SPY3**	**----**	**3**	**100**

Objectives

- *To understand the principles of semiconductor devices*
- *To have a detailed knowledge of the different types of digital circuits*
- *To understand the elements of RADAR and television*
- *To understand the modes of wave propagation*

Unit I Semiconductor Devices

FET as a voltage variable resistor – Common source Amplifier and Common drain Amplifier at high frequencies – Silicon controlled characteristics – SCR Power Control – Tunnel Diode

Unit II Digital Circuits and Devices

Logic Families – combinational Logic – Function of Combinational Logic – Flip Flops and other Multivibrator –**Counters**
Shift Registers: Memories RAM, ROM, PROM, EPROM-Charge coupled Devices (CCD)

Unit III Signal Processing Circuits

Wave form Generators and Wave shaping circuits- Sinusoidal Oscillator Phase shift Oscillator – Wien Bridge Oscillator- Crystal Oscillator Multivibrator, Comparators – Schmitt Trigger – Square wave & Triangular Wave Generators- Pulse Generators -

Unit IV Radar and Television

Elements of a Radar System – Radar Equation – Radar Performance Factors – Radar Transmitting Systems – radar Antennas – Duplexers – radar Receivers and indicators –Black and White TV Transmission and Reception – Color TV transmission and reception.

Unit V Antennas and Wave Propagation

Terms and Definition – Effect of Ground on Antennas – Grounded $\lambda/4$ Antenna – ungrounded $\lambda/2$ Antenna – antenna Arrays – Broad side and End side Arrays – antenna Gain - Directional high frequency antennas – wideband and special purpose antennas – sky wave propagation- ionosphere – Ecles and Larmor Theory – Magneto ionic Theory – Ground wave Propagation.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	SELF STUDY PAPER- COMMUNICATION SYSTEMS-P6SPY3
CO-1	Acquire knowledge on the properties of semiconductor device.
CO-2	Understand the advantages of digital circuits.
CO-3	Know the concept of oscillators.
CO-4	Recall the concepts of radar network.
CO-5	Know the terms and definitions of antennas.

Text Books:

1. Physics of Semiconductor Devices-Wiley Eastern

2. Integrated Electronics-Millman & Halkias-Tata McGraw Hill

3. Microelectronics-Millman & Grabel-McGraw Hill

4. Digital Principles and Applications-Malvino- McGraw Hill

5. Electronic Communication Systems-George Kennedy & Davis -Tata McGraw Hill

6. Electronics & Radio Engineering-F.E.Terman- McGraw Hill

7. Communication Systems-Carlson- McGraw Hill

DEPARTMENT OF PHYSICS

	ELECTIVE PAPER –I(A) PROGRAMING IN C++				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P6EPY3**	**4**	**5**	**100**

Objectives

- *To develop skill for developing the different programs*
- *To appreciate and apply the programming concepts*
- *To know overloading, inheritance concepts*
- *To develop logical thinking*

Unit I: Data types operators, statements and writing C++ Program

Identifiers and keywords – Constants – C++ operators – Type conversion - Declaration of variables – Statements – Simple c++ Programs – Features of iostream.h – Manipulated functions – Input output (I/O) stream flags.

Unit II: Control statements and functions

Conditional Expressions – Switch Statement – Loop statements – Breaking Control `statements – Defining a function – Types of function – Actual and formal arguments – Local and Global variables – Default Arguments – Multifunction Program

Unit III Arrays and Pointers

Array Notation, Declaration, Initialization- Processing with array – Arrays and functions – Multidimensional Arrays – Character Array – Pointer Declaration – Pointer Arithmetic – Pointers and Function – Pointers and Arrays

Unit IV Structures, Unions and Bit Fields:

Classes Declaration, Initialization of structure – Functions and structures – Arrays of structures – Arrays within a structures – Structures with a structure – Pointers and structures – Unions – Bit Fields –Structures and classes – Declaration of class – Member function – Defining the object of a class – Accessing a member of a class – Array of class objects – Pointers and classes – Unions and classes – Classes within classes.

