Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A' Grade by NAAC. Recognized by UGC Under Section 12 B
Coimbatore-641 043, Tamil Nadu, India

B.Sc. Physics

Programme Specific Outcomes:

1. Understand the core concept of Physics subjects
2. Acquire analytical and logical skill for higher Education.
3. Excel in Experimental and Theoretical Physics.
4. Trained to take up jobs in allied fields.
5. Confident to take up competitive exams

Scheme of Instructions & Examination
(for students Admitted from 2018-2019 & onwards)

Part	Subject Code	Name of Paper/ Component	Hours of Instructions/ Week		Scheme of Examination				
			Theory	Practical	Duration of exam	CIA	CE	Total	Credit
		First Semester							
I	**18BLT001/ 18BLH001/ 18BLF001**	Ilakkiyam-I-Ilakkanam, Ilakkiya Varalaru/ Prose and Non Detailed texts/ Language French-I	5	-	3	50	50	100	4
II	**18BLE001**	English Language for communication-I	5	-	3	50	50	100	4
III		**Core Course**							
	18BPHC01	Properties of Matter	5	-	3	50	50	100	3
	18BPHC02	Heat and Thermodynamics	5	-	3	50	50	100	3
	18BPHC03	Practical – I Properties of Matter ,Heat and Sound	-	5	3	50	50	100	2
		Discipline Specific Elective Course							
	18BPHI01	**DSE- I** Mathematics I	4		3	50	50	100	3
		Games	-	1					

Part	Subject Code	Name of Paper/ Component	Hours of Instructions/ Week		Scheme of Examination				
			Theory	Practical	Duration of exam	CIA	CE	Total	Credit
		Second Semester							
I	**18BLT002/ 18BLH002/ 18BLF002**	Ilakkiyam-II-Ilakkanam, Ilakkiya Varalaru/ Grammar Translation and General Essay / Language French-II	5	-	3	50	50	100	4
II	**18BLE002**	English Language for communication-II	5	-	3	50	50	100	4
III		**Core Course**							
	18BPHC04	Mechanics and Sound	5	-	3	50	50	100	3
	18BPHC05	Optics	5	-	3	50	50	100	3
	18BPHC06	Practical - II Properties of Matter ,Sound and Optics	-	5	3	50	50	100	2
		Discipline Specific Elective Course							
	18BPHI02	**DSE-II** Mathematics II	4	-	3	50	50	100	3
		Games	-	1					
		Third Semester							
I	**18BLT003/ 18BLH003/ 18BLF003**	Ilakkiyam-III-Ilakkanam, Ilakkiya Varalaru/ Ancient and Modern Poetry/ Language French-III	5	-	3	50	50	100	4
II	**18BLE003**	English Language for communication-III	5	-	3	50	50	100	4
III		**Core Course**							
	18BPHC07	Electricity and Magnetism	5	-	3	50	50	100	3
	18BPHC08	Mathematical Physics	5	-	3	50	50	100	3
	18BPHC09	Practical- III Optics, Electricity and Magnetism	-	3	3	50	50	100	2
		Discipline Specific Elective Course							
	18BPHI03	**DSE-III** Chemistry Theory for Physics	4	-	3	50	50	100	3
	18BPHI04	**DSE-III** Chemistry Practical for Physics	-	3	3	50	50	100	2

Part	Subject Code	Name of Paper/ Component	Hours of Instructions/ Week		Scheme of Examination				
			Theory	Practical	Duration of exam	CIA	CE	Total	Credit
		Fourth Semester							
I	**18BLT004/ 18BLH004/ 18BLF004**	Ilakkiyam-IV-Ilakkanam, Ilakkiya Varalaru/ Introduction to Functional Hindi and Journalism / Language French-IV	5	-	3	50	50	100	4
II	**18BLE004**	English Language for communication-IV	5	-	3	50	50	100	4
III		**Core Course**							
	18BPHC10	Atomic Physics and Spectroscopy	5	-	3	50	50	100	3
	18BPHC11	Electromagnetism	5		3	50	50	100	3
	18BPHC12	Practical – IV Optics, Electricity and Magnetism	-	5	3	50	50	100	2
		Discipline Specific Elective Course							
	18BPHI05	**DSE - IV** Computer Applications for Physics	2	3	3	50	50	100	4
		Internship during Summer Vacation for 15 days							
		Fifth Semester							
III		**Core Course**							
	18BPHC13	Geographic Information System	5	-	3	50	50	100	3
	18BPHC14	Materials Science	5	-	3	50	50	100	3
	18BPHC15	Solid State Physics	5	-	3	50	50	100	3
	18BPHC16	Electronics	5	-	3	50	50	100	3
	18BPHC17	Practical-V Electronics and Digital Electronics	-	5	3	50	50	100	2
	18BPHC18	Energy and Environment (Self Study Course)	1	-	3	100	-	100	4
	18BPHC19	Physics Computer based Test (CBT)	-	-	3	-	100	100	2
	18BPHC20	Internship	-	-	-	100	-	100	4

Part	Subject Code	Name of Paper/ Component	Hours of Instructions/Week		Scheme of Examination				
			Theory	Practical	Duration of exam	CIA	CE	Total	Credit
III		**Generic Elective (GE) Course**	2	-	3	100	-	100	2
		Sixth Semester							
III		**Core Course**							
	18BPHC21	Digital Electronics	4	-	3	50	50	100	3
	18BPHC22	Nuclear and Particle Physics	5	-	3	50	50	100	3
	18BPHC23	Quantum Mechanics and Relativity	5	-	3	50	50	100	3
	18BPHC24	Communication Electronics	4	-	3	50	50	100	3
	18BPHC25	Microprocessor	4	-	3	50	50	100	3
	18BPHC26	Practical-VI Electronics, Digital Electronics and Microprocessor	-	5	3	50	50	100	2
								Total Credit	**122**

Semester	Subject Code	Name of Paper/ Component	Hours of Instructions/week		Scheme of Examination			
			Theory	Practical	CIA	CE	Total	Credit
Part IV Components								
	A. Ability Enhancement Courses ***I. Ability Enhancement Compulsory Courses (AECC)***							
2	**15BAES01**	Environmental Studies (Foundation course)	4	-	100	-	100	4
5	**17BSCS01**	Communication Skills	3	-	Remarks			2
6	**17BSSS01**	Soft Skills	3	-	Remarks			2
	II. Skill Enhancement Courses (SEC)		40 hours duration		Remarks			2
3		**Value Added Course (from a basket of choices offered)**						
4		**Co-curricular Courses** Add on Certificate / Quantitative Aptitude/ Certificate Courses – Gandhian Studies/Women's Studies / Ambedkar Studies/GK/Verbal and Non-Verbal Reasoning/General awareness /others as per list	Varied duration		Remarks			2
	B. Extra-Curricular Course							
1-6	**15BXNC01-06/ 15BXNS01-06/ 17BXSP01-06**	**NCC/ NSS /Sports** (representing the University)	-	-	Remarks			6
							Total Credits	**18**

Total credits to earn the degree

1. Part I, II & III components - 122
2. Part IV components - 18

Total - 140 credits

Other courses offered by the Department

- **Discipline Specific Electives:**

18BMAI04	Physics for Mathematics	For B.Sc., Mathematics Students	During 4th Semester
18BMAI05	Physics Practical for Mathematics		
18BSEI02	Physics for Special Education	For B.Sc., Special Education Students	During 2nd Semester
18BSEI03	Physics Practical for Special Education		
18BCHI01	Physics for Chemistry	For B.Sc., Chemistry Students	During 1st Semester
18BCHI02	Physics Practical for Chemistry		
18BBCI03	Physics for Biochemistry	For B.Sc., Biochemistry Students	During 2nd Semester
18BBCI04	Physics Practical for Biochemistry		

- Generic Elective Course:

18BPHO01	Everyday Physics	Any major other than physics	During 5th semester

- Value added Course

18BPHV01	Domestic Appliances Servicing	Any major other than physics	During 3rd semester

Properties of Matter

SEMESTER I **Hours of Instruction/week : 5**
18BPHC01 **No. of Credits: 3**

Objectives:
1. To know the basic principles of properties of matter.
2. To understand the properties of liquids.
3.To gain knowledge in the concepts of Gravitation, Osmosis and Diffusion

Unit 1 Elasticity

Stress, Strain, Elastic limit, Hooke's law, Moduli of Elasticity, Torsion, Expression of torque per unit twist of a cylinder, Determination of rigidity modulus, Static torsion method, Work done in twisting a wire, Bending Moment, Expression for bending moment, Cantilever, Bending of beams of a rectangular Bar - Uniform and Non uniform bending, Koening's method for 'q' Uniform and Non uniform bending. **20**

Unit 2 Flow of Liquids - Viscosity

Streamline and turbulent flow, Energy of a liquid, Bernoulli's Theorem, Torricelli's Theorem, Application of Bernoulli's Theorem – Venturimeter, Reynolds number , Poiseuille's formula for the flow of liquid through a capillary tube, Experimental determination of Coefficient of Viscosity using Poiseuille's method, correction to Poiseuille's formula, motion through highly viscous liquid, Stoke's method, Searle's Viscometer **10**

Unit 3 Surface Tension

Surface Tension, Definition of surface energy, Excess pressure over curved surface - Excess pressure inside a liquid drop and soap bubble, Determination of surface tension, Drop weight method, Interfacial surface tension between two liquids, Quinke's Method, Variation of surface tension with temperature, Jaeger's Method. **15**

Unit 4 Gravitation

Newton's law of gravitation, Kepler's Law of Planetary Motion, Determination of 'G' by Poynting's method, Variation of 'g' with altitude, depth and latitude, Escape velocity, Principle of rocket, Gravitational potential due to sphere, Compound pendulum, Kater's pendulum. **15**

Unit 5 Diffusion and Osmosis

Graham's law of diffusion, Fick's law of diffusion, Experimental Determination of coefficient of diffusion, Differential equation for diffusion, Osmosis and Osmotic pressure, Osmosis and Vapor pressure of a solution, Osmosis and Boiling point of a solution, Osmosis and Freezing point of a solution Reverse osmosis, Osmotic pressure, Berkley and Hartley method, Laws of osmotic pressure, Determination of Molecular weight of a substance from Elevation of boiling point of a solution and Lowering of freezing point of a solution. **15**

Total Hours 75

Course Outcomes:
1. Analyze and comprehend regarding the strength of the solid materials of different size.
2. Differentiate between the streamline and turbulent flow of liquids and reason out the effects of liquids while flowing
3. Compare the viscosity and interfacial surface tension between the liquids
4. Understand the effect of gravitation on objects and understand the principle of rocket

5. Assimilate and analyze the motion in fluids and express the changes occurring in them in turns of boiling point and freezing point.

Text Books:

1. ***Brijlal and N. Subrahmanyam, (2005). Properties of Matter***.S.Chand & Co. Pvt. Ltd., New Delhi.
2. ***R.Murugesan, (2004). Properties of Matter.*** S.Chand & Co. Pvt. Ltd., RamNagar, New Delhi.
3. ***C.L.Arora, P.S.Hemne ,*** **(2010)** ***Physics for Degree Students.*** S.Chand & Co. Pvt. Ltd., New Delhi

Reference Books:

1. ***Chatterjee and Sen Gupta, (2001). A Treatise on General Properties of Matter***. New Central Books agency (p) Ltd, Calcutta.
2. ***D.S.Mathur, (2000). Elements of Properties of Matter***. ShyamLal Charitable Trust, New Delhi.
3. ***Hafez A . Radi, John O Rasmussen*** **(2013)** ***Principles of Physics : For Scientists and Engineers***,
Springer Heidelberg, New York - Dordrecht - London

Heat and Thermodynamics

SEMESTER I **Hours of Instruction/week : 5**

18BPHC02 **No. of Credits: 3**

Objectives:

1. To understand the basic concepts of heat and temperature
2. To learn about thermometry
3. To understand the applications of the laws of thermodynamics

Unit 1 Thermometry and Specific Heat

Concept of Heat and Temperature, Thermoelectric thermometer, Absolute zero and Ice point, Specific Heat of the gas, C_p and C_v, Determination of C_v by Joule's differential steam calorimeter, Determination of C_p by continuous flow electrical method, Dulong and Petit's Law, Variation of Specific heat and Atomic heat with temperature, Einstein's theory of Specific heat, Debye's theory of specific heat. **18**

Unit 2 Calorimetry and Low temperature

Calorimetry, Nernst vacuum calorimeter, Newton's Law of cooling. Joule-Kelvin effect, Porous plug experiment , Temperature of inversion, Liquefaction of air, helium and hydrogen, Adiabatic demagnetization. **15**

Unit 3 Kinetic theory of gases

Postulates, Mean free path, Degrees of freedom, Theorem of equipartition of energy, Viscosity of gases, Van der Waal's equation of critical constants and their determination. **12**

Unit 4 Thermodynamics

Isothermal and adiabatic changes, Work done in these processes, Heat engines, Reversible and irreversible processes, Efficiency of heat engine, Indicator diagram, Carnot's engine, Second law of thermodynamics, Carnot's theorem, Internal combustion engine, Thermodynamic scale of temperature. **15**

Unit 5 Entropy

Definition of entropy, Change of entropy in reversible and irreversible processes, Entropy of a perfect gas, Third law of thermodynamics, temperature-entropy diagram, Maxwell's thermodynamic relation, Clausius-Clapeyron equation, Negative temperature, Enthalpy. **15**

Total Hours 75

Course Outcomes:

1**.** Differentiate the terms heat and temperature and measure temperature using thermometer and convert one scale of temperature to another scale.
2. Understand specific heat capacity of gas and the different theories on specific heat capacity
3. Differentiate between principles and methods to produce low temperature, liquefy air, helium and hydrogen
4. Define postulates of kinetic theory of gases and arrive at theorem of equipartition of energy and derive Van der Waal's equation.
5. Define different thermal processes and understand laws of thermodynamics and identify its outcomes

Text Books:

1. ***Brijlal and Subrahmanyam, (2000). Heat and thermodynamics.*** S.Chand & Co .Ltd. Ram Nagar, New Delhi.
2. ***A.B.Gupta and H.P.Roy, (1995). Heat and thermodynamics.*** New Central Book Agency (p) Ltd, Calcutta.
3. ***J.K.Sharma and K.K.Sarkar,*** **(2018),** ***Thermodynamics and Statistical Physics,*** Himalaya Publishing House.

