PG & RESEARCH
DEPARTMENT OF PHYSICS

B.Sc. PHYSICS SYLLABUS

(For the Candidates to be admitted from the academic year 2019-2020 onwards)

POOMPUHAR COLLEGE (AUTONOMOUS)

(of the Tamil Nadu H.R.& C.E Admn. Dept) (Accredited B+ By NAAC)

MELAIYUR - 609 107

PG & RESEARCH DEPARTMENT OF PHYSICS

POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR
COURSE STRUCTURE FOR UG COURSE UNDER CBSE
(Applicable to the candidates admitted from the academic year 2019 - 2020 onwards)

SEME	PART	SUBJECT	TITLE	HRS	CRED	EXA	MARKS
I	I	Tamil -1		6	3	3	100
	II	English -1		6	3	3	100
	III	First Allied – I		5	3	3	100
		First Allied – II		3	*	*	*
		Core Course -1	**PROPERTIES OF MATTER AND COUSTICS**	5	5	3	100
		Core Course – II	**MAJOR PRACTICAL – I**	3	*	*	*
	IV	Value Education	**VALUE EDUCATION**	2	2	3	100
Total					**16**	**30**	**500**
II	I	Tamil – II		6	3	3	100
	II	English – II		6	3	3	100
	III	First Allied – II		3	4	3	100
		First Allied – III		5	3	3	100
		Core Course – II	**MAJOR PRACTICAL – I**	3	5	3	100
		Core Course – III	**MECHANICS**	5	5	3	100
	IV	Environmental Studies	**ENVIRONMENTAL STUDIES**	2	2	3	100
Total					**25**	**30**	**700**
III	I	Tamil – III		6	3	3	100
	II	English – III		6	3	3	100
	III	Second Allied -1		5	3	3	100
		Second Allied – II		3	*	*	*
		Core Course – IV	**HEAT, THERMODYNAMICS AND STATISTICAL MECHANICS**	5	5	3	100
		Core Course – V	**MAJOR PRACTICAL – II**	3	*	*	*
	IV	Non Major	**ENERGY PHYSICS (for other dept.)**	2	2	3	100
Total					16	30	500
IV	I	Tamil – IV		6	3	3	100
	II	English – IV		6	3	3	100
	III	Second Allied – II		2	4	3	100
		Second Allied – III		5	3	3	100
		Core Course – V	**MAJOR PRACTICAL – II**	2	5	3	100
		Core Course – VI	**OPTICS AND SPECTROSCOPY**	5	5	3	100
	IV	Non Major Elective – II	**LASER PHYSICS (for other dept.)**	2	2	3	100
		Skill Based Elective – I	**ELECTRICAL INSTRUMENTS AND MEASUREMENTS**	2	2	3	100
Total					**27**	**30**	**800**

SEMESTER	PART	SUBJECT	TITLE	HRS	CRED	EXAM	MARKS
V	III	Core Course - VII	**ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM**	5	5	3	100
		Core Course - VIII	**THEORITICAL PHYSICS**	5	5	3	100
		Core Course - IX	**ANALOG ELECTRONICS**	5	5	3	100
		Core Course - X	**MAJOR PRACTICAL – III**	3	*	*	*
		Core Course - XI	**MAJOR PRACTICAL – IV**	3	*	*	*
		Major Based Elective-I	**MICROPROCESSOR AND C PROGRAMMING**	5	4	3	100
	IV	Skill Based Elective –	**ELECTRIC MACHINES**	2	2	3	100
		Skill Based Elective-III	**ELECTRIAL WIRING**	2	2	3	100
Total				**30**	**23**		**600**
VI	III	Core Course - X	**MAJOR PRACTICAL – III**	3	5	3	100
		Core Course - XI	**MAJOR PRACTICAL – IV**	3	5	3	100
		Core Course - XII	**ATOMIC AND NUCLEAR PHYSICS**	6	5	3	100
		Core Course - XIII	**DIGITAL ELECTRONICS**	5	5	3	100
		Major Based	**MATERIALS SCIENCE**	5	4	3	100
		Major Based Elective – III	**OPTO ELECTRONICS AND FIBER OPTIC**	5	5	3	100
	IV	Soft Skills	**SOFT SKILLS DEVELOPMENT**	2	2	3	100
		Gender Studies	**GENDER STUDIES**	1	1	3	100
	V	Extension Activities	**EXTENSION ACTIVITIES**	-	1	-	-
Total				**30**	**33**		**800**
Grand Total				**180**	**140**		**3900**

Note: * Examination at the end of the even semester

List of Allied Courses

1. **Allied Course I - Mathematics**
2. **Allied Course II - Chemistry**

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks] The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks] The passing minimum for University Examinations **shall be 40% out of 60 marks** [i.e. 24 marks]

POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR

COURSE STRUCTURE FOR ALL UG DEGREE COURSES

(Applicable to the candidates admitted from the academic year 2019 - 2020 onwards)

PART	NAME OF THE PAPERS	NUMBER OF PAPERS	CREDITS
I	TAMIL	04	12
II	ENGLISH	04	12
III	CORE (INCLUDING OPTIONAL)	16	78
	FIRST ALLIED	03	10
	SECOND ALLIED	03	10
IV	NON-MAJOR ELECTIVE	02	04
	SKILLBASED ELECTIVE	03	06
	VALUE EDUCATION	01	02
	ENVIRONMENTAL STUDIES	01	02
	SOFT SKILLS DEVELOPMENT	01	02
	GENDER STUDIES	01	02
V	EXTENSION ACTIVITIES	--	01
TOTAL		39	140

Question Paper Pattern (for Part I, II, III)

Part A

Ten questions — 10 x 2 = 20 marks

(Two questions from each unit - No choice)

PartB

Five questions (either or type) — 5 x 5 = 25 marks

(One question from each unit)

Part C

Three questions out of five — 3 x 10 = 30 marks

(One question from each unit)

Total — **75 marks**

Question Paper Pattern (for Part IV only)

Part A

Three questions (either or type) — 3 x 10 = 30 marks

(One question from each unit)

PartB

Three questions out of five — 3 x 15 = 45 marks

(Atleast one question from each unit,

Not more than two questions from each unit,

No unit shall be omitted)

Total — **75 marks**

PG & Research Department of Physics

Learning Objectives, Course Outcome and Course Outcome Mapping are included in every subjects of PG and UG Physics syllabus.

- ✓ Learning Objective for units of Subject covers from LO1 to LO5.
- ✓ Course Outcome for units of Subject takes CO1 to CO5
- ✓ Course Outcome Mapping for each subject gives correlation between Programme Outcome versus Course Outcome.

Programme Outcomes (POs)

- **PO1: Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
- **PO2** - Analytical and Technical Skills: Ability to handle/use appropriate tools/techniques.
- **PO3** – Critical thinking and Problem Solving: Critically analyse problems and to arrive viable conclusions
- **PO4** – Environment and Society: Analyze the impact of scientific advances on the environment and society.
- **PO5** –Lifelong learning: Ability to engage in lifelong learning in the discipline.

Programme Specified Outcomes:

- **PSO1:** Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of Physics and its allied disciplines.
- **PSO2:** Understand, formulate, and develop physics concepts for applications to address issues arising in social sciences, business and other context /fields.
- **PSO3:** Students will show that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusions.
- **PSO4:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making, technical skill and leadership skill that will facilitate to establish high potential organizations.
- **PSO5:** Enabling students to develop a positive attitude towards Physics as an interesting and valuable subject of study.

HOD **PRINCIPAL**

CORE COURSE I

Code : **Class : I - B.Sc.,Physics**

PROPERTIES OF MATTER AND ACOUSTICS

Learning Objectives:

LO 1	To expound the fundamentals of elastic properties of solids.
LO 2	To understand the bending of beams
LO 3	To explain the fundamentals of surface tension
LO 4	To acquire knowledge on viscosity
LO 5	To understand the ultrasonic generation method and acoustics of buildings.

UNIT I Elasticity

Stress – Strain – Types of strain - Hookes law - Different moduli of elasticity – Poisson's ratio - Work done in a strain – stress – strain diagram - Relation between elastic Constants - Expression for Poisson's ratio in terms of elastic constants – Torsion of a body – Torsion of a cylinder - Work done in twisting a wire -Torsional pendulum -determination of rigidity - modulus of a wire and moment of inertia of a disc.

UNIT II Bending of Beams

Bending of beams - Expression for bending moment - Cantilever - Expression for depression of the loaded end of a cantilever — Young's modulus by measuring the depression in a loaded cantilever - Oscillation of a cantilever - Non-uniform bending - Expression for depression- Uniform bending - Expression for elevation -Experimental determination of Young's modulus using pin and microscope (Non-uniform bending - Uniform bending) - Determination of Young's modulus by Koenig's method.

UNIT III Surface Tension

Definition - Molecular forces - Explanation of surface tension on kinetic theory - Surface energy - Work done on increasing the area of a surface - Angle of contact - Excess pressure inside a liquid drop and soap bubble - Excess pressure inside a curved liquid surface – Force between two plates separated by a thin layer of a liquid – Experimental determination of surface tension - Jaeger's method - Drop weight method - Variation of surface tension with temperature.

UNIT IV Viscosity

Newton's law of viscous flow - streamlined and turbulent motion - Reynold's number - Poiseuille's formula for the flow of a liquid through a horizontal capillary tube - Experimental determination of co-efficient of a liquid by Poiseuille's method - Ostwald's viscometer - Terminal velocity and Stokes' formula - Viscosity of gases - Meyer's formula - Rankine's method - Variation of viscosity with temperature and pressure - Lubrication.