Unit V Inheritance and Overloading:

Single Inheritance – Types of Base Classes – Types of Derivation – Function overloading – Operator overloading.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	ELECTIVE PAPER- PROGRAMMING IN C++-P6EPY3
CO-1	Learn the concepts of data types, operators, statements, declaration of variables and how to write a simple C++ programme.
CO-2	Understand the different types of control statements and functions.
CO-3	Gain the ability to learn the concepts of Arrays, functions, pointer declarations pointers and functions, pointers and Arrays.'
CO-4	Gain knowledge of the structure, unions and bitwise concepts.
CO-5	Gain conceptual understanding of inheritance and overloading.

Pedagogy (Teaching Methods): Chalk and Talk, seminar and PPT.

Text Book:

Programming in C++ - D.Ravichandran, II Edition, TATA MC GRAW Publishing Company.
Unit I - 1.1-1.4, 2.1-2.6
Unit II – 3.1-3.4, 4.2-4.8
Unit III – 5.1-5.7, 6.1-6.4
Unit IV-7.1-7.9, 8.2-8.10
Unit V- 10.2-10.4, 11.1, 11.2

Reference Book:

1. *Programming in C++ - E. Balagurusamy, Fourth Edition Copyright @2008, Tata MC Graw Hill Ltd.*
2. *Fundamentals of data structure in C++ Ellis Horowitz, Sartaj sahni, Dinesh mahta.. Published by Galgotia publication Pvt .Ltd .*
3. *Let Us C++ - Yashavant , P.Kanetkar Published by BPB publication*

DEPARTMENT OF PHYSICS

	ELECTIVE PAPER-I (B) NUMERICAL METHODS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	I	**P6EPY2**	**4**	**5**	**100**

Objectives

- *To recall the curve fitting procedures*
- *To analyse different interpolation techniques*
- *To rejuvenate the concepts of numerical integration and differentiation*
- *To solve partial differential equations*

Unit I: Solution of Algebraic and Transcendental Equations:

The Bisection Method-The Iteration method –The Method of False position –Newton Raphson Method-Generalized Newton's Method – Ramanujan's Method – Muller's Method – Quotient Difference method.

Curve fitting –Least squares curve fitting procedures – Fitting a straight line-nonlinear curve fitting – Curve fitting by sum of exponentials

Unit II: Interpolation

Finite Differences-Forward Differences – Backward differences – Central Differences – Detection of errors by use of difference tables – Differences of a polynomial – Newton's formula for interpolation – Central difference interpolation formula – Gauss's central difference formula – Stirling's formula – Bessel's formula-Everett's formula – Interpolation with unevenly spaced points: Lagrange's interpolation formula – Hermite's interpolation formula – Divided difference and their properties – Newton's General interpolation formula – Interpolation by iteration – Inverse interpolation – Method of successive approximations – Double interpolation.

Unit III: Numerical integration and differentiation:

Numerical differentiation – Errors in numerical differentiation – Numerical integration – Trapezoidal rule – Simpson's 1/3 rule-Simpson's 3/8 rule – Numerical solution of ordinary differential equations: Introduction-solution by Taylor's series – Picard's method of successive approximations – Euler's method – Modified Euler's method – Runge kutta method.

Unit IV: Matrices and linear systems of equations

Introduction – Matrix operations – Transpose of a Matrix – Inverse of a Matrix –Rank of a matrix – Consistency of a linear system of equations – Vector and matrix norms – Solution of linear systems – Direct methods – Matrix inversion method – Gaussaian elimination method –

Modification of the gauss method to compute the inverse – Method of factorization – Solution of linear systems – Iterative methods – The eigen value problem**.**

Unit V: Numerical solution of partial differential equations:

Finite difference approximations to derivatives – Laplace equations – Jacobi's method – Gauss-seidel method – Successive over relaxation.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	**ELECTIVE PAPER- NUMERICAL METHODS- P6EPY2**
CO-1	Learn concepts of solution of algebraic and transcendental equation.
CO-2	Gain knowledge of the interpolation formulas.
CO-3	Explain the numerical integration and differentiation.
CO-4	Learn the Simpson's rule, Taylors series, Picard's methods of successive approximation, Euler's method and Runge Kutta Method
CO-5	Discuss the matrix operations, solution of linear systems iterative methods and solve the Eigen value problems
CO-6	Get the ability to understand the numerical solution of partial differential equations

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Book:

Introductory methods of Numerical methods – S.S.Sastry, Third Edition, Prentice- Hall of India Private Limited, New Delhi.