Reference Books:

1. ***Resnick, Halliday and Krane, (2002). Physics, Volume I.*** John Wiley & sons, Fifth edition.
2. **M.W.Zemansky,Richard H.Dittman, (1996),** ***Heat and Thermodynamics,*** McGraw-Hill**.**
3. ***S.Loganathan and R.S.Gambhir*****,(1991),** ***Statistical and Thermal Physics-An Introduction,*** PHI Publishers

Practical-I Properties of Matter, Heat and Sound

SEMESTER I **Hours of Instruction/week : 5**
18BPHC03 **No. of Credits: 2**

Objectives:

1. To identify the strength of a given object.
2. To Test the heat capacity of liquids and thermal conductivity of solids.
3. To understand laws of sound.

1. Determination of 'k' and 'g', Compound Pendulum
2. Young's Modulus, Non-Uniform Bending, Pin & Microscope.
3. Young's Modulus, Uniform Bending, Pin & Microscope.
4. Young's Modulus, Cantilever (Static method)
5. Young's Modulus, Cantilever (Dynamic method)
6. Young's Modulus, Non -Uniform Bending, Koening's method
7. Rigidity Modulus, Torsion Pendulum
8. Rigidity Modulus, Static Torsion, Scale & Telescope.
9. Specific Heat Capacity of a Liquid , Joule's Calorimeter
10. Surface Tension, Drop Weight Method
11. Coefficient of Viscosity of a liquid, Poiseulle's flow
12. Comparison of radii of Capillary tubes, Poiseulle's flow.
13. Viscosity of a Highly Viscous Liquid, Searle's Viscometer
14. Thermal Conductivity of a bad conductor, Lee's Disc
15. Verification of Laws of Transverse Vibrations, Sonometer

Total Hours 75

Course Outcomes:

1. Perform experiments on any material to identify the strength the given objects
2. Deal with liquids based on their viscosity
3. Compare the thermal conductivity of solids
4. Analyze the heat capacity of liquids
5. Comment on the relation between frequency, length and tension of a stretched string under vibration.

Mechanics and Sound

SEMESTER II **Hours of Instruction/week : 5**
18BPHC04 **No. of Credits: 3**

Objectives:

1. To enable the students to understand the basic concepts of mechanics
2. To understand the concepts of simple harmonic motion
3. To acquire the knowledge on Ultrasonic waves and Acoustics

Unit 1 Non Relativistic Particle Dynamics

Dynamics of uncharged Particles, Motion of a body falling freely under the action of gravity, Projectile Motion, Range of the Projectile.
Dynamics of charged Particles, Definitions and Preliminary Relations, Charged Particle in an uniform and constant electric field, Charged Particle in an alternating electric field, Charged Particle in an uniform and constant magnetic field. **15**

Unit 2 Conservation laws

Law of conservation of energy, Concept of work, power and energy, Conservative forces, Law of conservation of momentum, Motion of center of mass, Centre of mass, Angular momentum and torque, Conservation of angular momentum. **15**

Unit 3 Simple harmonic motion

Simple harmonic motion, Composition of two simple harmonic motions, Linearly and perpendicularly, Lissajous figures, Average Kinetic energy and potential energy, Theory of beats, Harmonic oscillator, Damped and forced simple harmonic motion, Resonance. **15**

Unit 4 Ultrasonic waves

Ultrasonic waves, ultrasonic generators, Piezoelectric generator, Magnetostriction generator, Acoustic grating, Velocity of ultrasonic wave, Application of ultrasonic waves, Fourier theorem, Analysis of square and saw tooth waves by Fourier theorem. **15**

Unit 5 Acoustics

Laws of transverse vibrations of strings, Velocity of sound in air, Helmholtz resonator, Determination of frequency by Melde's method, Acoustics of buildings, Sabine's reverberation formula, Open window unit. **15**

Total Hours **75**

Course Outcomes:

1. Recognize the motion of the charged particle in electromagnetic field.
2. Describe conservation of energy, work, force, linear momentum and angular momentum
3. Learn the fundamentals of harmonic oscillator model, including damped and forced oscillators
4. Describe the production, detection of ultrasonic waves and applications
5. Explain the absorption and reflection of sound by various materials and describe the requirements for good architectural acoustics

Text Books:

1. ***D.S.Mathur, (2000). Mechanics***. S.Chand & Co, New Delhi.
2. ***M.Narayanamurthy,(1976). A text book of Dynamics***. The National Publishing Company, Chennai.
3. ***Brijlal and Subrahmanyam, (2000). A text book of Sound.*** S.Chand & Co .Ltd. Ram Nagar,New Delhi.

Reference Books:

1. M.Narayanamurthy, V.Gosakan and T.Rajagopalan, (1980). Sound. The National Publishing Company Co., Chennai**.**
2. Resnick, Halliday and Krane, (2002). Physics, Volume I. John Wiley & Sons, Fifth edition.
3. ***Lawrence E.Kinsler, Austin R.Frey, Alan B.Coppens, James V.Sanders* , (2000). *Fundamentals of***
Acoustics, John Wiley Sons Ltd. Fourth Edition.

Optics

SEMESTER II **Hours of Instruction/week : 5**

18BPHC05 **No. of Credits: 3**

Objectives:

1. To learn about Phenomenon of light
2. To understand the properties of light energy
3. To gain knowledge of geometrical and physical optics

Unit 1 Aberration

Aberration in a lens ,Longitudinal and Lateral Chromatic aberration, Expression for longitudinal chromatic aberration for i) an object at infinity, ii) an object at finite distance, Circle of least chromatic aberration, Achromatic lenses, Condition for achromatism when two lenses are i) in contact and ii) separated. **10**

Unit 2 Optical instruments and velocity of light

Objective, Eye piece, Huygens Eye piece, Construction, Theory, Equivalent focal length, Position of cross wires, Ramsden Eyepiece, Theory, Equivalent focal length, Position of cross wires, Comparison between eyepieces, Velocity of light, Michelson's rotating mirror null method, Kerr cell method. **15**

Unit 3 Physical optics

Huygens principle of wave propagation, wave front, wave surface, Types of wave front, spherical and cylindrical wave front, Interference, coherent sources ,Theory of interference, analytical method, Fresnel's biprism: Experiment and Theory, Determination of wavelength of light, fringe width, distance between coherence sources (d), wedge shaped thin film, Newton's rings: condition of bright and dark rings, radii of dark fringes, determination of wavelength of light, Michelson Interferometer: Principle, construction, working, Circular fringes, localized fringes, Determination of wavelength. **20**

Unit 4 Diffraction

Fresnel's assumptions, Rectilinear propagation of light, Zone plate construction, Comparision between a zone plate and a convex lens, Fresnel's diffraction at a (i) Circular aperture, mathematical treatment of diffraction at a circular aperture, (ii) Fraunhofer diffraction at (i) single slit, intensity distribution, interference maxima and minima, diffraction maxima and minima, (ii) double slit, distinction between single slit and double slit diffraction pattern, Diffraction grating, transmission and reflection grating, theory of plane transmission grating, Determination of wavelength by transmission grating, Dispersive power of grating, Distinction between interference and diffraction. **15**

Unit 5 Polarisation

Polarisation, plane of polarization, Polarisation by reflection, Brewster's law, applications, Polarizer and analyser, polarization by double refraction, Nicol prism, construction, working, Effect of polarizer on natural light, Effect of analyser on plane polarized light (Malus Law), Anisotropic crystal, uniaxial and biaxial crystal, Huygens's principle of double refraction in uniaxial crystals, positive and negative crystals. Various types of polarized light, Quarter Wave Plate and Half Wave Plate, production and detection of elliptically polarized light, circularly polarized light. **15**

Total Hours 75

Course Outcomes:

1. Distinguish the different types of aberrations and achromatism.
2. Use different types of eyepieces according to their application.
3. Calculate wavelength difference and fringe width from the interference pattern.
4. Explain diffraction pattern and calculate dispersive power of the grating
5. Analyze different types of polarized light.

Text Books:

1. ***Brijlal & Subramaniam, (2006). A Text book of Optics*****.** S.Chand & Co. Ramnagar, New Delhi.

2. ***A.K.Jha, (2009). A Text Book of Applied Physics*****.** I.K International Publishing House Pvt. Ltd., New Delhi, Bangalore.

3. ***Satyaprakash, (1991). Optics and Atomic Physics.*** Ratna Prakashan Mandir.

Reference Books:

1. ***Emil Wolf and Max Born*****, (1959).** ***Principles of Optics***, Pergamon Press, New York, Sixth Edition

2. ***S.P.Singh & J.P.Agarwal, (2000). Optics.*** K.K.Mittal for Pragathi Prakashan, Seventh edition.

3. ***Resnick, Halliday & Krane, (2002). Physics. Volume II,*** John Wiley & Sons, Fifth edition.

Practical-II Properties of Matter, Sound and Optics

SEMESTER II **Hours of Instruction/week : 5**

18BPHC06 **No. of Credits: 2**

Objectives:

1. To identify the strength the given objects
2. To deal with liquids based on their viscosity
3. To test the thermal conductivity of bad conductors

1. Young's Modulus,Uniform Bending, Koening's method
2. Moment of Inertia, Bifiliar Pendulum
3. Moment of inertia with symmetrical masses , Torsion Pendulum
4. Determination of 'g', Kater's Pendulum
5. Interfacial Surface Tension , Drop Weight Method
6. Variation of Surface Tension with Temperature, Jaeger's Method
7. Comparison of Viscosities of two liquids (Water and Kerosene), Poiseulle's flow.
8. Stoke's Method., Viscosity of Highly Viscous Liquid
9. Young's Modulus, Non-Uniform Bending , Optic lever and telescope
10. AC Frequency , Sonometer
11. Frequency of a Fork , Melde's String
12. Unknown mass and relative densities of solid and liquid Melde's string
13. Spectrometer- Refractive index of Glass Prism
14. Polarimeter – Specific rotatory power of a solution
15. Spectrometer- Standardization of Grating – Number of lines on Grating

Total Hours 75

Course Outcomes :

1. Conduct experiments on wooden bar and to identify its the strength
2. Test a wire or cylindrical rod for its strength
3. Deal with liquids based on their viscosity
4. Identify information such as purity and concentration of a solution
5. Distinguish first order and second order spectrum

Electricity and Magnetism

SEMESTER III **Hours of Instruction/week : 5**

18BPHC07 **No. of Credits: 3**

Objectives:

1. To understand the utility of electric and magnetic phenomena.
2. To gain knowledge of Thermoelectricity and to apply them in daily life.
3. To know the magnetic properties of matter

Unit 1 Electrostatistics

Gauss's theorem, Electric intensity at a point due to uniformly charged hollow cylinder, Coulomb's Law, Mechanical force experienced by unit area of a charged surface, Energy stored per unit volume in an electric field, Definition for electrical images, electric intensity at a point on a plane conducting surface, Electric intensity and electric potential due to an earthed conducting sphere applying the principle of electric images. **15**