UNIT V Acoustics & Ultrasonics

Musical Sound and Noise pollution - Speech - Characteristics of Musical sound - *q*uality of tone, consonance and dissonance – musical scale – tempered scale - Intensity of sound - Measurement of intensity of sound : Bel, Decibel and Phon - Reverberation- Reverberation time - Sabine's Reverberation formula - Factors Affecting the Acoustics of Buildings - Sound distribution in an Auditorium - Requisites for good acoustics - Ultrasonics – Production – Magnetostriction method - detection – Properties and applications of Ultrasonic waves - Acoustic Grating.

Course Outcome

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

CO 1	expound the fundamentals of elastic properties of solids.
CO 2	understand the bending of beams
CO 3	explain the fundamentals of surface tension
CO 4	acquire knowledge on viscosity
CO 5	understand the ultrasonic generation method and acoustics of buildings.

Books for Study:

1. R. Murugeshan, *Properties of matter,* S. Chand & Co. Pvt. Ltd., Revised edition, 2012.
2. D.S. Mathur, *Elements of Properties of matter,* S. Chand & Co. Pvt.Ltd., Revised edition, 2010
3. Brijlal & N. Subramanyam, *Properties of matter,* Vikas Publishng. Pvt. Ltd, 2005.
4. Brijlal 8& N. Subramanyam, *'A Text Book of Sound',* Vikas Publishing. Pvt. Ltd, 2008.

Books for Reference:

1. Feynman, *Lectures on Physics.* Vol. I *&* II by Richard P. Feynman, The New Millennium Edition, 2012.
2. David Halliday and Robert Resnick, *Fundamentals of Physics* by Wiley Plus., 2013.
3. B.H. Flowers and E. Mendoza, *Properties of matter,* Wiley Plus, 1991.
4. H.R. GulatL *Fundamentals of General properties of matter,* S. Chand *8a* Co. Pvt. Ltd, 2012.
5. Chatterjee and Sen Gupta, *A treatise on general properties of matter,* New central Books agency (p) Ltd, Kolkata, 2001.
6. R.L. Saihgal, *A Text Book of Sound,* S. Chand & Co. Pvt. Ltd, New Delhi, 1979.

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	3	3	2	3
CO3	2	3	3	2	3
CO4	2	2	2	2	3
CO5	2	2	2	3	2

CORE COURSE II

Code : **Class : I - B.Sc.,Physics**

MAJOR PRACTICAL - I

(Any Twelve Experiments)

Learning Objectives:

LO 1	To understand the concept of physical quantities.
LO 2	To acquire experimental skill to measure physical quantities using measuring instruments.
LO 3	To know the problem solving.
LO 4	To understand concepts related with Optic experiments.
LO 5	To understand concepts related with diode and logic experiments.

1. Non uniform bending - Pin & Microscope
2. Uniform bending – Single optic lever
3. Surface Tension - Capillary rise method
4. Melde's experiment -T & L Mode
5. Compound pendulum - g & k
6. Stoke's method - Viscosity of highly viscous liquid.
7. Coefficient of viscosity of liquid—Poiseuille's flow method
8. Comparison of viscosity of two liquids – Hare's apparatus
9. Potentiometer -Calibration of low range Voltmeter
10. Spectrometer - μ of a solid prism
11. P.O box –Temperature coefficient of a coil
12. Meter bridge - Specific resistance
13. Carey Foster's Bridge –Specific resistance
14. Surface Tension and interfacial Surface Tension – Drop weight method.

Course Outcome

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

CO 1	use basic measuring instruments such as vernier caliper, screw gauge, travelling microscope.
CO 2	perform lab experiments to find various physical quantities involved in elasticity, viscosity, surface tension.
CO 3	perform lab experiments to find various physical quantities involved in electricity and optics.
CO 4	perform lab experiments to find various physical quantities involved in

	spectrometer, Potentiometer.
CO 5	study characteristic of diode and logic gates

Books for Study:

1. Dr. S. Somasundaram, *"Practical Physics,* Apsara publications, Tiruchirapalli, 2012.
2. Department of Physics, *Practical Physics,* (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli 1998.

Books for Reference:

1. S. Srinivasan, *A Text Book of Practical physics,* S. Sultan Chand publications. 2005
2. R. Sasikumar, *Practical Physics,* PHI Learning Pvt. Ltd, New Delhi, 2011.

Course Outcome Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	2	2
CO2	2	3	3	2	2
CO3	2	2	3	2	2
CO4	2	2	2	2	2
CO5	2	3	3	2	2

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CORE COURSE III

Code : **Class : I - B.Sc.,Physics**

MECHANICS

Learning Objectives:

LO 1	To expose students to the basics of projectile motion, Impulse and impact
LO 2	To get the knowledge of motion on a plane curve
LO 3	To understand the laws of gravitation, gravitational field and potential.
LO 4	To acquire adequate knowledge on dynamics of rigid body and friction
LO 5	To know fundamentals on centre of gravity centre of pressure

UNIT I Projectile, Impulse and Impact

Projectile - particle projected in any direction - Path of a projectile is a parabola - Range of a projectile on plane inclined to the horizontal -Maximum range on the inclined plane - Impulse of a force - Laws of impact - Direct impact between two smooth spheres - oblique impact between two smooth spheres - Impact of a smooth sphere on a smooth fixed horizontal plane - Loss of KE due to direct impact - Oblique impact.

UNIT II Motion on a plane curve

Centripetal and centrifugal forces – Hodograph – Expression for normal acceleration – The critical parameters – Governers of steam engine -- Motion of a cyclist along a curved path – Motion of a railway carriage round a curved track - upsetting of a carriage - Motion of a carriage on a banked up curve - relative equilibrium of a particle inside a smooth rotating sphere - Effect of earth's rotation on the value of the acceleration due to gravity - Variation of 'g' with, altitude, latitude and depth.

UNIT III Gravitation

Newton's law of gravitation - Mass and density of earth - Inertial and Gravitation mass - Determination of G-Boy's experiment -Kepler's Laws of planetary motion -Deduction of Newton's law of gravitation from Kepler's Law - Gravitation - Field - potential -Intensity of Gravitational field -gravitational potential due to a point mass - Equipotential surface -Gravitational potential and field due to a spherical shell and solid sphere -Escape velocity-Orbital velocity.

UNIT IV Dynamics of rigid body and Friction

Moment of Inertia - Kinetic energy and angular momentum of rotating body - Theorems of perpendicular and parallel axes - Acceleration of a body rolling down an inclined plane without slipping - Oscillations of a small sphere on a large concave smooth surface - Compound pendulum - Centre of suspension and centre of oscillation - Centre of percussion - Minimum period of a compound pendulum - Kater's pendulum.

Friction: Laws of friction - Resultant reaction - Angle, and cone of friction - Equilibrium of a body on a rough plane inclined to the horizontal - The friction dynamometer - The friction clutch.

UNIT V Centre of gravity, Centre of Pressure and Floating bodies

Centre of gravity of a body - Centre of gravity of a trapezoidal lamina - C.G. of a solid hemisphere - C.G. of a solid tetrahedron - C.G. of a solid cone - Centre of pressure - rectangular lamina - triangular lamina - triangular lamina immersed in a liquid - Conditions of equilibrium of a floating body - Stability of equilibrium of a floating body - Metacentre - Experimental determination of a metacentric height of a ship.

Course Outcome

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

CO 1	know the basics of projectile motion, Impulse and impact
CO 2	understand rigid body dynamics and its application to compound pendulum.
CO 3	understand the laws of gravitation, gravitational field and potential.
CO 4	get adequate knowledge on friction

CO 5	know the fundamentals on centre of gravity

Books for study:

1. M. Narayanamurthi and N. Nagarathinam, *Dynamics,* The National Publishing Company 2005, Chennai.
2. M. Narayanamurthi and N. Nagarathinam, *Statics, Hydrostatics and Hydrodynamics* - The National Publishing Company 2005, Chennai.

Books for reference:

1. R. Murugesan, *Mechanics and Mathematical Physics,* S. Chand 85 Company Ltd., New Delhi, 2008.
2. D.S. Mathur, *Mechanics,* S. Chand & Company Ltd., New Delhi - 1990.

Course Outcome Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2	3	2	3
CO2	2	3	3	2	2
CO3	3	2	3	3	3
CO4	2	2	3	2	2
CO5	2	2	3	2	2

CORE COURSE IV

Code : **Class : II - B.Sc.,Physics**

HEAT, THERMODYNAMICS AND STATISTICAL MECHANICS

Learning Objectives:

LO 1	To understand the fundamentals of specific heat
LO 2	To get knowledge on conduction and radiation
LO 3	To understand about low temperature
LO 4	To acquire adequate knowledge on thermodynamics
LO 5	To understand the concept of statistical mechanics

UNIT I Specific heat

Specific heat of solids - Dulong and Pettit's law – Quantum theory of specific heat – Einstein theory of specific heat – Debye's theory – specific heat of gases – Mayer's relation – Quantization of various contributions (vibration, rotational) to energy of diatomic molecules – specific heat of diatomic gases (Quantum theory).

UNIT II Conduction and Radiation

Conduction – coefficient of thermal conductivity – Rectilinear flow of heat along a bar – Thermal conductivity of good conductors - Forbe's method – Lee's method for bad conductors - Radiation – Black body – Stefan's law – Deduction of Newton's law of cooling from Stefen's law – Boltzmann's law – Wien's law – Rayleigh – Jean's law – Planck's Law – Solar constant – Temperature of the Sun-Angstrom pyrheliometer.