Unit I: Chapter (2.2 to 2.7, 2.10) Chapter (4.2, 4.2.1 to 4.2.3)

Unit II: Chapter (3.3 – 3.7.4, 3.9 – 3.9.3, 3.11, 3.12, 3.13)

Unit III: Chapter (5.2-5.2.1, 5.4-5.4.3) Chapter (7.2-7.4, 7.4.2, 7.5)

Unit IV: Chapter (6.1-6.3.4, 6.3.7, 6.4, 6.5)

Unit V: Chapter (8.1-8.3.3)

Reference Book:

Numerical methods by Veerarajan Ramachandran, second edition, (2006), TATA MC GRAW HILL Ltd.,

DEPARTMENT OF PHYSICS

	CORE IV- MATHEMATICAL PHYSICS – II				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6CPY8**	**6**	**4**	**100**

Objectives

- *To use the complex variables in solving integrals*
- *To have an introductory idea of tensors*
- *To understand the group theory concepts*
- *To study statistical and probability concepts*

Unit I: Complex Variables:

Introduction – Function of complex variable– Cauchy Riemann equations – Line integral of complex functions– Cauchy integral theorem (simple proof) – Cauchy integral formula – Taylor's and Laurent's series..

Unit II: Residue:

Cauchy Residue theorem – Singular points of an analytic function – The point at infinity – Evaluation of residues – Evaluation of definite integrals – Jordan's lemma.

Unit III: Tensors

Qualitative introduction – Coordinate transformation – Scalars, Contravarient vectors and Covariant vectors – Addition, Multiplication and contraction of Tensors – Associated Tensors – Differentiation of an invariant – Differentiation of Tensors – Intrinsic and covariant derivatives of tensors of higher order – Applications of tensor analysis.

Unit IV: Group theory

Introduction –Definitions of theorems of group theory- defining properties of a group- some examples of groups – Sub groups – Classes – Classes of symmetry operations – Representation of groups – The great Orthogonality theorem and its consequences – Character table – Representation for cyclic groups

Unit V: Probability

The Binomial Distribution – The Poisson distribution – The normal or Gaussian distribution – Distribution of a sum of normal variates – Applications to experimental measurements – The standard deviation of the mean.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	CORE PAPER- MATHEMATICAL PHYSICS-II-Q6CPY8
CO-1	Know the techniques of complex variables and functions together with their derivatives and evaluation of integrals
CO-2	Understand the classifications of singularities, calculus of residues and its applications in the evaluation of integrals
CO-3	Learn about basic Tensor algebra, covariant and contravariant Tensors
CO-4	Familiar with Basics of Group theory, properties, and character table
CO-5	Realize and Apply the Binomial, Poisson and Gaussian probability distributions

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.
Text Books:

1. *Applied mathematics for Engineers and Physicists - Pipes and Harvill, III Edition (1970), Mc Graw Hill International Book Company.*

Unit I – Chapter1 (1 to 8)

Unit II – Chapter 1(9 to 12, 14, 15)

Unit III – Appendix E (19, 21 to 27)

Unit V – Chapter 16(11 to 16)

2. Chemical Application of Group theory - F. Albert Cotton – Third Edition, John wiley and sons Private Limited

Unit IV – Chapter 1, Chapter (2.1 to 2.4,), Chapter (3.13) Chapter (4.1,4.3 to 4.5)

Reference Books:

1. Mathematical Physics – B. D. Gupta, Third Edition (2004), Vikas Publishing House, Private Limited

2. Matrices and Tensors in Physics – A.W. Joshi, III Edition Reprint 2005, New Age International Publishers

3. Group theory and its applications to chemistry by K.V. Raman– Reprint Edition (2005) –TATA MC GRAW HILL limited

DEPARTMENT OF PHYSICS

	CORE V- THERMODYNAMICS AND STATISTICAL MECHANICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6CPY10**	**6**	**4**	**100**

Objectives

- *To study the Law of Thermodynamics*
- *To apply the Laws of Thermodynamics*
- *To understand the Application and concept of Ensembles.*
- *To appreciate the difference of classical and quantum statistics*

Unit I: Thermodynamics:

First law of thermodynamics – The Two specific heats – Second law of thermodynamics and entropy – Latent Heat Equations – Clausius theorem – Entropy; a Point Function – Entropy as a thermodynamic coordinate – T-S indicator diagram – Third law of thermodynamics; Nernst Heat theorem – Calculation of entropy change in different process – Maxwell's Thermodynamical Relations – Thermodynamical potentials – Maxwell's Equation from Thermodynamical potentials – The two Tds equations.

Unit II: Applications of laws of thermodynamics:

Application of Tds equation – Clausius Clapeyron's latent heat equation – The Triple point; Thomson's Theorem – Perfect gas equation – Joule-Thomson's theorem –The energy equation – Ratio of two Specific heats – Adiabatic stretching of a wire – Application to Paramagnetic salts; Magneto-Caloric effect – Application to surface Films –Application to Chemical Thermodynamics.

Unit III: Statistical mechanics:

Phase Spaces – concept of ensembles – Canonical ensemble – Thermodynamical relations in canonical ensemble –Micro canonical – Grand Canonical ensembles.

Properties of Gases:

Partition function for the system and for the particles – Translational Partition function – Gibb's paradox – Boltzmann equipartion theorem – Maxwell distribution of velocities.

Unit IV Bose-Einstein and Fermi - Dirac Statistics:

Symmetric and Antisymmetric wave functions – Bose-Einstein and Fermi-Dirac distribution – Weak and strong degeneracy of Perfect gas – Bose-Einstein condensation – Blackbody radiation: Photons.

Unit V: Applications of Statistics:

Introduction – Specific Heat of Solids – Dulong and Petit's Law – Deduction of Dulong and Petit's law from Classical statistics –Temperature Variation of specific heat – Einstein's theory of specific heat of solids – Debye's theory of specific heat solved examples – Specific heat of gases – Temperature variation of specific heat of Diatomic Gases – Quantization of various contributions to energy of a Diatomic molecule – Specific heat of diatomic gases.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	**CORE PAPER-THERMODYNAMICS AND STATISTICAL MECHANICS-Q6CPY10**
CO-1	Realize the importance of thermo dynamical functions and applications of Maxwell's relation.
CO-2	Apply the law of thermodynamics to paramagnetic salt, surface films and chemical potentials.
CO-3	Grasp the basis of ensemble approach in statistical mechanics.
CO-4	Familiarize in depth about statistical distribution and have basic ideas, Bose-Einstein and Fermi Dirac statistics and their applications.
CO-5	Understand the Einstein and Debye's theory of specific heat.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Books:

1. Thermodynamics and Statistical Physics – Sharma and Sarkar Edition (2005) Himalaya publishing house.

Unit I – Chapter2, 5,6 – 2.7,2.9,5.10 to 5.14,5.20,5.21,6.1 to 6.4

Unit II - Chapter 6 – 6.5 to 6.16

Unit V – Chapter 14 – 14.1 to 14.10

2. Statistical Mechanics and properties of matter – E. S. R. Gopal (No Edition)

Unit III – Chapter 1, 2 (Relevant Sections), Unit IV – Chapter3

Reference Books:

1. Thermodynamics – P.C.Rakshit, Fourth Edition (1983), The New Book Stall,

2. Statistical Thermodynamics – MC Gupta, First Reprint Wiley Eastern Limited.

3. Statistical Mechanics – Gupta and Kumar, First Edition (1972), Pragati Prakashan, Meerut

DEPARTMENT OF PHYSICS

	CORE VI - ELECTROMAGNETIC THEORY				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6CPY9**	**6**	**4**	**100**

Objectives

- *To understand the concepts of electrostatic fields*
- *To review the Maxwell's equations*
- *To analyse electromagnetic wave propagation*
- *To induce the knowledge about wave guides*

Unit I Electrostatic Field I:

The Equations of Poisson and of Laplace – Conductors – Calculation of the Electric Field Produced by a simple charge distribution – The electric dipole – The linear electric quadrupole – Electric multipoles.