Unit 2 Capacitors and Electrometers

Capacity of a conductor, Energy of a charged conductor, Sharing of charge between two charged conductors, Condensers, Capacity of Spherical, cylindrical and parallel plate condensers, Kelvin's absolute electrometer, Quadrant electrometer. **15**

Unit 3 Electrical measurements and Thermoelectricity

Kirchoff's laws, P.O.Box, Potentiometer, Determination of emf, low resistance, small thermo emf, and large potential difference, Seebeck effect, Peltier effect, Thermo emf, Application of thermodynamics to thermocouple, Thermoelectric Power, Thermoelectric diagrams (Conceptual ideas). **15**

Unit 4 Magnetism

Magnetic dipole, potential and intensity at a point on the axial and equatorial points due to a dipole, Magnetic potential and its relation to intensity of a field at an arbitrary point due to a dipole, potential due to a dipole, Magnetized sphere, Magnetic shell, definition, strength of a shell, potential due to magnetic shell of different shapes. **15**

Unit 5 Magnetic properties of matter

Magnetic induction, Intensity of magnetization, Susceptibility, Permeability and relation connecting them, Hysteresis, Cycle of magnetization, Calculation of energy loss from hysteresis loop - Magnetometer method (I-H) and Ballistic (B-H**)** **15**

Total Hours 75

Course Outcomes:

1. Identify the presence of static electric charges and fields due to static charges
2. Possess adequate knowledge to analyze electrical circuits using Kirchoff's laws
3. Understand the phenomena of Seeback effect and apply the concept of thermo-emf wherever suitable
4. Distinguish between different types of magnetic materials and different kinds of magnetism manifested in materials
5. Analyze magnetic properties of a ferromagnetic solid by analyzing or recording its hysteresis behavior

Text Books:

1. ***Brijlal & Subramaniam, (2006). Electricity and Magnetism.*** Ratna Prakashan Mandir, Educational & University Publication 1751/18, Barya ganj, New Delhi.
2. ***R.Murugeshan,(2008). Electricity and Magnetism.*** S.Chand & Co. Ltd., Ram Nagar, New Delhi
3. ***K.K.Tewari, (2007). Electricity & Magnetism with electronics.*** S.Chand & Co. Pvt. Ltd., Ram Nagar, New Delhi.

Reference Books:

1. ***D.Chatthopadhyay and P.C.Rakshit, (2001). Electricity and Magnetism,*** Books and Allied (P) Ltd.
2. ***M.Narayanamurthy & N.Nagaratnam, (1988). Electricity and Magnetism.*** The National Publishing Co, Chennai.
3. ***Resnick, Halliday & Krane, (2002). Physics, Volume II.*** John Wiley & sons, Fifth edition.

Mathematical Physics

SEMESTER III **Hours of Instruction/week : 5**
18BPHC08 **No. of Credits: 3**

Objectives:

1. To study the mathematical methods of physics
2. To study the concepts of classical mechanics
3. To understand the concepts of statistical mechanics

Unit 1 Vector Calculus

Vector calculus in three dimensions, Del operator, Divergence of a vector, Curl of a vector, Laplace operator, Guass theorem, Stoke's theorem, Green's theorem **15**

Unit 2 Curvilinear Coordinates

Curvilinear coordinates, Transformation of coordinates, Orthogonal Curvilinear coordinates, Unit vectors in curvilinear systems, cylindrical coordinates, Spherical coordinates, Curl, divergence and gradient in cylindrical and spherical coordinates. **15**

Unit 3 Special functions

Special functions, Definition of beta and gamma function, Interrelationship, properties of beta function, Properties of gamma function, Evaluation of Γ (1/2). **15**

Unit 4 Classical mechanics

Newtonian mechanics: single and many particle system, Conservation laws of constraints, their classification, D'Alembert's principle, Lagrange's equation, generalized coordinates and moments, Principle of least action, derivation of equation of motion, Variation of end points, Hamilton's principle. **15**

Unit 5 Elements of Statistical Mechanics

Distribution law for Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics, Derivation of Planck's law from Bose-Einstein statistics, Richardson-Dushmann equation from Fermi-Dirac Statistics. **15**

Total Hours **75**

Course Outcomes:

1. Understand vector calculus in three dimensions and derive Gauss theorem, Stoke's theorem and Green's theorem.
2. Derive Curvilinear coordinates and differential operators in cylindrical and spherical coordinates.
3. Apply special function to solve integral.
4. Understand Newtonian, Lagrangian and Hamiltonian mechanics.
5. Compare Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics and derive it's outcomes.

Text Books:

1. ***B.S.Rajput, (2000). Mathematical Physics.*** Pragati Prakashan Publishers, Meerut.

2. ***S.L.Gupta, Kumar and Sharma, (2007). Classical Mechanics.*** Pragati Prakashan Publishers, Meerut.

3. ***S.L.Gupta and Kumar, (2006). Statistical Mechanics.*** Pragati Prakashan Publishers, Meerut.

4. *B.D.Gupta, (2004). Mathematical Physics.* Vikas Publishing House (P) Ltd, New Delhi.

Reference Books:

1. *B.K. Agarwal and Eisner Melvin, (1998). Statistical Mechanics.* New Age International.

2. *P.M. Mathews and K.Venkatesan, (2002). A Textbook of Quantum Mechanics.* Tata McGraw Hill Publishing Company Ltd.

3. ***Goldstein Herbert, (2000). Classical Mechanics.*** Narosa Publishing House.

Practical-III Optics, Electricity and Magnetism

SEMESTER III **Hours of Instruction/week : 3**

18BPHC09 **No. of Credits: 2**

Objectives :

1. To demonstrate the effect of magnetic field on current carrying conductors
2. To calibrate a voltmeter or ammeter
3. To analyze the effects of refractive index of a medium using optical instruments

1. Radius of Curvature , Newton's Rings
2. Refractive index of a liquid, Newton's Rings
3. Refractive index of liquid using hollow prism, Spectrometer
4. Study of Transformer
5. Spectrometer i-d Curve, Solid prism.
6. Spectrometer , i-i' Curve , Solid Prism
7. Cauchy's Constants, Spectrometer ,Solid prism
8. Low range Voltmeter Calibration , Potentiometer
9. Low range Ammeter Calibration, Potentiometer
10. Temperature coefficient of a coil, Potentiometer
11. Resistance and Specific Resistance, Carey foster's bridge
12. Spectrometer, Brewster's Law, Refractive index of a prism
13. Study of CRO-Measurement of Sinusoidal voltage, frequency and power factor
14. Deflection Magnetometer, Tan C.
15. Determination of moment of a magnet, using coil carrying current.

Total Hours 45

Course Outcomes:

1. Demonstrate the effect of magnetic field on current carrying conductors
2. Examine the effect horizontal component of earth's magnetic field on magnetic materials
3. Calibrate a voltmeter or ammeter
4. Analyze the effects of refractive index of a medium using optical instruments
5. Predict the curvature of a transparent medium

Atomic Physics and Spectroscopy

SEMESTER IV **Hours of Instruction/week : 5**

18BPHC10 **No. of Credits: 3**

Objectives:

1. To learn the concepts in Atomic Physics.
2. To understand the principles and techniques of LASER and spectroscopy.
3. To learn the impact of magnetic field on spectra

Unit 1 Basic Quantum Concepts

Photoelectric phenomenon, Einstein's explanation on quantum theory, Millikan's experiment, Determination of Planck's constant, Photoelectric cells, Photo voltaic cell, Photo emissive cell and photo multiplier tube. **15**

Unit 2 Structure of Atom - I

Bohr atom model, Postulates, Expression for energy of an electron, Bohr's theory of hydrogen spectrum, Energy levels and spectral series, effect of nuclear motion on atomic spectrum, Ritz combination principle, Bohr's correspondence principle, Excitation and ionization potential, Frank Hertz experiment **20**

Unit 3 Structure of Atom - I

Sommerfeld's relativistic atom model, Modification in Bohr's theory, Fine structure of H line, Vector atom model, Coupling schemes, Magnetic dipole moment due to orbital motion of the electron, Magnetic dipole moment due to spin, Stern Gerlach experiment, Zeeman effect and Paschen Back effect (qualitative only). **10**

Unit 4 Spectroscopy

IR Region, Zero Point energy, Condition for IR activity, IR spectrometer, Sample handling techniques, Applications. Raman Effect, Stokes and Antistokes line, classical theory of Raman effect, Quantum Theory of Raman effect, Raman Spectrometer, Applications. **15**

Unit 5 Lasers

Absorption, Spontaneous and Induced emission, Population inversion, active medium, active centre, Characteristics of a Laser: Coherence length and Coherence time, Pumping mechanism, Gas lasers: He-Ne, Solid state lasers: Ruby, Dye laser: Rhodamine 6G **15**

Total Hours **75**

Course Outcomes:

1. Understand the emergence of quantum concept
2. Distinguish between different photodevices and working
3. Understand different atom models
4. Analyse the prerequisite in a molecule towards its Rotational and vibrational activity
5. Understand the laser action phenomena, properties of laser

Text Books:

1. ***Murugeshan R, (2005). Modern Physics.*** S.Chand and Co., New Delhi.
2. ***Gurudeep Chatwal and Shyam Anand,(1987). Spectroscopy-Atomic and Molecular.***

Himalaya Publishing House, Delhi.
3. ***A.K.Jha,(2009). A text Book of Applied Physics.*** *JK International Publishing House Pvt. Ltd..,New Delhi, Bangalore.*
4. ***G. Aruldhas,(2004).Molecular Structure and Spectroscopy.*** Prentice, Hall of India Pvt. Ltd, NewDelhi

Reference Books:

1. ***Arthur Beiser, (2002). Concepts in Modern Physics.*** Tata McGraw Hill Publishers, 6th Edition.
2. ***Francis A. Jenkins and Maxvey E.White, (2000).Fundamentals of Optics.*** Mc Graw Hill Book Co.,New Delhi.
3. ***M.R.Srinivasan,(1996).Physics for Engineers.*** New Age International Pvt. Ltd. Publishers.

Electromagnetism

SEMESTER IV **Hours of Instruction/week : 5**

18BPHC11 **No. of Credits: 3**

Objectives:

1. Understand the magnetic effects of electric current.
2. Study the unification of electric and magnetic phenomena.
3. To gain knowledge about Maxwell's equations and EM waves

Unit 1 Magnetic effects of electric current: **20**

Laplace's law, Magnetic field due to a straight conductor and circular coil carrying current, Intensity at a point on the axis of a circular coil carrying current. Magnetic field at a point on the axis of a solenoid. Force on a straight current carrying conductor in a magnetic field. Fleming's left hand rule, Force between two plane parallel conductors carrying current, Definition of ampere, Force on an electron in a magnetic field. Force experienced by a conductor moving in a magnetic field. Moving coil galvanometer, deadbeat galvanometer, ballistic galvanometer: theory, construction and uses, damping in a ballistic galvanometer.

Unit 2 Electromagnetic induction: **15**

Faraday's law, Lenz's law, Fleming's right hand rule, Self induction, Mutual induction. Self inductance and its determination, Rayleigh's method, mutual inductance and its determination, coefficient of coupling.

Unit 3 Varying current circuits: **10**

Growth and decay in L-R and C-R circuits. High resistance by leakage, Charging and discharging of a condenser through L and R.

Unit 4 AC Circuits: **15**

EMF induced in a coil, Mean Value of Alternating emf, RMS value of alternating emf, AC circuits with L,C,R, Reactance and Impedance, Series and parallel resonant circuits, Power in AC circuits having LR,CR, choke coil ,Wattless current.

Unit 5 Maxwell's Equations: **15**

Basic equations,Types of currents, Vacuum displacement current, Maxwell's equations in free space, Electromagnetic waves in free space, Electromagnetic waves in isotropic non conducting media, Index of refraction, Energy density of electromagnetic wave and Poynting's theorem.

Total Hours **75**

Course Outcomes:

1. Distinguish between magnetic effect of electric current and electromagnetic induction and to apply the related laws in appropriate circumstances
2. Demonstrate magnetic field of electric current/ electromagnetic induction through proper understanding
3. Compare the principles and working of different types of galvanometer
4. Apply and analyze the behaviour of ac/ dc circuits based on L,C and R
5. Understand the unification of electric and magnetic fields and Maxwell's equations governing EM waves

Text Books:

1. ***Brijlal and Subramaniam,*** **(2002).** ***Electricity and Magnetism,*** Ratna Prakashan Mandir,

Educational & University Publication 1715/18, Barya ganj ,New Delhi.
2. ***R.Murugeshan*, (2008), *Electricity & Magnetism***. S.Chand & Co. Ltd., Ram Nagar, New Delhi.
3. ***K.K.Tewari*, (2007), *Electricity & Magnetism with Electronics***. S.Chand&Co. Ltd., Ram Nagar, New Delhi.