UNIT III Low Temperature

Joule – Kelvin effect – Porous plug experiment - Liquefaction of air – Linde's process – Liquefaction of hydrogen – Liquefaction of Helium – K.Onnes method – Helium I and Helium II – production of low temperature – Adiabatic demagnetisation – practical application of low temperature – Refrigerator – Air conditioning machine.

UNIT IV Thermodynamics

Zeroth and first law of thermodynamics – reversible and irreversible process – Isothermal process – adiabetic process – Second law of thermodynamics – Carnot's reversible engine - Entropy – Change of entropy in reversible and irreversible process – Temperature – entropy diagrams – Zero point energy – Maxwell's thermodynamical relations – derivation and application – Clausius – Clapeyron's equation.

UNIT V Statistical Mechanics

Concept of ensemble – microstate – macrostate – Number of states accessible to macroscopic system – Probability theorems – phase space – Maxwell Boltzmann distribution- Ideal gas – Quantum statistics – Fermi-Dirac distribution – Electron gas – Bose-Einstein distribution - photon gas.

Course Outcome

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

CO 1	understand the fundamentals of specific heat	
CO 2	get knowledge on conduction and radiation	
CO 3	understand about low temperature	
CO 4	acquire adequate knowledge on thermodynamics	
CO 5	understand the concept of statistical mechanics	

Text Books:

1. Heat and Thermodynamics - Brijlal and Subramanyam, S.Chand 8r. Ci 16th Edition New Delhi, 2005.
2. Heat and Thermodynamics - D.S. Mathur, Sultan Chand & Sons, 5 Edition, New Delhi, 2014.

3. Thermal Physics - R. Murughesan and Kiruthiga Sivaprasath, S.Chand Co, II Edition, New Delhi, 2008

Books for Reference:

1. Heat & Thermodynamics - J.B. Rajan, SC Publisher, New Delhi, 1985.
2. Concepts of Physics Volume I and II - H.C. Varma, Bharati Bhawi Publishers, New Delhi, 2015
3. M. Narayanamoorthy and N. Nagarathinam, Heat, National publishii Co,Chennai, Eight edition, 1987.
4. Heat and Thermodynamics – M.W.Zemansky

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	2	2
CO2	3	3	3	2	3
CO3	2	3	2	3	2
CO4	2	2	3	2	3
CO5	3	2	2	2	3

CORE COURSE V

MAJOR PRACTICAL II

(Any Twelve Experiments)

Learning Objectives:

LO 1	To understand the concept of physical quantities.
LO 2	To acquire experimental skill to measure physical quantities using measuring instruments.
LO 3	To know the problem solving.
LO 4	To understand concepts related with elasticity, heat, Optic and electrical experiments.
LO 5	To understand concepts related with diode and logic experiments.

1. Static Torsion -Determination of rigidity modulus.(η)
2. Torsional Pendulum – Rigidity modulus(η) and moment of inertia(I)
3. Emissive power of a surface - Spherical calorimeter.
4. Thermal conductivity of bad conductor – Lee's disc method.
5. Specific heat capacity of liquid - Newton's law of cooling
6. Joule's calorimeter - Specific heat capacity of liquid.
7. Potentiometer -Ammeter calibration.
8. Potentiometer - Determination of resistance.
9. Figure of merit of a Galvanometer.
10. Spectrometer - μ of a liquid.
11. Spectrometer - grating – wavelength - minimum deviation method.
12. Air Wedge - Thickness of a wire.
13. Newton's rings – Radius of curvature of a lens.
14. Construction of a full wave rectifier.
15. Characteristics of zener diode.

Books for Study :

1 Dr. S. Somasundaram, *Practical Physics,* Apsara publications, Tiruchirapalli, 2012.

2 Department of Physics, *Practical Physics,* (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli 1998.

Books for Reference:

1. S. Srinivasan, A *Text Book of Practical physics,* S. Sultan Chand publications, 2005.
2. R. Sasikumar, *Practical Physics,* PHI Learning Pvt. Ltd, New Delhi, 2011.

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	2	3	3	2	2
CO3	2	2	3	2	2
CO4	2	2	2	2	2
CO5	2	3	3	2	2

CORE COURSE VI

Code : **Class : II - B.Sc.,Physics**

OPTICS AND SPECTROSCOPY

Learning Objectives:

LO 1	To know the aberration and dispersion in lenses and eyepieces.
LO 2	To understand the phenomenon of interference and interferometers.
LO 3	To get the sufficient knowledge on diffraction and its application to grating.
LO 4	To acquire knowledge of different types of polarization and its applications.
LO 5	To gain knowledge on spectroscopic instrumentation and theory.

UNIT I Geometrical optics

Aberrations – Spherical aberration in a lens – Methods of reducing spherical aberration – Coma - Aplanatic lens – Astigmatism – Curvature of the field – Distortion – Chromatic aberration in a lens – Achromatic lenses – condition for achromatism of two thin lenses (in and out of contact) – Objective and eyepiece – Huygen's eye piece – Ramsden's eyepiece – Compound microscope

UNIT II Interference

Interference – condition for interference – Colours of thin film – Air wedge –Theory - Determination of thickness of the wire – Newton's rings – Theory – Determination of wave length of light – Refractive index of a liquid – Michelson interferometer – Applications - Fabry - Perot interferometer – Holography

UNIT III Diffraction

Freshnel's diffraction – Zone plate – Comparison between Fresnel and Fraunhoffer types of diffraction – Fraunhoffer's diffraction at a single slit – double slit – plane diffraction grating – Theory of plane transmission grating – experiment to determine wavelength – dispersive power of a grating – Resolving power – Rayleigh's criterion for resolution – resolving power of a prism – resolving power of a grating.

UNIT IV Polarisation

Brewster's law – Double refraction – Nicol prism as polarizer and analyzer – Huygens explanation of double refraction in uniaxial crystals – elliptically and circularly polarised light – Quarter wave plate – Half wave plate – production and detection of plane, circularly and elliptically polarized light – Dichroism – optical activity – Fresnel's explanation of optical activity – specific rotation – Laurents half shade polarimeter.

UNIT V Spectroscopy

Electromagnetic spectrum – Types of spectra – Infrared spectroscopy – Sources and detector – uses – Ultraviolet spectroscopy – Sources and detector – Uses – Raman Spectroscopy – Quantum theory of Raman effect – applications

Course Outcome

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

CO 1	know the aberration and dispersion in lenses and eyepieces.
CO 2	understand the phenomenon of interference and interferometers.
CO 3	get the sufficient knowledge on diffraction and its application to grating.
CO 4	acquire knowledge of different types of polarization and its applications.
CO 5	gain knowledge on spectroscopic instrumentation and theory.

Books for study :

1. Optics and Spectroscopy by R.Murugeshan and Kiruthiga Sivaprasath, S. chand & co, New Delhi (2006).
2. Dr. N. Subramaniyam, Brijlal and Dr.M.N. Avathanulu, *Optics,S.* Chand &Co. Pvt.Ltd the

revised edition, New Delhi, 2012 .
3. Dr. N. Subramaniyam, Brijlal and Dr.M.N. Avathanulu, *Optics,* S. Chand 85 Co. Pvt. Ltd.- 9th revised edition. New Delhi ,2014.
4. Krishnapada Ghosh Anandamoy Manna, Text book of Physical Optics, McMillan India Ltd., First edition, 2007.

Books for Reference:

1. Singh & Agarwal, Optics and Atomic Physics, Pragati Prakashan Meerut, Nineth edition, 2002,
2. A.B. Gupta, Modern optics, Books and allied (P) Ltd., Kolkata, First edition, 2006.
3. Ajoy Ghatak, Optics (TMH), New Delhi, Fourth edition, 2009.
4. Arial Lipson, Stephen G. Lipson and Hentry Lipson, Optical Physics,
5. Cambrige, Fourth edition, 2011.
6. Schaum's outlines, Optics, Tata Mc-Graw Hill, 2011.

Course outcome mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	3	2
CO3	3	2	3	2	2
CO4	3	3	2	3	3
CO5	3	3	2	2	3

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SKILL BASED ELECTIVE I

Code : **Class : II - B.Sc.,Physics**

ELECTRICAL INSTRUMENTS AND MEASUREMENTS

UNIT - I

Absolute and secondary instruments - Electrical principles of operation - Essentials of indicating instruments - deflecting torque –Controlling torque - Damping torque - Moving iron ammeter and voltmeter - Attraction type M.I instruments - Repulsion type M.I. instruments - Sources of error.

UNIT - II

Moving coil instruments - Permanent magnet type instrument - Advantages and Disadvantages - Extension of range - voltmeter sensitivity - Multirange voltmeter.

UNIT - III

Dynamometer type instruments - Advantages and disadvantages - Thermocouple ammeter-Megger - Induction type voltmeter and ammeter - Induction ammeter - Induction voltmeter - Errors in induction instruments - Advantages and Disadvantages – Electrostatic voltmeter.

Book for sudy:

1. A textbook of Electrical Technology—Volume I- B.L.Theraja and A.K. Theraja.

CORE COURSE VII

Code : **Class : III - B.Sc.,Physics**

ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM

Learning Objectives:

LO 1	To expose students to the fundamentals and applications of electrostatics.
LO 2	To learn the current electricity and its magnetic effect.
LO 3	To understand laws of magnetism
LO 4	To get knowledge on growth and decay of current in resistance, capacitance and inductance and their combination in circuits.
LO 5	To know basics of electromagnetic induction

UNIT – I Electrostatics

Coulomb's inverse square law – Electric potential at a point due to a point charge - Gauss theorem - Intensity at a point due to a charged sphere and infinite plane charged conductor - Principle of a capacitor - Capacity of a spherical and cylindrical capacitors - Energy stored in a capacitor - Loss of energy due to sharing of charges - capacitors in series and parallel.