The Electric Polarization – Electric Field at Exterior point – Electric Field at an Interior point – The local field – The Electric susceptibility – The Divergence of E. The Electric Displacement D – Calculation of Electric Fields Involving Dielectrics – The Claussius Mossotti Equation.

Unit II Electrostatic Field II:

Continuity of V, D, E at the interface between two different media – The Uniqueness theorem

The Vector potential – The scalar potential – Magnetic forces – The magnetic induction B. The Biot – Savart law – The divergence of the magnetic induction B – the vector potential – The curl of the magnetic induction B – Ampere's Circuital law.

Unit III Magnetic Fields:

The Faraday induction law – The induced electric field intensity E in terms of the vector potential A – Induced electromotance in a moving system

The conservation of electric charge – The potential V and A – The lorentz condition – The divergence of E and the non homogeneous wave equation for V – The non homogeneous wave equation for A – The curl of B – Maxwell's equations.

Unit IV Propogation of em waves:

Plane electromagnetic waves in free space – The E and H vectors in homogeneous, isotropic, linear and stationary media – Propagation of plane electromagnetic waves in non-conductors – Propagation of plane electromagnetic waves in Conducting Media – Propagation of plane electromagnetic waves in good conductors.

Unit V Guided electromagnetic waves:

Propagation in Straight Line – The Coaxial Line – The Hollow Rectangular Wave Guide – Electric Dipole Radiation.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	CORE PAPER-ELECTROMAGNETIC THEORY-Q6CPY9
CO-1	Identify the problems by application of Poisson's and Laplace's equations.
CO-2	Learn about the Biot-Savart law and to use it to calculate the magnetic field
CO-3	Apply the Maxwell equation to solve problems
CO-4	Acquire the knowledge of propagation of electromagnetic waves in different media
CO-5	Analyze the nature of electromagnetic wave propagation in guided medium.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Book:

Electromagnetic fields and waves – Paul Lorrain & Dale R. Corson – CBs Publ., New Delhi (1986) – Second Edition.

Unit I - Chapter 2.6 to 2.11, 3.1 to 3.8

Unit II – Chapter 4.1, 4.2, 6.4, 6.5, 7.1 to 7.7

Unit III - Chapter 8.1 to 8.3, 10.1 to 10.7

Unit IV – Chapter 11.1 to 11.5

Unit V – Chapter 13.1 to 13.3, 14.1

Reference Book:

1. *Fundamentals of electromagnetic theory by John R.Reitz,Federih . J Wilford &Robert W. Christry,III Edition, Narosa Publication house, New Delhi.*
2. *Electromagnetic waves and radiating system – Edward C.Jordon, Keith G.Balmain.Published by Pearson education (1968).*

Electromagnetic fields and waves – K.D.Prasad.Sisth edition (2005), Published by SMT.Sumitra Handa.

DEPARTMENT OF PHYSICS

	SELF STUDY PAPER - II BIOMEDICAL INSTRUMENTATION				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6SPY4**	**------**	**3**	**100**

Objectives

- *To understand human physiological system.*
- *To gain knowledge about electrodes and transducers.*
- *To understand advances* in biomedical instrumentation.

UNIT I HUMAN PHYSIOLOGICAL SYSTEMS

Introduction – cells and their structure – nature of cancer cells – transport of ions through the cell membrane – resting and action potentials – bio-electric potentials – nerve tissues and organs – different systems of human body.