Reference Books:

1. ***D. Vasudeva*,(1984). *Electricity & Magnetism*,** S.Chand & Co. Ltd., Ram Nagar, New Delhi.
2. ***Resnick, Halliday & Krane*, (2002), *Physics, Volume II*,**John Wiley & Sons, Fifth edition.
3. ***D.Chatthopadhyay and P.C.Rakshit, (2001), Electricity and Magnetism*,** Books and Allied (P) Ltd.

Practical - IV Optics, Electricity and Magnetism

SEMESTER IV **Hours of Instruction/week : 5**

18BPHC12 **No. of Credits: 2**

Objectives :

1. To analyze the effects of refractive index of a medium using optical instruments
2. To estimate the specific resistance of any conductor
3. To calibrate a High range voltmeter

1. Thickness of a thin material, Air Wedge
2. Normal incidence (λ of Hg Spectrum), Spectrometer Grating
3. Minimum deviation (λ of Hg Spectrum), Spectrometer Grating
4. Dispersive power of a Grating, Spectrometer
5. Dispersive power of a Prism, Spectrometer
6. Meter Bridge , Specific resistance of a wire
7. Meter Bridge, Temperature coefficient of resistance
8. Resistance and Specific Resistance, Potentiometer
9. EMF of a Thermocouple, Potentiometer
10. High Range Voltmeter Calibration, Potentiometer
11. Self Inductance, Rayleigh's Bridge Method
12. Determination of Retentivity and Coercivity
13. Determination of time constant of series RC electric circuit
14. Determination of frequency response of RLC circuit
15. Specific Resistance, Post Office Box

Total Hours 75

Course Outcomes:

1. Measure the thickness of thin material using optical means
2. Determine the wavelength of Mercury spectrum
3. Estimate the specific resistance of any conductor
4. Calibrate a High range voltmeter
5. Analyze frequency response of RLC circuit.

Computer Applications for Physics

SEMESTER IV **Hours of Instruction/week : 2+3**

18BPHI05 **No. of Credits: 4**

Objectives:

1. To impart basic knowledge on MS Office
2. To understand MS Access
3. To understand the basics of Internet and programming in C

Unit 1 Introduction to Windows

Operating System, Function of OS-Classification of OS. Programming Languages: Types of languages, compilers and Interpreters. Working with windows explorer, organizing files and folders, MS Office 2007, basic elements of windows, working with Browsers, working with documents, Formula editor, Working with tables, Mail merge concepts. 6

Unit 2 Introduction to MS Excel

Spreadsheet software, working with worksheet, simple formula, copying the formula, paste function, creating charts, formatting with charts, enhancing the worksheet with Graphics, Manage multiple worksheets in a work book, Drawing Autoshapes. 6

Unit 3 Introduction to MS Access

Database concepts, Database Terminology, Normalization and its types, Import and link the data, Create and design tables, working with tables, Filtering records, Search and replace records, Sorting records, Relationship and its types, Creating Queries and Reports, Designing forms, Creating hyperlinks. 6

Unit 4 Basics of C Programming

Importance of C Language, Structure of C programming language, programming style, executing a C program. Constants, data types in C, scalar variables – declaring, variable names, defining constants, Defining variables, Various Expressions and operators, plotting graph with Origin 7

Unit 5 Working with Internet

Basics of internet, Web browsers, Connecting to the Internet Hardware, Software and ISPs, Search engines, search strategies, Web Portals, mail, Compose and send a message, working with e-mail attachments. 5

Total Hours 30

Computer Applications Practical for Physics

1. Letter documentation using mail merge concepts.
2. Calculation of worksheet by applying formulas.
3. Prepare a worksheet with following details Reg.No, Name, Major, Mark1, Mark2, Mark3, Total and Result. Enter 5 records. Calculate total and result using formulae
4. Preparation of charts using Microsoft Excel.
5. Create a database named telephone with following tables.

Customer

Telephone Number	Number
Customer Name	Text
Customer Address	Text

Office

Telephone number	Number
Number of calls	Number
Bill date	Date
Last date	Date

a. Create a query to display the records with telephone number, customer name, No of calls, Unit charge.
b. Create a query to display the records with telephone number, customer name, No of calls>50.
c. Create a query to display the records with telephone number, No. of calls and total amount using build function.
d. Create a query to display the records with customer name "Abishek"

6. Create a employee database with the following table details

Employee details

EmpNo	Number	Primary
Emp Name	Text	
Department	Text	
Designation	Text	

Salary Details

EmpNo	Text
Basicpay	Number
HRA	Number
DA	Number
PF	Number
IT	Number

Apply the following simple and complex queries and display corresponding records.

a. Display the records with designation as "Programmer".
b. Display the records with following details EmpNo, Emp name, BP.
c. Display all the records where BasicPay>=5000 with the following fields, EmpNo, EmpName, BP.
d. Calculate the Netpay using the build function and display records with the fields EmpNo, EmpName, BP.

e. Display the records with department “Sales” and Netpay>=6000 with the fields EmpNo, Department, Designation and Netpay.

7. Create Library Database with the following details create three tables.

BOOK DETAILS TABLE	**LENDING TABLE**	**CUSTOMER TABLE**
Book ID	Book ID	Customer Number
Book Name	DOI	Address
Author	DOR	Deposit
Price	Customer Number	
Publisher		

8. Create five records for each table, create query by displaying the following fields.
   a. Book ID, Book name, DOI, DOR, Fine, use Build function to calculate fine, the formula for Fine if DOR>DOI the Fine is Rs.5.
   b. To display all the books which has Author Sidney Sheldon (Book name, Book Id, Author, Amount).
9. Write a C program to find the largest among the three given numbers.
10. Write a C program to find the smallest number in the given set of N numbers.
11. Write a C program to count the number of positive, negative and zero integers from the set of N numbers.
12. Write a C program to find the factorial of a given number.

Total Hours 75

Course Outcomes:

1. Compile word document independently along with usage of access for generation of multiple end user.
2. Preparation of spread sheet and working with multiple data.
3. Execution of simple ‘C’ Programme.
4. Assimilate knowledge on working of internet.
5. Hands on experience with MS Office and ‘C’ Programming.

Text books:

4. ***D.P Nagpal , (2000). Mastering Microsoft Office 2000.*** A.H.Wheeler Publishing and Co.Ltd,.
5. ***Excel 2007 in simple steps, (2008).*** Kogent solutions Inc.,Dreamtech Press.
6. ***Peterson, L.L. and Davie, S.B.,(2007.) Computer networks***-A System approach Published by MorganKaufmann.

Reference books:

1. ***E. Balagurusamy,(2010). Programming in Ansi C,*** Tata McGraw Hill Pub., 5th edition
2. ***G. Padmavathi, (2005).*** Visual Basic with Access, Registrar, 1st Edition.
3. ***Dorothy House, (2015).*** Microsoft Word, Excel and Power Point, Outskirts Press, 1st Edition.

Geographic Information System

SEMESTER V **Hours of Instruction/week : 5**

18BPHC13

No. of Credits: 3

Objectives:

1. To understand the fundamentals of Geographic Information Systems.
2. To gain knowledge on the Data storage using GIS.
3. To understand the Photogrammetry

Unit 1 GIS, Fundamentals, History & Applications

Introduction, Data and Information, Elements of GIS, GIS Objectives, GIS Applications, GIS in Retrospect, Advantage of GIS, Examples of GIS Outputs. **15**

Unit 2 Database Concepts and Map Projection

Introduction, Data, Definition, Information organization, Data Models, Raster and Vector, Raster and Vector systems compared, Organizing Attribute Data, Flat Files and Spreadsheets, Hierarchical Files, Relational Files, Data Structure, Relational Data Structure, Hierarchical Data Structure, Network Data Structure, Introduction, Types of Map Projections, Map Projection Illustrations, Commonly used Map Projections **15**

Unit 3 Data Capture, Conversion, Linking

Introduction, Entering the Spatial Data, Entering the Non-Spatial Associated Attributes, Linking Spatial and Non-Spatial Data, Creating a Map: Tourism, Pollution level along river **15**

Unit 4 Errors, Precision Accuracy & Quality Assurance

Introduction, Sources of Errors in GIS Database, Data Quality Parameters, Handling Errors in GIS, Quality Assurance plan and validation, Data Maintenance, Correcting the Errors. **15**

Unit 5 Photogrammetry

Definitions, Processes and Products,Data acquisition, Photogrammetric Products, Photographic Products, Maps, Photogrammetric cameras, Classification of Sensing devices, Components of aerial cameras, Photographic Processes, Exposure, Sensitivity, colors and filters, Processing color film, Digital Cameras, Multiple frame cameras, Line cameras, CCD Camera, Working principle, Aerial Photography, Classification of aerial Photographs. **15**

Total Hours 75

Course Outcomes:

1. Comprehend the history and applications of GIS
2. Formats of spatial and non spatial data and associated attributes
3. Define different data models
4. Analyze sources of errors and correct errors
5. Have knowledge regarding the hardwares related to data acquisition

Text Books:

1. ***B. Gurugnanam*,(2009). *Geographic Information Systems*.** New India Publishing Agency, Pitam Pura, New Delhi.
2. ***Kang, tsung Chang*, (2002). *Introduction to Geographic Information Systems*.** Tata McGraw Hill, New Delhi.

3. ***Burrough, Peter A. and Rachael McDonnell*, (1998).** ***Principles of Geographical Information Systems*.** Oxford University Press, New York.

4. ***Magwire, D.J., Goodchild, M.F. and Rhind, D.M. Edm*, (1991).*Geographical Information Systems: Principles and Application*.** Longman Group. U.K.
5. ***Edward.M.Mikhail, James S Bethel, J Chris McGlone*,(2001).** ***Introduction to Modern Photogrammetry*.** John Wiley and Sons, Inc.

Reference Books:

1. ***C.P.Lo and Albert K.W.Yeung***,(**2005**). ***Concepts and Techniques of Geographic Information Systems***. Prentice Hall of India, New Delhi.
2. ***Brain Tomaszewski*** (2015) ***Geographic Information Systems (GIS) for Disaster Management***, CRC Press, Taylor and Francis Group, Boca Raton London New York
3. ***Barnali Dixon, Venkatesh Uddameri*** , (2016) ***GIS and Geocomputation for Water Resource Science and Engineering***, John Wiley & Sons, Ltd., UK

Materials Science

SEMESTER V **Hours of Instruction/week : 5**
18BPHC14
No. of Credits: 3

Objectives:
1. To acquire knowledge of molecular bonding.
2. To study the basics of crystal growth.
3. To learn about non,destructive testing and thin film technology.

Unit 1 Bonding

Molecular bond, Formation of a molecule, Bonds in solid, Ionic Bonding, Covalent Bonding, Vander Waals Bonding, Hydrogen bond, Bond strength and Binding energy of a crystal. **15**

Unit 2 Crystal Structure

Introduction to crystal structure, crystal imperfection, classification, point defect (Frenkel, Schottky), geometry of dislocations, properties of screw and edge dislocations, surface imperfections. **15**

Unit 3 Fundamentals of Crystal Growth

The birth of the concept of crystal growth , Significance of single crystals, Concept of nucleation, Homogeneous nucleation and Heterogeneous nucleation, Solubility and super solubility, Super saturation. **15**

Unit 4 Thin film Preparation Technology

Introduction, Nature of thin film, Kinetic theory of gas and emission condition, Distribution of deposit, Electron beam method, Cathodic sputtering, Chemical vapour deposition, Electrolysis plating, Deposition by chemical reaction, Chemical displacement. **15**

Unit 5 Non-Destructive Testing (NDT)

Radiographic method, Electrical method, ultrasonic method, Visual methods, Thermal methods, Surface defect detection by NDT, Equipments used in non- destructive testing. **15**

Total Hours 75

Course Outcomes:
1. Know about various types of bonding.
2. Distinguish between various types of crystal imperfection.
3. Explain the basics of crystal growth.
4. An idea about basics of thin film technology and few deposition methods.
5. Describe nondestructive testing methods and its applications.