UNIT – II Current Electricity

Laplace's law and its applications - Field along the axis of a circular coil and Solenoid - Force on a conductor in a magnetic field — Theory of Ballistic Galvanometer -Figure of merit - Damping Correction – Kirchoff's laws - Wheatstone network - Carey Foster's Bridge –Potentiometer – principle - calibration of ammeter - calibration of voltmeter.

UNIT – III Magnetism

Intensity of magnetization - Susceptibility –permeability and relation between them - Properties of para, dia and ferro magnetic materials - Hysterisis - B-H curve - application of BH curve - Ballistic galvanometer method for plotting B-H curve.

UNIT – IV DC & AC Circuits

Growth and decay of current in circuits containing L and R - Growth and decay of charge in a circuit containing C and R - High resistance by leakage-

Alternating EMF applied to circuits containing L and R - C and R – L, C and R- Series and parallel resonance circuits - Sharpness of resonance - Q factor - Power in AC circuits - Power factor- Wattless current.

UNIT – V Electromagnetic Induction

Laws of electromagnetic induction - Self and mutual induction - Self inductance of a solenoid - Mutual inductance of a pair of solenoids - Coefficient of coupling - Experimental determination of self inductance by Rayleigh's method –Determination of mutual inductance.

Course Outcome

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

CO 1	expose students to the fundamentals and applications of electrostatics.
CO 2	know the current electricity and its magnetic effect.
CO 3	understand laws of electromagnetic induction and measurement of self and mutual inductance.
CO 4	get knowledge on growth and decay of current in resistance, capacitance and inductance and their combination in circuits.
CO 5	know basics of electromagnetic waves.

Books for study:

1. R. Murugeshan, Electricity and Magnetism (2008) S Chand & Co, New Delhi
2. BrijLal & Subramanyam, Electricity Magnetism, (2005)
3. Ratan Prakashan Mandir Publishers, Agra Magnetism, NPC
4. M.Narayanamurthy & N.Nagarathnam, Electricity & Magnetism, NPC pub., Revised edition.

Books for Reference:

1. Electricity and Magnetism –D.N-Vasudeva (Twelfth revised edition)
2. Electricity and Magnetism - K.K. Tiwari
3. Electricity and Magnetism - E.M.Pource , Berkley Physics Cource, Vol.2 (Mc Grraw-Hill)
4. Electricity and Magnetism - Tayal (Himalalaya Publishing Co.)
5. D.Halliday, R.Resnick and J.Walker, fundamentals of Physics - Electicity and Magnetism (2011), Wiley India Pvt. Ltd.
6. David J. Griffith, Introduction to Electrodynamics, (2012) PHI, New Delhi.

Course outcome mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	2	3	2	3
CO5	3	2	3	2	3

CORE COURSE VIII

Code : **Class : III - B.Sc.,Physics**

THEORETICAL PHYSICS

Learning Objectives:

LO 1	To understand the Lagrangian formulation for system of particles.
LO 2	To get knowledge of Hamilton canonical equation and its applications.
LO 3	To acquire idea about transformation equations and special theory relativity.
LO 4	To know the schrodiner equation and relativity
LO 5	To study the photoelectric effect and Compton efect

UNIT I Lagrangian formulation

Mechanics of a particle and system of particles – conservation of laws – Degrees of freedom – Constraints – Types of constraints – Generalized coordinates – Transformation equations – configuration space – principle of virtual work – D' Alembert 's principle – Derivation of Lagrange 's equation Applications of Lagrange equation – Atwood 's machine – simple pendulum – Hamilton's variation principle – Deduction of Lagrange's equations of motion from Hamilton's principle – Deduction of Hamilton's principle from D'Alembert's principle

UNIT II Hamiltonian formulation.

Phase – space – Hamilton's canonical equation of motion –physical significance of H – Deduction of canonical equations from variation principle – Applications of Hamilton's equation of motion –Simple pendulum – compound pendulum – poisson bracket – properties of poisson bracket.

Cyclic or ignorable coordinate – Generalised momentum – conservation of linear momentum – conservation of angular momentum – conservation of energy (Jacobi's integral)

UNIT III Dual nature of matter

De Broglie concept of matter waves – De Broglie wavelength wave velocity and group velocity – relation between them – Experimental study of matter waves – Davisson and Germer's experiment – G.P Thomson's experiment – for verifying De Broglie relation- Heisenberg's un certainty principle - Gamma ray microscope – Electron microscope.

UNIT IV Schrödinger equation and Relativity

Basic postulates of quantum mechanics – Schrödinger wave equation – Time independent and Time de pendent equations – properties of wave function – Eigen function and Eigen values –Application of Schrödinger equation –particle in a box

Frame of reference – Newtonian relativity – Galilean transformation equation – ether hypothesis – Michelson – Morley experiment - postulates of special theory of relativity – Lorentz transformation Length contraction – Time dilation – Mass energy relation

UNIT V Photo electric effect and Compton effect

Photoelectric effect – Lenard, Richardson and Compton experiments- Laws of photoelectric effect – Einstein photo electric equation – Experimental verification of Einstein's photoelectric equation – Millikan's experiment – photoelectric cells – photo emissive cell – photovoltaic cell – photo conductive cell – photomultiplier – Compton Effect – theory – experimental verification.

Course Outcome

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

CO 1	understand the Lagrangian formulation for system of particles.
CO 2	get knowledge of Hamilton canonical equation and its applications.

CO 3	acquire idea about transformation equations and special theory relativity.
CO 4	know the schrodiner equation and relativity
CO 5	study the photoelectric effect and Compton efect

Books for study:

1. S.L. Gupta, V. Kumar and H.V.Sharma, Pragathi Prakasan, *Classical Mechanics, Educational Publi*sher, Meerut, 25th edition, 2011.
2. Murughesan. R., *Modern Physics,* S.Chand & Co., New Delhi, 2006.

Books for Reference:

1. Arthur Beiser, *Concept of Modern Physics:* McGraw Hill Ed. V (1999).
2. *H. Goldstein, Classical Mechanics,* Narosa Book distributors, New Delhi 1980.
3. N.C. Rana and P.S.Joag, *Classical Mechanics,* Tata Mc Graw Hill, New Delhi 1991.
4. P.M. Mathews and K. Venkatesan, *A Text Book of Quantum Mechanics* ,Tata McGrawHill, New Delhi, 1987.

Course outcome mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	2	2	3
CO4	3	2	3	2	2
CO5	3	3	3	2	2

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CORE COURSE – IX

Code : **Class : III - B.Sc.,Physics**

ANALOG ELECTRONICS

Learning Objectives:

LO 1	To get adequate knowledge on semiconductor diodes
LO 2	To understand the transistor operation and its applications as amplifiers.
LO 3	To know the principle of feedback and working of Oscillators and multivibrators.
LO 4	To study the special devices such as FET, MOSFET, UJT and SCR.
LO 5	Understanding the Operational amplifier and its applications.

Unit I: Semiconductor diodes

Semiconductor PN junction theory - V-I characteristics of a PN junction diode - Half wave rectifier - Bridge rectifier - Efficiency - filters - Shunt capacitor filter - pi filter - Zener diode - equivalent circuit - voltage regulator.

Unit II: Transistor Amplifier

Transistor - Different modes of operations-CB mode &CE mode - Two port representation of a transistor- h parameter - AC equivalent circuit using h parameters- analysis of amplifiers using h parameters (CE only) - RC coupled amplifier - transformer coupled amplifier - power amplifier -classification of amplifiers - Class A, Class B and Class C - Push pull amplifier.

Unit III: Oscillators and Multivibrator

Feedback principle -effect negative feedback-and Barkhaussen criterion - Phase shift, Wien Bridge, Hartley and Colpitts oscillators using transistors - Expression for frequency- Multivibrators - Astable, Monostable and Bistable multi vibrators using transistors - Schmitt trigger.

Unit IV: Special Semiconductor Devices

Differentiating circuit – Integrating circuit clipping circuits – clamping circuit - FET – Characteristics of FET – FET as a VVR – MOSFET – Working principle – amplifier – SCR-V-I characteristics – Switch – half wave – Full wave rectifier – Applications – UJT – Characteristics – applications of UJT – relaxation oscillator – over voltage detector.

Unit V: Operational Amplifier

Operational Amplifier- characteristics-parameters-applications- Inverting amplifier - Non inverting amplifier - Voltage follower- Adder - Subtractor - Integrator - Differentiator- Solving simultaneous equations-comparator -square wave generator - Wien bridge oscillator -Schmitt trigger.

Course Outcome

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

CO 1	get adequate knowledge on semiconductor diodes, rectifier circuits and filters.
CO 2	understand the transistor operation and its applications as amplifiers.
CO 3	know the principle of feedback and working of Oscillators and multivibrators.
CO 4	study the special devices such as FET, MOSFET, UJT and SCR.
CO 5	understand the Operational amplifier and its applications.