UNIT II BIOPOTENTIAL ELECTRODES AND TRANSDUCERS

Design of medical instruments – components of the Bio-medical instrument system – electrodes – transducers – active transducers – passive transducers – photoelectric type – thermistor – capacitive transducers.

UNIT III PHYSIOLOGICAL ASSIST DEVICES

Pacemakers – pacemaker batteries – artificial heart valves – defibrillators – heart-lung machine – kidney machine.

UNIT IV SAFETY INSTRUMENTATION

Radiation safety instrumentation – physiological effects – micro and macro shock – electrical accidents in hospitals – devices to protect electrical hazards – hospital architecture.

UNIT V ADVANCES IN BIOMEDICAL INSTRUMENTATION

Computers in medicine – laser instrumentation – computer tomography – positron emission tomography (PET) – biomaterials – material response.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	SELF STUDY PAPER- BIO MEDICAL INSTRUMENTATION- Q6SPY4
CO-1	Study the nature of cells and their structure.
CO-2	Understand the techniques of medical and bio medical instrumentation.
CO-3	Gain of knowledge of heart, lung and kidney machine.
CO-4	Explain the radiation safely instrumentation.
CO-5	Illustrate the advanced laser instrumentation.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Book:

Biomedical instrumentation - Dr. M. Arumugam, second edition (2002).

UNIT I : Chapter 1.1-1.8

UNIT II : Chapter 2.2, 2.3, 2.4 (2.4.1-2.4.7), 2.5(2.5.1-2.5.6), (2.5.10, 2.5.11, 2.5.13)

UNIT III : Chapter 5.2 (5.2.1-5.2.3(ii & iii)), 5.3 (i, ii), 5.4, 5.5, 5.7(5.7.1, 5.7.2), 5.8.

UNIT IV : Chapter 9.1-9.7

UNIT V : Chapter 10.2, 10.3, 10.7, 10.11, 10.14

DEPARTMENT OF PHYSICS

	ELECTIVE PAPER – II (A) INSTRUMENTATION				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6EPY5**	**4**	**5**	**100**

Objectives

- *To know the principles of measuring instruments.*
- *To understand the display devices and systems.*
- *To gain knowledge about digital instruments.*
- *To study the working of the signal generators*

Unit I. Measurements:

Introduction – Performance characteristics – Static characteristics – Error in measurement - Types of error – Sources of error – Dynamic characteristics – Statistical analysis.

Unit II: Basic measuring instruments:

D.C Ammeter – multi range ammeters – The Aryton shunt or universal shunt – requirements of a shunt – Extending ammeter range – Basic meter as a DC voltmeter – DC voltmeter – Multi range voltmeters – Extending voltmeter range – Loading – AC voltmeter using rectifiers – Consideration in using analog voltmeter – Ohmmeter – Transistor tester.

Unit III: Digital instruments:

Introduction – Ramp technique – Dual slope integrating type DVM – integrating type DVM – Most commonly used principles of ADC – 3(1/2) digits – Resolution and sensitivity of digital meters – Digital multi meters – Digital frequency meter –Time base selector – Measurement of time – Capacitance meter.

Unit IV: Display devices & systems:

Digital display system & indicators – Classification of displays – Display devices – LED – LCD – Segmental display using LED's – Printer's – classification of printers – Printer character set – Drum wheel – Line printers – Drum printer – Dot matrix printer – Dual beam CRO – Dual trace oscilloscope – Applications of oscilloscope.

Unit V: Signal generators:

Introduction – Fixed frequency AF oscillator – Variable AF oscillator – Standard signal generator – AF sine & square wave generator – Function generator – square wave & pulse generator. Objective of a DAS – Signal conditioning of inputs – single channel DAS – Multi channel DAS – Computer based DAS – Data loggers – Data transmission systems – Advantages & disadvantages of digital transmission over analog – Full binary transmission – Modems.

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	ELECTIVE PAPER-INSTRUMENTATION-Q6EPY5
CO-1	Gain knowledge about the sources of errors in measurements.
CO-2	Realize the applications of electronic measurements
CO-3	Understand the working principles of different electronic instruments like DVM, DFM
CO-4	Know the functions of cathode ray oscilloscope and its applications
CO-5	Recall the working of generators.

Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT.

Text Book:

Electronic Instrumentation – H.S. Kalsi, II Edition Tata McGraw-Hill Publishing Company Limited

Unit I – Chapter 1.1 to 1.8

Unit II – Chapter 3.1 to 3.5, Chapter 4.1 to 4.6, 4.12, 4.20, 4.21, 10.11

Unit III - Chapter 5.1 to 5.5, 5.8, 5.9, Chapter 6.2 to 6.4, 6.13

Unit IV – Chapter2.7 to 2.19, Chapter 7.15, 7.30

Unit V – Chapter 8.1 to 8.5, 8.7 to 8.9 Chapters 17.2 to 17.6, 17.8

Chapter 18.2, 18.3, 18.7.1, 18.8

Reference Book

1. Modern Electronic Instrumentation and Measurement Techniques by Albert D.Helfrick &William D.Cooper, Ninth printing.

2. Introductory electronic devices and circuits Robert T.Paynter published by Dorling Kindersley (India) pvt.Ltd.Seventh edition 2013

3. Measurement and Instrumentation theory and application- Alan S.Morris,Reza Langavi published by Elsevier,a division of Read, Elsevier India private limited.

DEPARTMENT OF PHYSICS

	ELECTIVE PAPER II (B) MEDICAL PHYSICS				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6EPY4**	**4**	**5**	**100**

Objectives

To be able to

- use Physics of sound and Light in Medicine
- know the physics of diagnostic X-rays
- understand the concepts of Radio isotopes and Radio therapy
- review the concepts of Medical Physics

Unit I Sound in Medicine:

General Properties of Sound –The body as a Drum (Percussion in medicine), The Stethoscope, Ultrasound Pictures of the body, ultrasound to measure motion, Physiological effects of ultrasound in therapy, the production of speech. Physics of the ear and Hearing – The Outer ear, the middle ear, the inner ear, Sensitivity of the ears, Testing your hearing, Deafness and hearing aids

Unit II Light in Medicine:

Measurement of Light and its units, Applications of visible light in Medicine, Applications of ultraviolet and infrared light in medicine, Lasers in medicine, Applications of Microscopes in Medicine. Physics of Eye and vision: Focusing Elements of the eye, some other elements of the eye, the retina-The light detector of the eye, How sharp are your eyes? Optical illusions and related phenomena, defective vision and its correction, color vision and chromatic aberration, Instruments used in ophthalmology.

Unit III Physics of diagnostic X rays:

Production of X-ray beams, How X-ray is absorbed? Making an X-ray image, Radiation to patients from X-rays, Producing live X-ray images-Fluoroscopy, X-ray slices of the body, Radiographs taken without film.

Unit IV Physics of Nuclear Medicine (Radio isotopes in Medicine):

Review of basic characteristics and units of radioactivity, sources of radioactivity for nuclear medicine. Statistical aspects of Nuclear medicine, Basic instrumentation and its clinical applications, Nuclear medicine imaging devices, Physical Principles of nuclear medicine imaging procedures, Therapy with radioactivity, Radiation doses in nuclear medicine.

Unit V Physics of Radiation Therapy:

The dose units used in radiotherapy-the Red and the Gray, Principlesof radiation therapy, A short courses in radiotherapy treatment planning, Mega voltage therapy, Short distance radiotherapy or Branchy therapy, Other radiation sources, closing thought on Radiotherapy.

Course Outcome:

On the completion of the course the students will be able to

CO NO.	**ELECTIVE PAPER- MEDICAL PHYSICS- Q6EPY4**
CO-1	Understand the normal structure and function of the body and its major organ system.
CO-2	Know the applications of light and laser in medical field.
CO-3	Know the biological effects of radiation and safety rules.
CO-4	Know the procedures associated with the clinical track
CO-5	Retrieve, manage and utilize information for solving problems.

***Pedagogy (Teaching Methods): Chalk and Talk, Assignment, seminar and PPT*.**

Text Book:

Medical Physics by John R. Cameroon and James G. Skofronick, John Wiley& Sons, New York (1978).