Text Books:

1. ***M.Arumugam, (2002). Materials Science.*** Anuradha Agencies Publishers.
2. ***S.L.Gupta, V.K.Kumar, (2000). Solid State Physics.*** Nath & Co.
3. ***A.Goswami ,(1996). Thin Film Technology.*** Tata McGraw Hill Publications.
4. ***P.Santhana Raghavan and P.Ramasamy,(2000).Crystal growth Processes and Methods.*** K.R.U.Publications

Reference Books:

1. ***Milton Ohring*****, (2005).** ***Materials Science of Thin film*****.** Academic press**.**

2. ***J.C.Brice,*** **(1986).** ***Crystal Growth Processes,*** John Wiley and Sons, New York
3. ***Roger. J.Elliot and Alan. F.Gibson,*** **(1976).** ***An Introduction to Solid State Physics and its Applications*****.** Barnes and Noble Publishers

Solid State Physics

SEMESTER V **Hours of Instruction/week : 5**
18BPHC15 **No. of Credits: 3**

Objectives:

1. To understand the types of solids and their classification
2. To gain knowledge on magnetic properties of materials
3. To study Polarisation

Unit 1 Introduction

Introduction, crystalline solid, symmetry operation, primitive lattice cell and unit cell, symmetry elements, fundamental types of Bravais lattice, co-ordination number, lattice planes and miller indices, simple cubic lattice, fcc and bcc. **15**

Unit 2 Crystalline Solids

Types of Solids, Crystalline and amorphous, their distinction, atomic packing, atomic radius, lattice constant and density of lattice points in a lattice plane, Structure of Sodium Chloride and Caesium Chloride crystals, Diamond and Zinc blende crystals. **15**

Unit 3 Conductors and Semiconductors

Drude-Lorentz free electron theory, electrical conductivity, thermal conductivity, Wiedemann and Franz law, Semiconductors, Band theory of solids, effective mass in semiconductors, Kronig Penny model, Hall effect, Hall voltage and Hall coefficient, experimental determination of Hall co-efficient. **15**

Unit 4 Magnetic Properties of Materials

Introduction, electric current in atoms, Bohr magneton, electric spin and magnetic moment, magnetic moment due to nuclear spin, diamagnetism, classical theory of diamagnetism, paramagnetism , Langevin theory of paramagnetism, Weiss theory, paramagnetic susceptibility of a solid, ferromagnetism, spontaneous magnetization in ferromagnetic materials, ferromagnetic domains. **15**

Unit 5 Dielectric Theory

Introduction, Fundamental definitions in dielectrics, The microscopic concept of polarization, Electronic polarization, Ionic polarization, Orientational polarization, Langevin's theory of polarization in polar dielectrics, Internal field, Evaluation of the local field for cubic structure, Clausius- Mosotti equation, Relation between dielectric constant and refractive index. **15**

Total Hours 75

Course Outcomes:

1. Explain symmetry elements and Bravais lattice
2. Distinguish between crystalline and amorphous solids, calculate atomic packing factor for Cubic structure.
3. Analyze the success and failure of free electron theory, the origin of band gap and Hall effect.
4. Distinguish between different types of magnetic materials
5. Explore different kinds of polarization and its effects on dielectric constant and refractive index.

Text Books:

1. ***S.O.Pillai, (2000). Solid State Physics.*** New Age Intl.Publishers.

2. ***S.L.Gupta, V.K.Kumar,(2000). Solid State Physics.*** K.Nath & Co**.**

3. ***B.S. Saxena, R.C. Gupta, P.N. Saxena, (1987)*****. Fundamentals of Solid State Physics.** Pragati Prakashan, Meerut.

Reference Books:

1. ***C.Kittel*****, (2007),** ***Introduction to Solid State Physics***,. Wiley Eastern Prakashan

Publication, II Edition
2. ***A.J.Dekker*, (2000), *Solid State Physics***, McMillan India Publishers.
3. ***Anthony R.West*, (2014), *Solid State Chemistry and its applications***, John Wiley and Sons, Ltd, Second Edition.

Electronics

SEMESTER V **Hours of Instruction/week : 5**

18BPHC16 **No. of Credits: 3**

Objectives:

1. To understand the principles of semiconductor diodes, transistors and their characteristics.
2. To gain knowledge about oscillators and op-amps
3. To understand the characteristics of FET ,SCR and UJT

Unit 1 Basics of Electronics **15**

Network Theorem- Thevenin's theorem and Norton's theorem, Semiconductor, PN junction diode, V-I characteristics, Rectification of a.c., Half and full wave rectifier, Efficiency, Ripple Factor, Filter circuit types, inductor filter, Capacitor filter, Π filter.

Zener diode, V-I characteristics, Zener diode as a voltage regulator, Tunnel diode, V-I Characteristics.

Unit 2 Transistor Amplifiers

Transistors , CB, CE, CC connections, Load line analysis (dc and ac), Q point, Factors affecting stability of Q point, Stability factor, Transistor biasing, Base resistor method, Feedback resistor methods and voltage Divider bias method, Classification of Amplifiers, Common Emitter transistor Amplifier. Multistage amplifiers, RC coupled Amplifiers, frequency response, Advantages, Disadvantages, Transformer Coupled Amplifier. **15**

Unit 3 Feed back and Oscillators

Feed back, Types of feedback, principle of negative voltage feedback, Gain of negative voltage feedback, Advantages of negative voltage feedback, Classification of oscillators, Oscillating circuits, Barkhausen criteria, Hartley oscillator, Colpitt's oscillator. **15**

Unit 4 Multivibrator and Operational Amplifiers

Multivibrator, stable, monostable and bistable multivibrators, Hybrid parameter, input, output impedance, current gain and voltage gain in terms of h-parameter. **15**

Operational Amplifiers, Ideal op-amp, Parameters of op-amp, Inverting and Non-inverting op-amp, General linear applications,Adder, Subtractor, Integrator, Differentiator

Unit 5 Field Effect Transistor and Thyristors

FET, operation, characteristics, JFET parameters, comparison between FET and BJT, MOSFET, Depletion type, Enhancement type, Characteristics. **15**

Silicon controlled rectifier (SCR), SCR operation, V-I characteristics, UJT, Operation, Characteristics.

Total Hours 75

Course Outcomes:

1. Have basic knowledge of semiconductor diode, rectifier and filter circuits.
2. Understand transistor biasing and working principle of Amplifiers.
3. Explain feedback and oscillatory circuits.
4. An idea about Multivibrators and operational amplifiers.
5. Comprehend the operation and characteristics of FET, MOSFET, SCR and UJT.

Text Books:

1. ***V.K.Mehta, (2008). Rohit Mehta Principles of electronics.*** S.Chand & Company, Ramnagar.
2. ***R. S Sedha, (2006). A textbook of Applied Electronics.*** S.Chand & Company Ltd.
3. ***I.*J.Nagrath(2006),** ***Electronics: Analog & Digital***, Prentice Hall of India
4. ***Ramakant A.Gayakwad* (2000), *Operational Amplifier and Linear Integrated Circuits***, Prentice Hall of India

Reference Books:

1. ***B.L.Theraja ,(2000). Basic Electronics Solid State.*** S.Chand & Company Ltd.
2. ***D.C.Sarkar, (1997). Transistor physics and circuit design.*** S.Chand & Company Ltd.
3. ***Keiser,Gerd*** **(2000),*Optical Fiber Communications***, Tata Mc Graw Hill.
4. ***K.Ghosh Asoke*** **(2004),*Introduction to Operational Amplifier***, Prentice Hall of India

Practical- V Electronics and Digital Electronics

SEMESTER V **Hours of Instruction/week : 5**

18BPHC17 **No. of Credits: 2**

Objectives:

1. To gain knowledge on the applications of operational amplifier such as adder, subtractor, inverting and non-inverting amplifier, voltage follower
2. To gain knowledge on characteristics of transistors and construct amplifiers and oscillators using transistors and study their performance
3. To understand basic logic gates and universal gates and their truth tables

1. Operational amplifier , Adder , Subtractor and voltage follower

2. Operational amplifier , inverting and non-inverting amplifier
3. Verification of NORTON's theorem.
4. FET, Characteristics
5. RC coupled Amplifier, Single stage
6. Zener Diode, Regulated power supply
7. Characteristics of a Transistor CE mode
8. Characteristics of a Transistor CB mode.
9. Hartely Oscillator (Transistor) , Frequency Measurement
10. Colpitt's Oscillator (Transistor) , Frequency Measurement
11. IC Regulated power supply (5 volts)
12. UJT Characteristics
13. Verification of logic gates using discrete components
14. Gates, Verification of De Morgan's theorems
15. NAND, NOR as Universal building blocks

Total Hours 75

Course Outcomes:

1. Explain the characteristics and applications of operational amplifier
2. Construct regulated power supply using IC and Zener diode and draw the regulation curve
3. Interpret the characteristics of a transistor in CB and CE modes
4. Design circuits for RC coupled amplifier and study the frequency response , construct Hartley and Colpitt's Oscillator and measure the frequency of oscillations
5. Verify the truth tables of basic logic gates and universal gates.

Energy and Environment
(Self Study)

SEMESTER V **Hours of Instruction/week : 1**

18BPHC18 **No. of Credits: 4**

Objectives:

1. To gain knowledge in various energy sources
2. To gain knowledge on environmental pollution
3. To understand the different environmental issues and the management

Unit 1 Energy Sources **3**

Conventional sources of energy, Energy Crisis, Non, conventional

sources of energy, Renewable energy sources, Solar energy, Wind energy, Biomass energy, Tidal energy, geothermal energy and Hydrogen Energy , Principles, Advantages and Disadvantages.

Unit 2 Environmental Pollution

Introduction, Types of pollutants. Air pollution, Water pollution and Noise pollution, Causes, effects and control measures. **3**

Unit 3 Solid Waste Management

Sources and classification of solid wastes, Causes of solid waste pollution , Health hazards, Management of urban and industrial wastes: Collection and Disposal of solid wastes, Waste utilization. **3**

Unit 4 Environmental Issues

Causes, effects and control measures of Global warming and Green house effect, Acid rain, Ozone layer depletion and Nuclear pollution. **3**

Unit 5 Environmental Management

Energy conservation, Measures for promoting energy conservation, Water conservation and management, Strategies to support water conservation, Rainwater harvesting, Watershed Management, Conservation of biodiversity. **3**

Total Hours 15

Course Outcomes:

1. Comment on various energy sources.
2. Compare the various types of pollution and their control measures.
3. Identify the sources of solid wastes and various methods of disposal.
4. Comprehend the causes, effects and control measures of global warming
5. Conserve Natural resources

Text Books:

1. ***Suresh.K.Dhameja***, **(2000). Environmental Engineering and Management**. S.K.Kataria & Sons.
2. ***P.Meenakshi, (2012). Elements of Environmental Science and Engineering.****PHI Pvt. Ltd., New Delhi*
3. ***Ramesha Chandrappa, Diganta Bhusan Das,*** **(2012).** ***Solid Waste Management : Principles and Practice,*** Springer Berlin Heidelberg New York London

Reference Books:

1. ***Ragosh Das and Bega Murdre, (2000). Energy Conversion Systems.*** New Age International Publishers Pvt. Ltd.
2. ***G.D.Rai, (2011). Non-Conventional Energy Sources,*** Khanna Publishers.
3. ***Frank R Spellman, (2015). Environmental Impacts of Renewable Energy.*** *CRC Press Taylor and Francis Group, Boca Raton London New York*

Digital Electronics

SEMESTER VI **Hours of Instruction/week : 4**

18BPHC21 **No. of Credits: 3**

Objectives:

1. To study Number systems and Boolean algebra
2. To learn about minimization techniques and codes
3. To gain knowledge on sequential circuits and memory devices

Unit 1 Number Systems **10**

Number Systems used in digital electronics, Decimal Number Systems, Binary Number Systems, Octal Number Systems, Hexadecimal Number Systems, Binary addition, subtraction, multiplication and division, Conversion

Algorithms.