Books for Study:

1. Hand Book of Electronics by Gupta and Kumar - PragatiPrakashan -Meerut(2002).
2. Principles of Electronics by V.K. Mehta, Rohit Mehta S. Chand & Co.(2006).
3. Electronics by M. Arul Thalapathi, Comptek Publishers(2005).
4. Elements of Electronics by M.K.Bagde and Singh S.P., S. Chand & Co., New Delhi(1990).
5. Applied Electronics by A. Subramanyam - National Publishing Co. (1997)
6. OP - AMPs and Linear Integrated Circuits by Ramakant A. Gayakwad, Prentice Hall of India 1994).

Books for Reference:

1. Electronic Devices by Mittal.G.K., G.K. Publishers Pvt. Ltd., (1993).
2. Basic Electronics by B.L. Theraja, S. Chand & Co., (2008).
3. Solid State Electronics by Ambrose and Vincent Devaraj, Meera Publication.
4. Applied Electronics by R.S. Sedha, S. Chand & Co.(1990).

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	3	2	3	2	2
CO3	3	3	3	2	2
CO4	3	3	2	2	2
CO5	3	3	3	2	2

CORE COURSE X

Code : **Class : III - B.Sc.,Physics**

MAJOR PRACTICAL - III

(Any Twelve Experiments)

Learning Objectives:

LO 1	To understand the concept of physical quantities.
LO 2	To acquire experimental skill to measure physical quantities using measuring instruments.
LO 3	To know the problem solving.
LO 4	To understand concepts related with Optics and electrical experiments.
LO 5	To know programming with 'C' in physics problems.

1. Spectrometer i-d curve
2. Spectrometer i-i' curve
3. Spectrometer- Dispersive power of prism.
4. Field along the axis of a coil – determination of M.
5. Potentiometer - EMF of a thermocouple.
6. Potentiometer Temperature coefficient of thermistor.
7. Ballistic Galvanometer-Figure of merit
8. Anderson's bridge - self inductance of a coil.
9. Series and Parallel resonant circuits.
10. Koenig's method-Uniform bending
11. Spectrometer-Grating-Normal incidence.-wave length
12. Spectrometer - Grating dispersive power. minimum deviation.
13. Spectrometer ~ Cauchy's constants.
14. M and H - Absolute determination using deflection and vibration magnetometer
15. Potentiometer - High range voltmeter calibration.
16. B.G. Absolute capacity of condenser.
17. B.G.-Absolute determination of M.
18. Conversion of centigrade to Fahrenheit- using C programming.
19. Arranging numbers in ascending order/descending order- using C programming.
20. Calculation of volume of sphere/cone/cube/rectangular cubiod- using C programming.
21. Solving quadratic equation- using C programming.
22. Sum of digits of a number- using C programming.

Course Outcome

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

CO 1	understand the concept of physical quantities.
CO 2	acquire experimental skill to measure physical quantities using measuring instruments.
CO 3	know the problem solving.
CO 4	Tunderstand concepts related with Optics and electrical experiments.
CO 5	know programming with 'C' in physics problems.

Books for Study :

1. Dr.S.Somasundaram, *Practical Physics,* Apsara publications, Tiruchirapalli, 2012.
2. Department of Physics, *Practical Physics,* (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli 1998.

Books for Reference:

1. S. Srinivasan, *A Text Book of Practical physics,* S. Sultan Chand publications. 2005
2. R. Sasikumar, *Practical Physics,* PHI Learning Pvt. Ltd, New Delhi, 2011.

Course Outcome Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	2	3	3	2	3
CO2	3	3	3	2	3
CO3	2	3	3	2	3
CO4	3	3	3	2	2
CO5	2	3	3	2	3

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CORE COURSE XI

Code : **Class : III - B.Sc.,Physics**

MAJOR PRACTICAL - IV

(Any Twelve Experiments)

Learning Objectives:

LO 1	To understand the concept of physical quantities.
LO 2	To acquire experimental skill to measure physical quantities using measuring instruments.
LO 3	To know the problem solving.
LO 4	To understand perform experiments in analog and digital electronics.
LO 5	To know programming with assembly language in microprocessor 8085.

1. Regulated power supply using Zener diode- Percentage of voltage regulation.
2. Single stage - CE amplifier – Transistor
3. Hartley oscillator using transistor.
4. FET Characteristics.
5. AND, OR and NOT gates using discrete components - Truth table
6. AND, OR and NOT gates using Integrated circuits
7. Op-Amp -Adder and Subtractor.
8. Op - Amp - Integrator and Differentiator
9. Emitter follower amplifier — Frequency response.
10. Colpitt's oscillator using transistor.
11. Astable multivibrator using Op.Amp
12. Monostable Multivibrator-Transistor
13. Monostable – Op.Amp
14. FET amplifier.
15. Universality of NAND and NOR gates
16. Demorgan's theorem and Boolean algebra- verification
17. SR Flip Flop circuit using gates.
18. Half Adder using gates
19. Half Subtractor using gates
20. 8-bit addition and 8-bit subtraction- using µp 8085.
21. 8-bit multiplication and Division- using µp 8085.
22. Conversion from decimal to hexadecimal system- using µp 8085.
23. Conversion from hexadecimal to decimal system- using µp 8085.
24. 16-bit addition- using µp 8085.
25. Conversion of binary to hexadecimal - using µp 8085.
26. Conversion of hexadecimal to binary- using µp 8085.

Course Outcome

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

CO 1	understand the concept of physical quantities.
CO 2	acquire experimental skill to measure physical quantities using measuring instruments.
CO 3	know the problem solving.
CO 4	understand perform experiments in analog and digital electronics.
CO 5	know programming with assembly language in microprocessor 8085.

Books for Study :

1. Dr.S.Somasundaram , Practical Physics, Apsara publications, Tiruchirapalli , 2012.
2. Department of Physics, Practical Physics, (B.Sc Physics Main), St. Joseph's College, Tiruchirapalli 1998.

Books for Reference:

1. S.Srinivasan,A Text Book of Practical physics, S.Sultan Chand publications, 2005.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	2	3	3	2	2
CO3	2	2	3	2	3
CO4	2	2	2	2	2
CO5	2	3	3	2	3

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MAJOR BASED ELECTIVE I

Code : **Class: III- B.Sc, Physics**

MICROPROCESSOR AND `C' PROGRAMMING

Learning Objectives:

LO 1	To know the basics digital computer and its hardware, software and memory.
LO 2	To study architecture of Intel 8085 processor.
LO 3	To get skill to write assembly language programmes for mathematical operations.
LO 4	To know the 'C' programming.
LO 5	To get knowledge on functions of 'C' programming.

UNIT I Basics of Digital Computer

Basic components of a digital computer - Evolution of microprocessors - Important INTEL microprocessors - Hardware, Software and Firmware - Memory Semiconductor memories - RAM, ROM - Flash memory - CCD memory – Cache memory – Buses.

UNIT II Intel 8085 and its Architecture

INTEL 8085 - Pin Diagram - Architecture - Various registers - Status Flags - Interrupts and their order of priority - Addressing modes - Direct, Register, Register indirect, Immediate and implicit addressing - Instruction set - Data transfer group – Arithmetic Group - Logical group - Branch group, Stack, I/O and Machine control group.

UNIT III Assembly Language Programming

Addition - subtraction - multiplication -division of two 8 - bit numbers - Finding the largest and smallest number in a data array - Arranging a list of numbers in ascending or descending order-complement - shift - mask- look up table

UNIT IV Introduction to C

Basic structure of C Programs - Character set - C tokens - Keywords and identifiers - constants - variables - Data types - declaration of variables - *Assigning* values to variables - Symbolic constants - Operators and Expressions - Arithmetic operators - Relational, Logical and Assignment operators, Increment and decrement operators - Conditional operator, Bitwise and Special operators - Arithmetic Expressions.

UNIT V Preliminaries and Functions

Data input and output - getchar, putchar, scanf, printf, gets, puts functions –Decision making and branching - if, if...else, else if ladder, switch, break, continue, goto - Decision making and looping - while, do... while, for, nested loops – Arrays (one -, two and multi-dimensional arrays) - Declaration, Initialization of arrays – Programms – To find smallest and largest element in array – Solving quadratic equation.

Learning Objectives:

LO 1	know the basics digital computer and its hardware, software and memory.
LO 2	study architecture of Intel 8085 processor.
LO 3	get skill to write assembly language programmes for mathematical operations.
LO 4	know the 'C' programming.
LO 5	get knowledge on functions of 'C' programming.

Books for study:

1. B. Ram - *Fundamentals of Microprocessors and M*icrocontrollers-Dhanpat Rai Publications (P) Ltd., New Delhi, 2013.

2. Balagurusamy - *Programming in ANSI C* - Tata McGraw Hill Education Private Limited, New Delhi,2012.

Books For Reference:

1. R.S. Gaonkar- *Microprocessor Architecture, Programming, and Applications with the 8085, Penram* International Publishing (India) Private Limited, Mumbai 2007.

2. K.R. Venugopal and S. R. Prasad - *Programming with C*- Tata McGraw-Hill Publishing Company Limited, New Delhi, 2002.

Course outcome mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	3
CO2	3	2	2	2	2
CO3	3	2	2	2	2
CO4	2	2	3	2	2
CO5	2	2	2	2	2

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SKILL BASED ELECTIVE II

Code : **Class: III- B.Sc, Physics**

ELECTRIC MACHINES

Learning Objectives:

LO 1	To know the working and components of AC generator.
LO 2	To observe knowledge of working and characteristics of DC motors.
LO 3	To study the working of Transformer

UNIT I

Generation of alternating voltages and currents - Equations of the | alternating voltages and currents - simple waveforms - complex *waveforms* - cycle -Time period - Frequency-Amplitude - Different forms of equations - Generator principle - simple loop generator – yoke-pole cores and pole shoes - pole coils - Armature core - Armature - commutator - Brushes and Bearings.