DEPARTMENT OF PHYSICS

	CORE VII – ELECTRONICS - PRACTICAL - I				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6CPYL3**	**4**	**6**	**100**

(Any twelve)

1. Construction of dual power supply using IC 7812 and IC 7912 &
   OP-AMP I - Adder, Subtractor
2. OP-AMP II- Inverter, Non-Inverter, Differentiator, Integrator.
3. 4-bit up and down counter
4. Active Filters using IC 741
5. FET Characteristics
6. FET Amplifier
7. Karnaugh map reduction and logic circuit implementation
8. Astable operation – 555 Timer
9. Astable and Bistable Multivibrator - Transistor
10. Half Subtractor and Full Subtractor
11. Relaxation Oscillator – UJT
12. Wien bridge oscillator – Transistor
13. Colpitt's Oscillator – Transistor
14. Hartley's Oscillator – Transistor
15. Miller integrator
16. Solving Simultaneous Equations
17. Four bit binary Adder and Subtractor
18. Schmitt trigger – Transistor
19. Digital to Analog Converter
20. Multiplexer - 8 to 1.

Course Outcomes:

On sucessful completion of the course the students will be able to

CO NO.	MAJOR PRACTICALS-I ELECTRONICS-Q6CPYL3
CO-1	Understand the working of Op-amp as Hartley oscillator, digital to analog converter, analog to digital converter and by solving simultaneous equations.
CO-2	Summarize the characteristics of LED, LDR, photodiode and photo transistors.
CO-3	Compare the low pass, high pass and band pass filters.
CO-4	Design and perform transistor based circuits like Schmitt trigger, Hartley oscillator and Wien's bridge oscillator
CO-5	Simplify and summarize the given logical function using Karnaugh map technique.
CO-6	Study astable multivibrator using IC 555 and use the same as LED flasher.
CO-7	Study the behavior of unijunction transistor as relaxation oscillator.
CO-8	Compare the working of multiplexer and demultiplexer.
CO-9	Perform simple circuits using 'digital works' software.

DEPARTMENT OF PHYSICS

	CORE VIII - GENERAL EXPERIMENTS - PRACTICAL - II				
	SEMESTER	**CODE**	**HOURS**	**CREDIT**	**MARKS**
	II	**Q6CPYL2**	**4**	**6**	**100**

(Any twelve)

1. Cauchy's constant
2. Hyperbolic fringes
3. Maxwell's Bridge
4. Owens's Bridge
5. Wien's Bridge Network
6. Resolving power of a prism
7. Numerical Method– I (Simpson's 1/3 rule & Trapezoidal rule)
8. Numerical Method – II (Bisection and Newton Raphson method)
9. Numerical Method – III (Runge Kutta Method)
10. Elliptical Fringes
11. Refractive index of liquids using Hollow Prism
12. Optic Bench Biprism Experiments
13. Anderson Bridge
14. Refractive Index of Liquids using Laser

Course Outcomes:

On successful completion of the course the students will be able to

CO NO.	MAJOR PRACTICALS-II GENERAL EXPERIMENTS- Q6CPYL2
CO-1	Diagnose the Cauchy's constant of a given prism for different pairs of spectral color using spectrometer.
CO-2	Analyze the hyperbolic and elliptical fringes which could provide information about Young's modulus and Poisson's ratio of the given beam.
CO-3	Construct the Maxwell's bridge circuit and measure the self inductance, mutual inductance and coefficient of coupling of the coil.
CO-4	Understand the concept of Owens's Bridge and can measure the self inductance, mutual inductance and coefficient of coupling of the coil.
CO-5	Determine the unknown capacitance value using Wien's bridge method.
CO-6	Analyze the refractive index of different liquids using hallow prism.
CO-7	Write the numerical method program in C++ language.
CO-8	Analyze the refractive index of liquid using laser diffraction method.
CO-9	Construct the Anderson's bridge and measure the self inductance, mutual inductance and coefficient of coupling of the coil.