Unit 2 Boolean Algebra And Arithmetic Circuits

Boolean Laws and Algebra, Truth functions, AND operator, OR operator, NOT operator, NAND operator, Boolean expressions, Reducing Boolean expressions and logic circuits, NAND and NOR Gates as Universal building blocks, Exclusive OR gate, Half adder and full adder, Half Subtractor and Full Subtractor. **13**

Unit 3 Minimization Techniques And Codes

Sum of Product method, Product of sum method, Karnaugh Map, Binary Codes, Weighted and Non-Weighted Codes, Error Detecting Codes, ASCII Code, Gray Code and Excess 3 Code. **12**

Unit 4 Sequential circuits

Flip flops, RS flip flop, Clocked RS flip flop, D flip flop, JK flip flop, JK Master /Slave flip flop, Counters, Asynchronous counters, Synchronous counters, MOD 5 counter and wave forms, Decade counters and waveforms, Shift Register, Serial-In, Serial-Out Shift Register (SISO), Serial-In, Parallel-Out Shift Register (SIPO), Ring counter. **15**

Unit 5 Memory Devices

Read Only Memory (ROM), Random Access Memory (RAM), Programmable Read Only Memory (PROM), Electrically Programmable Read Only Memory (EPROM), Electrically Erasable Programmable Read Only Memory (EEPROM). **10**

Total Hours 60

Course Outcomes:

1. Conversion between various number systems
2. Employ Logic gates for carrying out logic operations
3. Apply the concept of Boolean laws and employ a Karnaugh Map to reduce Boolean expressions.
4. Design various combinational and sequential circuits using flipflops.
5. Explain different types of memory used in computers

Text Books:

1. ***Malvino and Leach,(2004). Digital Electronics.*** Tata Mc Graw Hill Publishers IV Edition.
2. ***R.K.Gaur,(2005). Digital Electronics and Micro Computers.*** Dhanpat Rai Publications, New Delhi.
3. ***V.K.Puri,*** **(2016).*Digital Electronics,*** Mc Graw Hill Publishers,

Reference Books:

1. ***William Gothman,(2001). Digital Electronics.*** Prentice Hall of India, Publishers.
2. ***M.Morris Mano,(2007). Digital Logic and Computer Design.*** Published by Asoke K. Ghosh, Prentice, Hall of India Pvt. Ltd.
3. ***Anil K. Maini*****, (2007).** ***Digital Electronics: Principles and Integrated Circuits***, John Wiley and Sons

Nuclear and Particle Physics

SEMESTER VI **Hours of Instruction/week : 5**

18BPHC22 **No. of Credits: 3**

Objectives:

1. To understand the properties of nucleus and nuclear reactions.
2. To gain knowledge on particle detectors and accelerators
3. To acquire knowledge on cosmic rays and elementary particles

Unit 1 Nuclear Properties

Classification of nuclei, general properties of nucleus, binding energy, packing fraction, nuclear stability, theories of nuclear composition, nuclear **12**

forces, meson theory of nuclear forces, liquid drop model, shell model.

Unit 2 Sources, Detectors and Accelerators

Introduction to nuclear sources, Interaction between energetic particles and matter, ionization chamber, proportional counter, Geiger-Muller counters, Wilson cloud chamber, Scintillation counter, Nuclear emulsions. **18**

Accelerators, The linear accelerators, cyclotron, synchrocyclotron, Betatron, synchrotrons.

Unit 3 Radioactivity

Velocity and range of alpha particles, experimental measurement of range of α-particles, Geiger-Nuttal law, Gamow's theory of α-decay, Beta ray spectra, Magnetic spectrograph, The nuclear isomerism, Laws of radioactivity, Soddy Fajan's displacement law, Law of radioactive disintegration, Half life period, Mean life, Law of successive disintegration, Age of earth, Radiation hazards. **15**

Unit 4 Nuclear Reactions

Discovery of artifical transmutation, Bohr's theory of Nuclear distintegration, Nuclear reaction, Energy balance in nuclear reactions and Q-value, Threshold energy of an endoergic reaction, Nuclear transmutations, Application of radioisotopes, Neutron and its properties. **15**

Nuclear fission, Energy released in fission, Chain reaction, Atom bomb, Nuclear reactors, Pressurized water reactor, Nuclear fusion, Sources of stellar energy.

Unit 5 Cosmic rays and Elementary particles

Discovery of cosmic rays, Latitude effect, east, west effect, Altitude effect, Longitude effect. Primary and secondary cosmic rays, effect of earth's magnetic field, Van Allen Belt, Origin of comic rays. **15**

Elementary particles,Classification, Particles and Anti-particles, Anti-matter, Fundamental interaction.

Total Hours 75

Course Outcomes:

1. Explain nuclei properties, compare a drop of liquid with that of a nucleus and understand Shell model
2. Distinguish between principles and working of different types of detectors, counters and accelerators.
3. Describe basic radioactivity, calculate half-lives and understand radiation hazards
4. Explain natural and artificial transmutations, calculate Q-value of a reaction, recognize the applications of isotopes
5. Distinguish between the forces of nature, recall the properties of cosmic rays,Classify elementary particles

Text Books:

1. ***D.C.Tayal, (2011). Nuclear Physics.*** Himalaya publishing House.

2. ***M.L.Pandya and R.P.S.Yadav, (2000). Elements of Nuclear Physics.*** Kedar Nath RamNath, Publications.
3. S.*N.Ghosal, (2003). *Nuclear Physics, S.Chand & Company.

Reference Books:

1. *Kenneth S. Krane, (2008). Introductory Nuclear Physics.*Wiley India Pvt. Ltd.
2. *Irving Kaplan, (1998). Nuclear Physics.* Narosa Publishing House, New Delhi.
3. *S. B. Patel (1998). Nuclear Physics An Introduction.* New Age International (P) Limited,
Publishers.

Quantum Mechanics and Relativity

SEMESTER VI **Hours of Instruction/week : 5**
18BPHC23 **No. of Credits: 3**

Objectives:

1. To understand the basics of quantum mechanical concepts
2. To understand wave mechanics
3. To acquire knowledge on the theory of relativity

Unit 1 Quantum Mechanics **15**

Introduction, de Broglie's hypothesis, phase velocity of de Broglie waves, Expression for group velocity, Relation between group velocity and phase velocity, Davission and Germer Experiment, G.P.Thomson's Experiment,

Heisenberg's uncertainty Principle, Illustrations, Diffraction of a beam of electrons by a slit, Gamma ray microscope.

Unit 2 Schrödinger's wave equation

Introduction, Wave function for a free particle, Time dependent and Time independent wave equation, Physical Interpretation of the wave function, Limitations on wave functions, Normalization of wave function, Operators in Quantum Mechanics, Eigen function, Eigen value and Eigen value equation, Postulates of Quantum mechanics, Orthogonality of Eigen function. **15**

Unit 3 Applications of Schroedinger equation

Particle in a Box, Potential step, The Barrier penetration problem, Linear Harmonic Oscillator, Hydrogen atom. **15**

Unit 4 Relativity-I

Frames of reference, Newtonian Relativity, Galilean Transformation equations, Michelson-Morley experiment, Explanation of the negative result, Special Theory of Relativity, Lorentz transformation equations, Length contraction, Time Dilation, Relativity of Simultaneity, Addition of velocities. **15**

Unit 5 Relativity - II

Variation of mass with velocity, Mass energy equivalence, Minkowski's four dimensional space, General theory of Relativity, Effect of Gravitation on a ray of light, Gravitational red shift , Black hole. **15**

Total Hours 75

Course Outcomes:

1. Calculate the de Broglie Wavelength of a wave associated with the particle,explain the importance of Davisson and Germer and GP Thomson experiments and Heisenberg's Uncertainty Principle and Describe the illustrations
2. Describe wave function and derive the Schrödinger equation and interpret the wave function and eigen value equation.
3. Describe the different types of potentials and derive the solutions of Schrödinger equation for the same
4. Analyze the effects of Relativity by Newtonian and Special Theory of Relativity
5. Explain the gravitational effect using General theory of Relativity

Text Books:

1. ***S.P.Singh and M.K.Bagde, (2003). Quantum Mechanics.*** S.Chand & Company Ltd,.
2. ***R.Murugeshan, Kiruthiga Sivaprasath, (2006). Modern Physics.*** S.Chand & Company Ltd.
Reprint.
3. ***Arthur Beiser, (2002). Concepts in Modern Physics.*** Tata McGraw Hill Publishers, 6th Edition.

Reference Books:

1. ***D.S.Mathur, (2000). Mechanics.*** S.Chand & Company Ltd.
2. ***Sathya Prakash, (2000). Quantum Mechanics.*** S.Chand & Company Pvt. Ltd.
3. ***V.Devanathan,*** **(2005),** ***Quantum Mechanics,*** Narosa Publishing House, New Delhi**.**

Communication Electronics

SEMESTER VI **Hours of Instruction/week : 4**

18BPHC24 **No. of Credits: 3**

Objectives:

1. To study about Modulation and Receiver fundamentals
2. To impart knowledge on Fiber optic communication
3. To learn about satellite communication

Unit 1 Modulation

Modulation, Necessity for modulation, Amplitude Modulation principle, Side bands, Power in amplitude modulated wave, Limitations of Amplitude modulation, Frequency modulation, Demodulation **12**

Unit 2 Receiver Fundamentals

AM Radio receivers, Types of AM radio receivers, Stages of Super heterodyne radio receivers, Advantages of Super heterodyne circuit, Double conversion receiver, Image frequency rejection, Signal to Noise ratio, Sensitivity & Selectivity. **12**

Unit 3 Fiber Optic Communication

Introduction, Basic principle, Structure of Optical fiber, Numerical aperture, Acceptance angle, Single mode, Multimode fibers, Step index and graded index fibers, Optical fiber communication system, Advantages of optical fiber communication. **14**

Unit 4 Digital modulation

Introduction to codes, analog to digital conversion, Pulse amplitude modulation, Pulse code modulation, Time division multiplexing, Frequency division multiplexing. **12**

Unit 5 Satellite Communication

Introduction, Satellite Orbits, Satellite Position, Linkages, Up-link, down- link, cross-link, Transponder, Antenna, Station, keeping section. **10**

Total Hours 60

Course Outcomes:

1. Explain the concept of amplitude and frequency modulation
2. Know fundamental of AM radio receiver and superhetrodyne receiver.
3. Compare working principle of single mode and multimode optical fibres.
4. Distinguish Digital modulation (pulse code and Pulse amplitude modulation) types
5. Explain the fundamentals of Antenna, Satellite orbits.

Text Books:

1. ***V.K.Mehta, (2008). Rohit Mehta Principles of Electronics.*** S.Chand & Company Ltd
   Ramnagar, New Delhi.
2. ***Robert J Schoenbeck, (2002). Electronic communication Modulation and Transmission.***
   Prentice Hall of India, New Delhi.
3. ***Djafar K. Mynbaev, Lowell.L. Scheiner, (2002).*** **Fibre-Optic Communications Technology**. Pearson Education Pvt. Ltd, India.

Reference Books:

1. ***N.D.Deshpande, D.A.Deshpande and P.K.Rangole, (1995). Communication electronics.*** Tata McGraw, Hill Publishing Company Ltd.
2. ***Dennis Roddy and John Coolen, (2003). Electronic Communications.*** Prentice Hall of India, New Delhi.
3. ***Simon S. Haykin, Michael Moher,*** **(2010*). Communication System***, Wiley, Fifth

edition

Microprocessor

SEMESTER VI **Hours of Instruction/week : 4**

18BPHC25 **No. of Credits: 3**

Objectives:

1. To acquire knowledge about 8085 Microprocessor, Assembly Language Programming.
2. To write simple programmes using Assembly Language Programming.

3. To learn about peripheral devices and applications of microprocessor

Unit 1 Introduction to 8085 Microprocessor

Microprocessor, Organization of a Microprocessor based system, Microprocessor instruction set and computer language, From large computers to single chip Micro controller, Microprocessor Architecture and its operations. **12**

Unit 2 Assembly Language Programming

8085 Programming model, Instruction classification, Instruction and Data format, Addressing mode, Overview of 8085, Writing simple programs (Addition, Subtraction, Multiplication, Division with 8 bit numbers). **12**

Unit 3 Memory Interfacing

8085 MPU, 8085 Microprocessor Pin out and Signals, Microprocessor Communication and Bus Timings, demultiplexing the Bus AD_7-AD_0, Generating Control Signals, 8085 Machine Cycles and Bus Timings, Opcode Fetch Machine Cycle, Memory Read Machine Cycle, Memory Structure and its requirements, Basic Concepts in Memory Interfacing, Address decoding, Interfacing Circuit. **14**

Unit 4 Interfacing of I/O Devices

Basic Interfacing Concepts, Peripheral I/O Instructions, I/O Execution, Device Selection and Data Transfer, Absolute Vs Partial Decoding, Input Interfacing, Interfacing I/Os using Decoders, Interfacing Output Displays, Illustration. **10**

Unit 5 Peripheral devices and applications of Microprocessor

Introduction, Programmable Peripheral Interface (PPI) , Programming the Ports, Modes of Operation, mode Setting, Setting/Resetting Port, C plus Bits, Programmable DMA Controller, INTEL 8237A. Applications, Temperature Control System, D.C. Motor Speed Control System. **12**

Total Hours 60

Course Outcomes:

1. Explain Microcontroller Architecture.
2. Write simple programs for addition, subtraction, multiplication and division
3. Understand the basic concepts of memory interfacing and circuit
4. Comprehend a suitable Input and Output peripheral
5. Execute simple programmes for temperature control and stepper motor

Text Books:

1. **Ramesh S. Goankar, (2002).** ***Microprocessor Architecture, Programming, and Applications with the 8085.*** Penram International Publishing.
2. **Mathur, Aditya.P, (1999).** ***Introduction to Microprocessor.*** Tata McGraw Hill Publishers, 3rd Edition.