UNIT II

DC Motor - principle-comparison of generator and motor action - significance of back emf - voltage equation of a motor - condition for maximum power - Motor characteristics - characteristics of series motor - characteristics of shunt motor - compound motors - comparison of shunt and series motor - losses and efficiency.

UNIT III

Transformer - working principle of transformer - construction - Types of transformers - core and shell -Type transformer - Theory of ideal transformer - EMF equations - voltage ratio.

Course Outcome

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

CO 1	know the basic principle of ac voltages
CO 2	get the knowledge of motor
CO 3	understand the working of transformer

ook for study:S

1. A textbook of Electrical Technology - Volume 1 - B.L. Theraja A.K. Theraja
2. A textbook of Electrical Technology - Volume 2 - B.L. Theraja A.K. Theraja

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	2	2	3	2
CO3	3	3	3	3	2

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SKILL BASED ELECTIVE III

Code : **Class: III- B.Sc, Physics**

ELECTRIAL WIRING

Learning Objectives:

LO 1	To know the skills of basic tools.
LO 2	To get adequate knowledge of different types of wires.
LO 3	To study the different types of switches.

UNIT I

Tools – Screw Drivers - pliers - packet knife- Hammers- wooden saw-scratch awl - Hand drill - Ratchet bit brace- Auger bits- Raw plug tool- Hacksaw-centre punch- Twist drill - Putty knife-Blow lamp.

UNIT II

Sizes of wire-standard wire-Types of wires-Rubber covered, tapped, braided, compounded wires-Lead alloy sheathed wires-tough rubber-sheathed wires-weather proof wires-Flexible wire- Method of installing wiring – cleat wiring - Tough rubber sheathed wiring-Lead sheathed wiring - Installation of conduit wiring.

UNIT III

Switches -surface switch - Flush switches-pull switches-Grid switches-Architrave switch-Rotary snap switches-Push button switches- Wiring system-looping in system- wiring of building- tree system- Ring system-Lamp circuits- simple circuits- series, parallel circuits-Master switch circuits.

Course Outcome

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

CO 1	know the skills of basic tools.
CO 2	get adequate knowledge of different types of wires.
CO 3	study the different types of switches.

Books for Study

1. Electrical Wiring, Estimating & Casting - SL. UPPAL

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	3	2	2	3	2
CO3	3	3	2	2	3

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CORE COURSE XII

Code : **Class : III B.Sc., Physics**

ATOMIC AND NUCLEAR PHYSICS

Learning Objectives:

LO 1	To get the fundamentals of cathode, positive rays and mass spectrograph
LO 2	To know atomic structure and atom models.
LO 3	To study the atomic spectra and effect of magnetic and electric fields on spectra.
LO 4	To acquire knowledge of X-rays and its application to crystal structure determination.
LO 5	To understand the particle accelerator

UNIT I Cathode rays and positive rays.

Cathode rays – production and properties – Electronic Charge – Millikan's oil drop method – Positive rays – Production and properties – Thomson's parabola method – Aston's mass spectrograph – Bainbridg's – Dempster's mass spectrograph – Dunnington's method of determining e/m

UNIT II Atomic Structure

Early atomic spectra – Thomson's model – Rutherford's model – Bohr's atom model – Bohr's interpretation of the hydrogen spectrum – correction for nuclear motion – evidences in favour of Bhor's theory – Somerfield's relativistic atom model – drawbacks – critical potential – experimental determination of critical potentials – Franck and Hertz's method – Davis and Goucher's method – Vector atom model – Quantum numbers associated with vector atom model – Paul's exclusion principle – Electronic configuration and peridic table.

UNIT III Fine Structure of spectral line

Coupling schemes – L-S coupling – j-j coupling – Stern and Gerlach experiment – spin orbit coupling – optical spectra – spectral notation – selection rules – intensity rules – interval rule – fine structure of sodium D line – hyperfine structure – Normal zeeman effect – Experimental arrangement – Lorentz classical theory for normal zeemen effect – Larmor's theorem – Quantum mechanical explanation of the normal zeeman effect – Anomalous zeeman effect - Paschen – Back effect – Stark effect

UNIT IV Nucleus properties and model

Classification of nuclei – Isotopes – Isobars – Isotones – Isomers – mirror nuclei – nuclear size – mass – radius - Nuclear charge – Nuclear spin and nuclear magnetic moments – Binding energy – stability of nucleus – mass defect – packing fraction – Binding energy Vs Mass number curve –Yukawa's model of nuclear force.

Nuclear models – Liquid drops model – Semi – empirical mass formula – The shell model - salient features of shell model.

UNIT V Particle accelerator, nuclear reactor and elementary particles.

Linear accelerator – Cyclotron – Betatron – Ionisation chamber - Geiger – Muller counter – Cloud chamber – Discovery of neutron – positron

Nuclear fission – Chain reaction – Atom bomb – Nuclear reactors – components of nuclear reactor – nuclear fusion – sources of stellar energy – Hydrogen bomb - classification of Elementary particles – protons – leptons – mesons – baryons.

Course Outcome

On completion of the course, the student would be capable of

CO 1	knowing the properties of cathode and positive rays, the experiments for finding the specific charge, and the principle and working of mass

	spectrograph.
CO 2	understanding the structure of the atom and the spectral lines.
CO 3	analyzing the effects of magnetic field on atomic spectra
CO 4	understanding photoelectric effect and derive the Einstein's photoelectric equation.
CO 5	recognizing various accelerator

Books for study:

1. R. Murugesan, KiruthigaSivaprasath, *Modern Physics,* S. Chand &Co Ltd., New Delhi, 14th Revised edition, 2014.
2. J.B. Rajam, *Atomic Physics,* S. Chand 8s Co Ltd., New Delhi, Revised edition, 2009.
3. Gupta & Roy., *Physics of the Nucleus,* Books and Allied (P) Ltd. Kolkatta, 2011 .

Books for Reference:

1. Sehgal, Chopra and Sehgal, *Modern physics,* Sultan Chand & Sons,New Delhi.
2. Arthur Beiser, Shobhit Mahajan, S. RaiChoudhury, *Concepts of Modern Physics,* Sixth edition, SIE, 2009.
3. S.N .Ghoshal, *Atomic Physics,* S. Chand & Co Ltd., New Delhi, Revised edition, 2004.
4. S. N. *Ghoshal,Nuclear Physics ,* S. Chand & Co., Edition ,2003.
5. ML Pandya& R. P .S .Yadav, *Elements of Nuclear Physics,*Kedaar Nath & Ram Nath , 2000.
6. SatyaPrakash, *Nuclear Physics,* A Pragati Prakasan Publication, 2011.
7. Jahan Singh, *Fundamentals of Nuclear Physics, A* Pragati Publication, 2012.
8. D.C.Tayal, *Nuclear Physics,* Himalaya Publishing House, 2009

Course outcome mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	2	2	3
CO4	3	2	3	2	3
CO5	3	2	3	2	2

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CORE COURSE XIII

Code: **Class: III- B.Sc, Physics**

DIGITAL ELECTRONICS

Learning Objectives:

LO 1	To improve knowledge about the basics of number system, logic gates.
LO 2	To understand the Boolean algebra and of combinational logic cicuits
LO 3	To know the timer IC, various flip flops, D/A and A/D converters.
LO 4	To get knowledge on timer and flip flops
LO 5	To develop skill about the counters and registers

Unit I Number Systems and Logic Gates

Introductions to decimal. binary, octal, hexadecimal number systems - Inter conversions - One's and two's complements - Simple binary arithmetic operaiiQBS - Addition, subtraction, multiplication and division - Binary subtraction using one's and two's complements - Positive and negative logic- Basic and derived logic gates, symbols and their truth tables - AND, OR, NOT, NAND, NOR, XOR, and XNOR - Universality of NAND and NOR gates.

Unit II Boolean algebra and Simplification of Logic Expressions

Boolean algebra - Basic laws of Boolean algebra -De - Morgan's theorems Reducing Boolean expressions usingBoolean laws - SOP and POS forms of exoresskms minterms and maxterms - Karnaugh map simplification.

Unit III Combinational digital Systems

Half adder- full adder - Binary adder - Half subtracter- full subtracter – 4 bit adder /subtractor-Binary subtractor Two's complement adder / subractor circuits - Decoder -Encode Multiplexer - Demultiplexer.

Unit IV Timer and flip flops

555 timer - monostable multivibrator - Astable multivibrator- logic gate-Flip flop - RS flip flop - clocked RS flip flop-JK flip flop- J-K master slave flip flop- T flip flop and D flip flop-D/A convertor-Binary weighted method – A/D converter – Successive approximation method.

Unit V counters and registers

Binary Counter - ring Counter - Four bit asynchronous Counter - ripple counter - Mod - 10 counters - Synchronous counter - Shift registers – shift left register - shift right register – up/down counter.

Course Outcome

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

CO 1	improve knowledge about the basics of number system, logic gates.
CO 2	understand the Boolean algebra and of combinational logic cicuits
CO 3	know the timer IC, various flip flops, D/A and A/D converters.
CO 4	get knowledge on timer and flip flops
CO 5	develop skill about the counters and registers

Books for Study

1. Digital Principles and Application, A.P. Malvino, D.P.Leach, IV Edition, McGraw Hill, New Delhi,1986.
2. Digital Fundamentals, V, Vijayendran, S.Viswanathan, Printers 8s Publishers Private Ltd, Chennai, 2O04.
3. Fundamentals of Microprocessor - 8085, V. Vijayendran, S.Viswanathan, Primes & Publishers private Ltd, Chennai, 2004.

Books for Reference

1. Fundamentals of Microprocessor and Microcomputers, B.Ram, Dhanpat Rai Publications, New Delhi, 2006, Digital Electronics, W.H.Gothmann, Prentice Hall of India, Pvt, New Delhi 1996.
2. Fundamentals of Digital Electronics and Micropocessors, Anokh Singh, A.K.Chhabra, Chand & Co, New Delhi, 2003

Course outcome mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	2
CO3	3	3	3	2	3
CO4	3	2	3	2	2
CO5	3	2	2	2	3

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MAJOR BASED ELECTIVE II

Code : **Class : III - B.Sc.,Physics**

MATERIAL SCIENCE

Learning Objectives:

LO 1	To study he properties and various bond
LO 2	To understand elementary crystallography
LO 3	To know the new materials such as metallic glass, ceramics, SMART materials.
LO 4	To gain the basic knowledge on different types super conducting materials
LO 5	To get adequate knowledge on classification, types, and applications of nano materials.

UNIT I Properties of engineering materials and chemical bond

Mechanical properties – Thermal properties – Electrical properties – Magnetic properties – Optical properties – Chemical and Physical properties.

Interatomic forces – Different types of chemical bond – Ithic or Electrovalent bond – Covalent bond or Homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – Lattice energy of ionic crystals.

UNIT II Elementary crystallography

Lattice points – space lattice – Unit cell – Lattice parameters of an unit cell – Nomenclature of crystal directions – Miller indices – Symmetry elements of a crystalline solid – Centre of symmetry – plane of symmetry – Axes of symmetry – Cubic lattice – SC – BCC – FCC - Sodium chloride – HCP – Diamond crystal structure – Zinc blende – Sodium chloride structure – Bragg's law and crystal structure X-ray diffraction methods – powder method.

UNIT III New materials

Metallic glasses – Fiber reinforced plastics (FRP) and filter reinforced metals (FRM) – Metal matrix composites (MMC) – Surface Acoustic Wave (SAW) materials – Applications Biomaterials – Ceramics – Cermets – High temperature materials – Thermoelectric materials – Electrets – Nuclear engineering materials – Intermetallic compounds – shape memory alloys – SMART materials – conducting polymers – optical materials – Nonlinear optical materials applications – properties.

UNIT IV Superconducting msterials

Superconductivity – properties - Meissner's effect - types of superconductors - Type I and Type II – High temperature superconductors - Josephson effects and it applications – SQUIDS - Applications of superconductor

UNIT V Nano materials and Characterization

Nano science and Nanotechnology – Nano materials – Properties of nano materials – (Size dependent) – Synthesis of nanomaterials – Fullerenes – Application of nanomaterials – Carbon nanotubes – Fabrications and structure of carbon nano – Properties of carbon nanotubes (Mechanical and Electrical) Applications CNT's - scanning Electron Microscopy (SEM) – Transmission Electron Microscopy (TEM).

Course Outcome

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

CO 1	study he properties and various bond
CO 2	understand elementary crystallography
CO 3	know the new materials such as metallic glass, ceramics, SMART materials.
CO 4	gain the basic knowledge on different types super conducting materials
CO 5	get adequate knowledge on classification, types, and applications of nano materials.

Books for Study

1. Dr. M.N. Avadhanulu, Material science S. Chand & Company, New Delhi, 2014
2. Material Science by M. Arumugam, Anuradha Publishers. 1990 idayalkaruppur, Kumbakonam.

Books for reference

1. V. Raghavan, Material Science and Engineering, Printice Hall India, 2004
2. V. Rajendran, Material Science, Tata McGraw Hill Ltd., New Delhi, 2001.

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	3	3	2	2	3
CO3	2	2	2	3	2
CO4	2	3	2	3	2
CO5	3	3	2	3	3

MAJOR BASED ELECTIVE III

Code: **Class: III B.Sc, Physics**

OPTO ELECTRONICS AND FIBER OPTICS

Learning Objectives:

LO 1	To understand absorption and emission of light in matter.
LO 2	To study optoelectronics materials, LED, LCD, Photo diode etc.,
LO 3	To know the properties, working and applications of LASERs.
LO 4	To gain the basic knowledge on optical fiber communication system.
LO 5	To get adequate knowledge on optical data storage, and hologram.

Unit I Interaction of Light with Matter

Introduction - Absorption - optical absorption in metals, dielectrics and semiconductors Reflection - trap - excitons - colour centers - Generation of colour centers - Luminescence -photo Luminescence.

Unit II Opto electronic Materials

Introduction – PN junction as a light source-Construction of LED - Advantages of LEDs in electronic display - LCD -Characteristics of LCD materials - Action of LCD display device - Photodetectors - Expression for photo conductivity gain - Detector performance - HMsce parameters - Photo conductive materials - Photo diode - LDR -Phototransistors.

Unit III Lasers

Introduction – Characteristics of laser – spontaneous - Stimulated emission - Einstein's coefficients-condition for population inversion-three level scheme-semiconductor- Absorption and amplifieaiioii of radiation - Optical feed back - Threshold condition for lasing - Properties of lasers - Radiant power, Coherence - Coherence length – Laser spot size - Beam divergence, - CO_2 laser, semiconductor laser - Applications.

Unit IV Fiber optic Communication

Introduction- step index-graded index-Prihciples of light transmission in a fiber - Numerical aperture-Fiber profiles - Modes of propagation - Losses in fibers - Light sources -Laser diode - Light detector - Avalanche photo diode - Fiber optic communication link (Block diagram)-Advantages of fiber optics communication-optical switching-logic gates.

Unit V Optical Data Storage

Surface Storage - Phase change recording - Magneto optical data storage -HI- tech evolwed in system development - Automatic focussing - Automatic track following capacity of CD - advantages of CD - holographic storage -Construction of a hologram - Reconstruction of a hologram.

Course Outcome

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

CO 1	understand absorption and emission of light in matter.
CO 2	study optoelectronics materials, LED, LCD, Photo diode etc.,.
CO 3	know the properties, working and applications of LASERs.
CO 4	gain the basic knowledge on optical fiber communication system.
CO 5	get adequate knowledge on optical data storage, and hologram.

Books for study

1. Palanisamy P,K.Semiconductor Physics and Opto electronics, Ed II Scitech - Publications. (2003),
2. Palanisamy P.K. Material Science Ed If Scitech (2003).
3. Tripathi K.N, Mathur P.C, Ainashi Kapoor Yinod K. Sharma, Opto electronics - BS Publications (2004).

COURSE OUTCOME MAPPING:

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	3	2	2	3	2
CO3	3	3	2	3	2
CO4	3	2	2	3	2
CO5	2	2	3	2	2

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ALLIED PHYSICS I

Code: **Class: I- B.Sc., Maths & Chemistry**

Learning Objectives

LO 1	To understand the concept of centre of gravity
LO 2	To study elasticity and surface tension
LO 3	To Study simle harmonic motion
LO 4	To acquire knowledge on thermodynamics.
LO 5	To know basic idea of Interference, diffraction, polarization and their applications.

UNIT-I Mechanics

Centre of Gravity – Centre of Gravity of a solid hemisphere and hollow hemisphere - solid cone - Centre of Gravity of a solid tetrahedron.- States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example - Stability of Floating bodies - Metacentre - Determination of Metacentric height of a ship.

UNIT-II Properties of matter

Elasticity – Stress – Strain – Young's modulus - Bending of beams – Expression for the bending moment – Determination of Young's modulus by bending of a beam – Non uniform bending and Uniform bendin - Viscosity - Streamline flow and Turbulent flow - Poissulllie's flow– Determination of coefficient of viscosity of a liquid - Surface Tension - Drop weight method - Surface tension and interfacial tension.

UNIT-III Sound

Simple Harmonic Motion – composition of simple harmonic motion - along a straight line- at right angles to each other- Lissajou's figures and their applications - Intensity of Sound - Decibel, Phonon - Intensity measurement by hotwire microphone method - Acoustics of buildings - Ultrasonics - Production by Mangnetostriction method - Properties and applications.

UNIT –IV Thermal Physics

Newton's law of cooling - verification - Specific Heat Capacity of a liquid by Cooling - Coefficient of thermal conductivity - bad conductor- Lee's Disc Method - Stefan's Law of radiation - solar constant - Angstrom's pyroheliometer - Temperature of the sun.

UNIT –V Optics

Interference - Introduction – Air wedge – Newton's rings – Colours of thin films. Diffraction - Plane diffraction Grating – Theory of plane transmission Grating.

Polarization – Nicol prism as polarizer and analyzer- Quarter wave plate – Half wave plate – Production and detection of plane, circularly and elliptically polarized light – Specific rotatory power – Determination of specific rotatory power using Laurent's half shade Polarimeter.

Course Outcome

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

CO 1	understand the centre of ravity
CO 2	study centre of gravity of different shapes and laws of floating.
CO 3	study Heat transformation from one place to another
CO 4	acquire knowledge on thermodynamics.
CO 5	know basic idea of Interference, diffraction, polarization and their applications.

Books for study

1. 1.Allied Physics – I, Prof. A. Sundaravelusamy.
2. R. Murugeshan, *Properties of matter*, S. Chand & Co. Pvt. Ltd., Revised edition, 2012.
3. Narayanamoorthyand N. Nagarathinam , *Mechanics – Part II*, The National ublishing Company , Chennai,2005.