3. ***Nagoor Kani. A,*** **(2006).** ***Microprocessors and Microcontrollers***, RBA Publications, First Edition

Reference Books:

1. ***Anokh Singh, A.K. Chhabra,*** **(2009).** ***Digital Electronics and Microprocessor.*** S.Chand & Company Ltd.
2. ***A.K.Ray and K.M.Bhurchandi,*** **(2013).** ***Advanced Microprocessors and Peripherals,*** Tata McGraw Hill Education Private Ltd., Third Edition**.**
3. ***M.Saravanan, N.Senthil Kumar and S.Jeevananthan,*** **(2012).** ***Microprocessors and interfacing,*** OUP India, Third edition

Practical -VI Electronics, Digital Electronics and Microprocessor

SEMESTER VI **Hours of Instruction/week : 5**
18BPHC26 **No. of Credits: 2**

Objectives:

1. To gain knowledge on the applications of operational amplifier such as differentiator, integrator, astable multivibrator and monostable multivibrator
2. To design and verify the Boolean laws, adder, subtractor circuits, parity generator and checker circuits and design circuits for sum-of-products and product-of-sum

3. To execute simple mnemonics using 8085 programming techniques for arithmetic, calculations, code conversions, arrangement of numbers in order

1. Operational amplifier, Differentiator
2. Operational amplifier, Integrator
3. Parity generator and Checker (IC 7486, 7404)
4. Operational amplifier, Astable Multivibrators
5. Operational amplifier, Monostable Multivibrators
6. NAND/ NOR, To generate sum of products and product of sum.
7. Verification of Associative law and distributive law, AND, OR Gates.
8. Gates, Half and Full adder.
9. Gates, Half and Full Subtractor.
10. Flip flops R-S, D and J-K.
11. Microprocessor, Addition and Subtraction of 8 bit numbers.
12. Microprocessor, Multiplication and Division of two 8 bit numbers.
13. Microprocessor, Code conversion, BCD to HEX and HEX to Binary.
14. Microprocessor, ascending and descending order
15. Microprocessor, To locate largest and smallest number in an array

Total Hours 75

Course Outcomes:

1. Explain the characteristics and applications of operational amplifier
2. Verify Flip-flop and truth table
3. Design circuits using universal gates such as NAND and NOR
4. Design and verify truth tables of adder, subtractor, parity generator and checker, sum-of-products and product-of-sum
5. Write mnemonics for simple applications using 8085 microprocessor

Department of Physics
Discipline Specific Elective
Physics for Mathematics
(applicable for B.Sc. Mathematics students admitted from 2018-19 onwards)

SEMESTER IV **Hours of Instruction/week : 4**
18BMAI04 **No. of Credits: 3**

Objectives:

1.To understand basic laws governing mechanics of particles/ system of particles , collision of smooth spheres and simple harmonic oscillator
2.To introduce the concept of relativity and Lorentz transformation and its consequences
3.To disseminate the fundamentals of digital electronics and principles of p-n junction diodes, solar cells and light emitting diodes

Unit 1 Dynamics

Relative Velocity, Relative acceleration, Angular acceleration, Relative angular velocity, Rectilinear motion under constant forces, Rectilinear motion under varying forces, Impulse, Laws of Impact, Direct and Oblique impact between spheres. 12

Unit 2 Relativity

Michelson Morley experiment, Negative result, explanation, Einstein's basic postulates of special theory of relativity, Lorentz transformation, Consequences of the Lorentz transformation, Length contraction , Time Dilation, Addition of velocities, Variation of mass with velocity, Mass, Energy equivalence. 12

Unit 3 Mechanics of system of Particles

Conservation theorem for a system of particle, Conservation theorem for linear momentum, angular momentum and energy, Constrained motion, Types of constraints, Forces of constraints, Degrees of freedom, Generalized coordinates, Generalized notation for displacement, Velocity, Momentum, Force and Potential. 12

Unit 4 Simple harmonic motion

Simple harmonic motion, Composition of two simple harmonic motions , Linearly and Perpendicularly, Lissajous figures, Average kinetic energy and potential energy, Theory of Beats, Harmonic Oscillator, Damped and forced simple harmonic motion , Resonance. 12

Unit 5 Semiconductor Physics

P- type, N- type semiconductors, I -V characteristics of pn junction diode, Zener diode characteristics & its uses. Basic principles of, LED and solar cells. 12

Total Hours : 60

Course Outcomes:

1. Apply the laws of mechanics and describe the motion of a particle/deduce the forces acting in a particle/system of particles.
2. Explain the postulates of special theory of relativity
3. Apply Lorentz transformation to describe the dynamics of particles in relativistic limit.
4. Distinguish between different types of oscillatory motion and to understand the variation of amplitude with time under various circumstances.
5. Describe the characteristics of semiconductors on the basis of band theory of solids and working principle of p-n junction diode and solar cells.

Text Books

1. ***N. JayaPrakash (1995). Ancillary Physics.*** Vol 1 &2 J.P.Publications, Coimbatore**.**
2. ***Murugeshan.R,* (2005) .*Modern Physics***., S.Chand and co., New Delhi.
3. ***R. S Sedha, (2006). A textbook of Applied Electronics.*** S.Chand & Company Ltd.

Reference Books

1**. *S.Arumugam (2002). Engineering Physics***. Anuradha Publications, Kumbakonam,
2. ***N.Narayanamoorthy (1980).Text Book of Dynamic.*** National publishing Company, Madras**.**
3. ***Goldstein Herbert, (2000). Classical mechanics.*** Narosa Publishing House

Department of Physics
Discipline Specific Elective
Physics Practical for Mathematics
(applicable for B.Sc. Mathematics students admitted from 2018-19 onwards)

Semester IV **Hours of Instruction/week : 3**
18BMAI05 **No. of Credits: 2**
Objectives:

1. To understand elastic properties of materials and determine Young's modulus of a beam and rigidity modulus of a metal string and magnetic properties of a bar magnet
2. To acquaint them in construction of basic electrical circuits and to understand the principle of potentiometer to calibrate low range voltmeter/ammeter
3. To understand the logic/principle of operation of basic logic gates and p-n junction diodes

1. Young's modulus – Non, Uniform bending
2. Young's modulus – Uniform bending
3. **Acceleration due to gravity, Compound pendulum**
4. Moment of a magnet – Tan C position
5. Low range Ammeter calibration- Potentiometer
6. Low range voltmeter calibration – Potentiometer
7. V – I characteristics on p-n junction diode
8. Logic gates – Verification of truth table
9. Rigidity modulus – Torsional pendulum
10. Moment of inertia –Torsional pendulum.

Total Hours : 45

Course Outcomes:

1. Distinguish between elastic/inelastic and rigid/flexible materials by measuring moduli of elasticity.
2. Apply the principle of potentiometer to determine the potential difference/current flowing between two points.
3. Demonstrate the determination of magnetic moment of a magnet
4. Explain I-V characteristics of a p-n junction diode.
5. Apply AND/OR/NOT logic operations to solve simple logic circuits.

Department of Physics
Discipline Specific Elective

Physics for Special Education
(applicable for B.Sc. Special Education students admitted from 2018-19 onwards)

SEMESTER II **Hours of Instruction/week :3**
18BSEI02 **No. of Credits: 4**

Objectives:

1. To understand basic laws governing mechanics of particles system of particles ,collision of smooth spheres and simple harmonic oscillator
2. To introduce the concept of relativity and Lorentz transformation and its consequences
3. To disseminate the fundamentals of digital electronics and principles of p-n junction diodes, solar cells and light emitting diodes

Unit 1 Dynamics

Relative Velocity, Relative acceleration, Angular acceleration, Relative angular velocity, Rectilinear motion under constant forces, Rectilinear motion under varying forces. 8

Unit 2 Relativity

Michelson Morley experiment, Negative result, Explanation, Einstein's basic postulates special theory of relativity, Lorentz transformation, Consequences of the Lorentz transformation, Length contraction, Time Dilation, Addition of velocities. Variation of mass with velocity, Mass, Energy equivalence. 10

Unit 3 Mechanics of system of Particles 9

Conservation theorem for a system of particle, Conservation theorem for linear momentum, Angular momentum and energy, Constrained motion, Types of constraints, Forces of constraints, Degrees of freedom.

Unit 4 Simple harmonic motion 9

Simple harmonic motion, Composition of two simple harmonic motions, Linearly and Perpendicularly, Lissajous figures, Average kinetic energy and potential energy, Theory of Beats, Harmonic Oscillator.

Unit 5 Semiconductor Physics 9

P- type, N - type semiconductors, I -V characteristics of p-n junction diode, Zener diode characteristics & its uses**.**

Total Hours : 45

Course Outcomes:

1.Apply the laws of mechanics and describe the motion of a particle/deduce the forces acting in a particle/system of particles.
2.Explain the postulates of special theory of relativity
3.Apply Lorentz transformation to describe the dynamics of particles in relativistic limit.
4.Distinguish between different types of oscillatory motion and to understand the variation of amplitude with time under various circumstances.
5. Describe the characteristics of semiconductors on the basis of band theory of solids and working principle of p-n junction diode and solar cells.

Text Books:

1. ***N. JayaPrakash (1995). Ancillary Physics.*** Vol 1 &2 J.P.Publications, Coimbatore**.**
2. ***Murugesan.R,* (2005). *Modern Physics*.**, S.Chand and co., New Delhi.
3. ***R. S Sedha, (2006). A textbook of Applied Electronics.*** S.Chand & Company Ltd.

Reference Books:

1**. *S.Arumugam (2002). Engineering Physics***. Anuradha Publications, Kumbakonam,

Department of Physics
Discipline Specific Elective

Physics Practical for Special Education

(applicable for B.Sc. Special Education students admitted from 2018-19 onwards)

Semester IV **Hours of Instruction/week : 3**

18BSEI03 **No. of Credits: 2**

Objectives:

1. To understand elastic properties of a metal string and magnetic properties of a bar magnet.
2. To acquaint them with construction of basic electrical circuits and to understand the principle of potentiometer to calibrate low range voltmeter/ammeter.
3. To understand the logic/principle of operation of basic logic gates and p-n junction diode/zener diode and to understand the formation of Lissajous figures.

1. **Acceleration due to gravity-Compound pendulum**
2. Moment of a magnet – Tan C position
3. Low range Ammeter calibration- Potentiometer
4. Low range voltmeter calibration – Potentiometer
5. V – I characteristics of p-n junction diode
6. Logic gates – Verification of truth table
7. Rigidity modulus – Torsional pendulum
8. Moment of inertia –Torsional pendulum.
9. Study of Lissajous figures-CRO.
10. V – I characteristics of Zener diode.

Total Hours : 45

Course Outcomes:

1. Distinguish rigid/flexible materials by measuring moduli of elasticity.
2. Apply the principle of potentiometer to determine the potential difference/current flowing between two points.
3. Demonstrate the determination of magnetic moment of a magnet
4. Explain I-V characteristics of a p-n junction diode/ zener diode.
5. Apply AND/OR/NOT logic operations to solve simple logic circuits and describe the formation of Lissajous figures .

Department of Physics

Discipline Specific Elective

Physics for Chemistry
(applicable for B.Sc. Chemistry students admitted from 2018-19 onwards)

SEMESTER I **Hours of Instruction/week : 4**
18BCHI01 **No. of Credits: 3**
Objectives:

1.To understand the basic concepts of Quantum Mechanics, electricity and magnetism
2.To acquire knowledge of semiconductor Physics and digital electronics
3.To understand the principles and operation of biomedical instruments

Unit 1 Electricity and Magnetism

Ballistic Galvanometer, theory, Charge sensitiveness of a Ballistic Galvanometer, Thermo emf, Measurement of thermo emf by potentiometer, Thermo couple, Magnetic properties of materials, Dia, Para, Ferro, Antiferro, Ferri magnetism (Qualitative explanation) . 12

Unit 2 Semi,conductor Physics 12

P type, N-type Semiconductors, Semiconductor diode, Zener diode characteristics and uses of Zener diode, Principle of organic LED, and dye sensitized solar cells(DSSC).

Digital Electronics:

Basic logic gates, OR, AND, NOT, NOR, NAND, Statement of Demorgans theorems.

Unit 3 Quantum Optics 12

Photoelectric effect, Laws of Photoelectric effect, Millikan's experimental verification. Photo emissive, Photovoltaic cells, Photomultiplier, Uses of Photo cells.

Production and properties of X-rays, X-ray spectrum, Moseley's law, Periodic table, X-ray diffraction, Bragg's law, Miller indices.

Unit 4 Lasers 12

Purity of a spectral line, Coherence length, Coherence time, Spontaneous and induced emission, Einstein's A and B coefficients , Population inversion, Metastable state condition for laser action, Ruby laser, Uses of laser, Raman effect, Raman shift , Stokes and Antistokes lines, Elementary theory of Raman effect, Laser Raman Spectrometer.