4. Dr.N. Subramaniyam,Brijlal and Dr.M.N.Avathanulu,*Optics,* S. Chand &Co. Pvt.Ltd.- 25 th revised edition, New Delhi, 2012.
5. V.Vijayendran, S.Viswanathan, *Digital Fundamentals,* Printers & Publishers Private Ltd, Chennai, 2004.

Books for References

1. Brijlal and Subramaniyan, *Properties of Matter,* S. Chand & Co.Pvt.Ltd.2005.
2. Brijlal and Subramaniyan., *Thermal Physics*, S. Chand & Co 2001.
3. Murugeshan and Kiruthiga Sivaprasath., *A Text Book of Optics*., S.Chand & Co. vt.Ltd.- 9 th revised edition Ramnagar 2014, Newdelhi-110055.
4. Mehta V.K., *Principles of Electronics*, S.Chand and company Ltd, 2014

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	3	2	2	3
CO5	3	3	2	3	3

ALLIED PHYSICS II

Code: **Class: I- B.Sc., Maths & Chemistry**

Learning Objectives

LO 1	To understand the concept of physical quantities.
LO 2	To acquire experimental skill to measure physical quantities using measuring instruments.
LO 3	To know the problem solving.
LO 4	To understand concepts related with physics experiments.
LO 5	To know the experiments of basics physics.

PRACTICALS

Any Twelve Experiments

1. Young's Modulus - Non uniform bending - pin and Microscope.
2. Rigidity modulus - Torsional pendulum.
3. Uniform bending - scale and Telescope.
4. Surface tension - Drop weight method interfacial surface tension between two liquids - drop weight method.
5. Viscosity of a liquid - comparision of viscosities – Hare's apparatus.
6. Specific heart capacity of a liquid - Newton's law of Cooling
7. Specific heat capacity of a liquid - Joule's calorimeter
8. Meter bridge - Specific Resistance
9. Carry Foster's Bridge – Specific Resistance Determination.
10. Potentiometer - calibration of low range voltmeter
11. Thermal conductivity of a bad conductor – Lee's disc method.
12. Table galvanometer - Figure of merit
13. Spectrometer - Refractive index of glass prism
14. Spectrometer - Mercury spectrum - grating – minimum deviation method
15. Air wedge – Thickness of the given thin wire.
16. Characteristics of a Zener diode
17. AND, OR, NOT, Logic gates- Verification of truth tables using discrete components.
18. AND, OR, NOT, Logic gates – using integrated circuit.

Course Outcome

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

CO 1	understand the concept of physical quantities.
CO 2	acquire experimental skill to measure physical quantities using measuring instruments.
CO 3	know the problem solving.
CO 4	understand concepts related with physics experiments.
CO 5	know the experiments of basics physics.

Books for Study :

1. Dr.S.Somasundaram, Practical Physics, Apsara publications, Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi2011.

Books for Reference:

1. S.Srinivasan,A Text Book of Practical physics., S.Sultanch and publications.
2. Department of Physics, Practical Physics, (B.Sc Physics Main), St.Joseph's College, Tiruchirapalli 1998.

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	3	3	2	3
CO5	3	3	3	3	3

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ALLIED PHYSICS III

Learning Objectives

LO 1	To understand the concept and laws of electrostatics
LO 2	To acquire knowledge on current electricity, electromagnetism
LO 3	To understand the atom models, X-rays and nuclear properties and reactions.
LO 4	To study fundamentals of analog electronics
LO 5	To know the number system, logic gates and basic digital circuits.

UNIT I Electrostatics

Electric field – Coulomb's inverse square law – Electric potential at a point charge – Gauss's theorem and its applications – Intensity of a point due to a charged sphere and infinite plane charged conductor – capacitor - Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges – capacitors in series and parallel.

UNIT II Magnetism and Electromagnetism

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties of para, dia and Ferromagnetic materials – Cycle of magnetization – Hysteresis – B-H curve – applications of B-H curve - Electromagnetic induction – Faraday's laws – Lenz law – Self and mutual induction – self – inductance of a solenoid – mutual inductance of a pair of solenoids – Coefficient of coupling.

UNIT III Atomic and nuclear physics

Bohr atom model – radius energy – critical potential - Somerfield's relativistic atom model – vector atom model – Quantum numbers associated with vector atom model – Pauli's exclusion principle - Nucleus – Classification of nucleus – Nuclear – Size – charge – Mass – Spin – Binding energy – Mass defect – Nuclear fission – Fusion – Nuclear models – Liquid drops model – The shell model – Salient features of shell model.

UNIT IV Analog electronics

Semiconductor – Intrinsic and extrinsic semiconductors – PN junction diode – Biasing PN junction – VI characteristics of diode – rectifiers – Half wave – full wave and bridge rectifiers – Break down mechanism – zener diode as voltage regulator- Transistor – Working of a transistor – CE configuration – Transistor characteristics (CE configuration) – CE amplifier.

UNIT V Digital electronics and operational amplifier

Simple binary arthritic operations – Addition, subtraction - multiplication - Division – Subtraction using 1's and 2's complements – Number systems- Binary – octal – Decimal – Hexadecimal number systems – Inter conversions – logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – NOR and NAND as Universal gates – Boolean algebra – De Morgan's theorems – Half adder and Full adder.

Course Outcome

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

CO 1	various laws involved in the charged systems, electric potential and capacitors principle and its types.
CO 2	laws used in electrical circuits, specific resistance measurement and laws of electromagnetic induction
CO 3	various atom models, nuclear models, fission and fusion reactions.
CO 4	solid state electronic devices diode and transistor, their characteristics and applications.

CO 5	the number systems, conversion between them and logic gates and digital circuits.

Books for Study and Reference:

1. Electricity and Magnetism – R. Murugesan, S. Chand & Co. 2001.
2. Modern Physics – E. Murugesan, S. Chand & Co. 2001.
3. Basic Electronics – B.L. Theraja, S. Chand & co. 2003.

Course Outcome Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	3	2	2	3
CO5	3	3	2	3	3

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NON-MAJOR ELECTIVE I

Code : **Class : II - B.Sc., B.Com., B.A**

ENERGY PHYSICS

Learning Objectives

LO 1	To understand the concepts of Conventional Energy Sources
LO 2	To introduce some basic concept of Biomass Energy and its Utilization
LO 3	To make them aware and understand Other forms of Energy Sources

UNIT I Conventional Energy Sources and Solar energy

World reserve of Commercial energy sources and their availability - Coal, oil and natural gas - applications - Merits and Demerits - Renewable energy sources - Renewable and Conventional energy comparison - Solar energy - Solar water heaters - Water desalination - Photovoltaic generation - merits and demerits.

UNIT II Biomass energy fundamentals and Biomass Utilization

Biomass energy - classification - Photosynthesis - Biomass conversion process - Gobar gas plants (KVIC) - Wood gasification - advantage & disadvantages of biomass as energy source.

UNIT III Other forms of energy sources

Geothermal energy - Wind energy - Ocean thermal energy conversion -Energy from waves - tides – Applications- merits and demerits.

Learning outcome:

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

CO 1	understand the concepts of Conventional Energy Sources
CO 2	introduce some basic concept of Biomass Energy and its Utilization
CO 3	make them aware and understand Other forms of Energy Sources

Books for study:

1. D.P. Kothari, K.C. Singal & Rakesh Ranjan, Renewable energy sources and emerging Technologies, Prentice Hall of India Pvt. Ltd., New Delhi (2008).

2. Suhas P Sukhatme, Solar energy — Principles of thermal collection and storage, Tata McGraw-Hill Publishing company, New Delhi, Second edition, 2012.

Books for References:

1. S.A. Abbasiand Nasema Abbasi, Renewable Energy sources and the environmental impact, PHI Learning Pvt. Ltd., New Delhi (2008).

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	3
CO2	2	2	2	3	2
CO3	2	2	2	3	2

NON MAJOR ELECTIVE II

Code: **Class: II - B.Sc., B.Com., B.A**

LASER PHYSICS

Learning Objectives

LO 1	To study the fundamental of laser
LO 2	To observe production of laser in industrial application
LO 3	To understand lasers in medicine and communication

Unit I: Fundamentals of LASER

Laser Characteristics - Spontaneous emission - stimulated emission – Einsteins Coefficients - meta stable state – Principle of laser - Population inversion – pumping.

Unit II: Production of LASER & Industrial Applications

Helium - Neon Laser - Ruby Laser - CO_2 Laser – Semiconductor Laser -Laser cutting - welding - drilling - Hologram - Recording and reconstruction of hologram.

Unit III: Lasers in Medicine & communication

Lasers in Surgery - Lasers in ophthalmology - Lasers in cancer treatment- Optic fibre, communication - Total internal reflection - Block diagram of fibre optic communication system - Advantages of fibre optic communication.

Learning outcome:

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

CO 1	study the fundamental of laser
CO 2	observe production of laser in industrial application
CO 3	understand lasers in medicine and communication

Book for Study:

1. An introduction to LASERS - N. Avadhanulu, S. Chand & Company (2001)

Books for Reference:

1. Laser fundamentals - William T. SiifVast Cambridge University Press - Published in South Asia by foundation books, 23, Ansari Road, New Delhi
2. LASER Theory and Application - K. Thyagarajan and AX Ghatak, Mac miIIan, India" Ltd.

Course Outcome Mapping:

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	3
CO2	2	2	2	2	2
CO3	3	2	2	3	2