Unit 5 Biomedical instrumentation 12

Electrocardiography(ECG), Electroencephalography(EEG), Electromyography (EMG), Electroretinography (ERG), Electrooculography(EOG), Endoscopes, Cryogenic surgery, Nuclear imaging techniques, Computer tomography, Thermography, Ultrasonic imaging systems, Magnetic resonance imaging, Positron emission tomography, Digital subtraction angiography.

Total Hours : 60

Course Outcomes:

1. Analyze different kinds of magnetic materials.
2. Distinguish applications of various types of diodes.
3. Explain the principles of Photocells..
4. Explain the laser characteristics and Raman Effect.
5. Describe biomedical instruments principle.

Text Books:

1. ***Jayaprakash.N,*** **(1995).** ***Ancillary Physics***. P.Publications, SaravanamathyIllam, Coimbatore-26.
2. ***Murugesan.R,*** **(2005).** ***Modern Physics***., S.Chand and Co., New Delhi.
3. ***Arumugam.M, (*****1994).** ***Biomedical instrumentation***. Second edition, Anuradha agencies.

Department of Physics
Discipline Specific Elective

Physics Practical for Chemistry

(applicable for B.Sc. Chemistry students admitted from 2018-19 onwards)

Semester I **Hours of Instruction/week : 3**

18BCHI02 **No. of Credits: 2**

Objectives:

1. To understand surface tension and interfacial surface tension by drop weight method.
2. To gain knowledge on diffraction and interference of light.
3. To acquire knowledge on calibration of voltmeter and logic gates

1. Surface tension by drop weight method
2. Interfacial surface tension by drop weight method
3. Spectrometer – Grating, normal incidence of Hg spectrum
4. Spectrometer – Grating, minimum deviation method
5. Air wedge experiment
6. Deflection magnetometer, Tan C position, moment of a magnet
7. Potentiometer-Ammeter calibration
8. Potentiometer- Voltmeter calibration
9. Potentiometer- Resistance
10. Characteristics of Zener diode
11. Logic gates – verification of truth table, AND, OR, NOT
12. Logic gates, NAND, NOR

Total Hours : 45

Course Outcomes:

1. Explain surface tension and interfacial surface tension of liquids.
2. Explain the phenomenon of diffraction and interference of light.
3. Explain the principle of potentiometer.
4. Demonstrate the determination of magnetic moment of a magnet.
5. Solve simple logic circuits.

Department of Physics

Discipline Specific Elective

Physics for Biochemistry
(applicable for B.Sc. Biochemistry students admitted from 2018-19 onwards)

SEMESTER II **Hours of Instruction/week : 4**
18BBCI03 **No. of Credits: 3**

Objectives:

1. To understand the fundamentals of thermodynamics and superconductivity.
2. To learn the properties of magnetic materials and X-rays.
3. To gain knowledge on LASER and Raman Effect.

Unit 1 Thermodynamics

Joule, Thomson effect, Boyle temperature, Inversion temperature, Liquefaction of Hydrogen and Helium, Adiabatic demagnetization, Measurement of low temperature, Properties of Liquid Helium I and II, Meissner effect, Superconductivity. 12

Unit 2 Electricity and Magnetism 12

Ballistic Galvanometer, Theory, charge sensitiveness of a Ballistic Galvanometer, Thermo emf, Measurement of thermo emf by potentiometer, Thermo couple, Magnetic properties of materials, Dia, Para, Ferro, Antiferro, Ferri magnetism (Qualitative explanation).

Unit 3 Semiconductor Physics 12

P- type, N-type Semiconductors, Semiconductor diode, Zener diode characteristics and uses of Zener diode, Principle of LED and solar cells.

Digital Electronics

Basic logic gates, OR, AND, NOT, NOR, NAND, Statement of Demorgans theorems.

Unit 4 Quantum Optics 12

Photoelectric effect, Laws of Photoelectric effect, Millikan's experimental verification, Photo emissive, Photovoltaic cells, Photomultiplier, Uses of Photo cells.
Production and properties of X-rays, X-ray spectrum, Moseley's law, Periodic table, X-ray diffraction , Bragg's law, Miller indices.

Unit 5 Lasers 12

Purity of a spectral line, Coherence length, Coherence time, Spontaneous and induced emission, Einstein's A and B coefficients, Population inversion, Meta stable state condition for laser action, Ruby laser, Uses of laser, Raman effect, Raman shift, Stokes and Antistokes lines, Elementary theory of Raman effect, Laser Raman Spectrometer.

Total Hours : 60

Course Outcomes:

1. Explain the properties of conductors and gaseous materials at low temperatures.
2. Distinguish different kinds of magnetic materials.
3. Explain the characteristics of semiconductors and X-rays.
4. Describe the characteristics of Laser and different types of Lasers.
5. Explain the concept of Raman effect (based on Classical theory).

Text Books:

1. ***Jayaprakash.N,*** **(1995).** ***Ancillary Physics***. J.P.Publications, Saravanamathy 61 Illam, Coimbatore- 26.
2. ***Murugesan.R,*** **(2005).** ***Modern Physics***. S.Chand and Co., New Delhi.
3. ***R. S Sedha, (2006). A textbook of Applied Electronics.*** S.Chand & Co. Ltd., New Delhi

Department of Physics
Discipline Specific Elective

Physics Practical for Biochemistry

(applicable for B.Sc. Biochemistry students admitted from 2018-19 onwards)

SEMESTER II **Hours of Instruction/week : 3**

18BBCI04 **No. of Credits: 2**

Objectives:

1. To understand surface tension and interfacial surface tension by drop weight method.
2. To gain knowledge on diffraction and interference of light.
3. To acquire knowledge on calibration of voltmeter and logic gates

1. Surface tension by drop weight method
2. Interfacial surface tension by drop weight method
3. Thermal Conductivity-Lees disc
4. Specific heat capacity of liquid by cooling
5. Specific heat capacity of liquid by Joule's Calorimeter
6. Air wedge method to determine the thickness of a thin material
7. Deflection magnetometer, Tan C position, moment of a magnet
8. Potentiometer-Ammeter calibration
9. Potentiometer-Voltmeter calibration
10. Potentiometer- resistance
11. Characteristics of Zener diode
12. Logic gates – verification of truth table, AND, OR, NOT
13. Logic gates- NAND, NOR

Total Hours : 45

Course Outcomes:

1. Explain surface tension and interfacial surface tension of liquids.
2. Explain the phenomenon of diffraction and interference of light.
3. Explain the principle of potentiometer.
4. Demonstrate the determination of magnetic moment of a magnet.
5. Solve simple logic circuits.

Department of Physics
Generic Elective Course
Everyday Physics

SEMESTER V **Hours of Instruction/week : 2**
18BPHO01 **No. of Credits: 2**

Objectives:

1. To promote background knowledge on atmospheric sciences.
2. To make students aware of the concepts of Physics involved in day-to-day life.
3. To update the knowledge of students with recent science and technology devices

Unit 1 Atmosphere

Cosmic rays, Rotation of earth, Shooting stars and comets, Saturn's rings, Temperature of planets/stars, Asteroids, Solar wind and earth, Lightening (Conducting medium to earth) Ozone layer, CFC's role in depletion, Rainbows and colour of rain clouds, Artificial rain, Acid rain, Nuclear winter. 6

Unit 2 Geology 6

Age of fossils, Measurement of depth of oceans, Monsoons, Radiation from granites and marbles, Geomagnetic prospecting, Causes of earth's magnetic field, Sun spot activity, Eleven year cycle, Detection of Volcano's Ore and Magnetic mines.

Unit 3 Physical Sciences

Atom bomb and Hydrogen bomb, Voltage of grid supply (110V, 220V, 440V and 11KV), Consumption of electricity in fluorescent lamps and CFLs, I.R radiation, Principle of remote controller, Ozonised mineral water, Antioxidants, Metallic Paints Pasteurisation, Purification of water, Reason for cyanide causing sudden death. 6

Unit 4 Applied Science and Technology 6

Refrigerators, Frost formation, Air Cooler and Conditioners, Microwave ovens, Pressure Cooker, Curved fan wings, Sodium Vapour lamps in streets, Role of Chokes of starter in tube lights, Photo copies, Thermostat, Solar panel and systems

Unit 5 DAY to day devices

Photochromating glasses, Sim card in cell phones, Plasma emission spectroscopy, 3D holograms, Polaroid Sun glass, Cell phones, Cordless phones, Touch screens, Speech synthesis, Lie detector, Bullet proof glass, Dry cleaning, Mosquito mats, Unleaded petrol, tubeless, radial and ordinary tyres. 6

Total Hours 30

Course Outcomes:

1. Relate Cosmic activity and the environmental effect on the earth's surface.
2. Appraise the importance of Physics in daily life.
3. Correlate technical aspects of devices with respect to the necessity.
4. Review the devices on the technical aspects in the real life.
5. Translate functioning of day-to-day devices into technical view**.**

Text Books :

1. ***The Editor*** **(2002).** ***Hindu speaks on scientific facts***. *Hindu.*
2. ***Jearl Walker (*** **2004).*** ***The Flying Circus of Physics with Answers***.John Wiley,
3. ***Michael B. Leyden, Gordon P.Johnson, Bonnie B. Barr*** **(1998).** ***Introduction to Physical Science***, Addison,Wesley

Reference Books:

1. ***Paul G. Hemitt, (*** **2002).** ***Conceptual Physics***, Addison,Wesley.
2. ***Judson Kight Ed.Neil Schlager,*** **(2002).** ***Science of Everyday Things Vol.I,Vol.II, Real Life Physics,*** *ITP, USA*
3. **James Kakalios, (2017). Physics of Everyday things: Extraordinary Science Behind an Ordinary Day,** Crown publishers ,Newyork

Department of Physics
Value Added Course
Domestic Appliances Servicing

SEMESTER III **18BPHV01**	**Hours of Instruction : 40** **No. of Credits: 2**

Objectives:

1. To impart knowledge on basics of Electricity.
2. To learn safety precautions in handling electrical appliances.
3. To study the principles domestic electric appliances.

Unit 1 Electrical terms Volts, Ampere, Watts, Resistance, Ohms, Switch, Direct current, Alternating current, Electrical conductors, Insulators, Ohm's ,series and parallel combination of resistors,Work, Power, Energy. Multimeter, measurement of resistance, current and voltage using multimeter. Electrical tester.	**8**
Unit 2 Electrical safety measures Safety precaution, Effect of electric shock on human body, First aid for electric shock, Types of fuses and its rating, MCB and ELCB, pipe and plate Earthing and its necessity	**8**
Unit 3 Fundamentals of AC & DC Generation of AC, idea of AC sine wave cycle, frequency, time period, amplitude, instantaneous value, average value, rms value, form factor, phase and phase difference,single phase circuits containing resistors, inductors and capacitors, impedance, power and power factor, kW, KVA and KVAR, phase supply.	**8**
Unit 4 DC Machines Importance of DC, parts of DC generator, principle of working, classification, failure of building up of voltage, DC motor, working principle, classification, Necessity of starter, 3 point starter, concept of Lap and wave winding , methods of speed control and reversal.	**8**
Unit 5 Electrical Household appliances and Illumination: Principle of working, parts and servicing of Non automatic electric Iron, Automatic Iron, Water heater, Electric Fan. Concept of illumination, working of incandescent lamp, CFL and LED. Advantages of electronic choke and CFL.	**8**
Total Hours	**40**

Course Outcomes:

1. Explain electrical terms used in daily life.
2. Explain Electrical safety measurements.
3. Describe the difference between alternating current and direct current.
4. Apply the knowledge to identify the components used in direct current machines
5. Examine the working of basic household appliances.

Text books:

1. ***Stanley Wolf, (1973). Guide to Electronic Measurements and Laboratory Practice.*** Prentice, Hall, Inc., Englewood Cliffs, New Jersey.
2. ***B.L.Thereja (2003). A Text book of Electrical Technology*** **Vol. 1 and 2.** S. Chand &

Reference books:

1. ***Dr. S.L. Uppal and*** Gc Garg ***(2015). Electrical wiring estimating and Costing.*** Khanna publishers.
2. ***G.B.Gupta,***(2013)***. Theory and performance of electrical machines.*** S.K. Kataria & Sons.
3. ***K.P.Anwer,(2013). Domestic appliances servicing.*** ScholarInstitute Publications.
4. ***M.L. Anwani,(2012). Basic Electrical Engineering***. Dhanpat Rai Publications. Company Ltd.

5.B.Raina, (2005). Electrical design estimating and costing. New Age International (p) Ltd.