



MADURAI KAMARAJ UNIVERSITY
University with Potential for Excellence

Re Accredited by NAAC with "A++" Grade in the 4th Cycle

DIRECTORATE OF DISTANCE EDUCATION

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SEMESTER – 1

CORE SUBJECT 1

CREDIT – 4

MECHANICS AND PROPERTIES OF MATTER – BPHYC11

Objective:

- To study the motion of objects, understand the laws of motion and laws of gravitation. To know the principle of conservation of momentum, energy and their consequences.
- To identify the characteristics of solids and fluids in terms of their properties

Unit I: Laws of motion

Newton's laws of motion – Force- Impulse of a force - law of conservation of linear momentum –Collision – Elastic and in elastic collision – (Fundamental laws of impact) – Newton's law of impact – coefficient of restitution – Impact of a smooth sphere on a fixed plane – Direct impact between two smooth spheres – Oblique impact between two smooth spheres – Calculation of final velocities of the spheres – Loss of K.E due to impact.

Unit II Dynamics of rigid body

Moment of inertia – Theorems of perpendicular and parallel axes – M.I of a circular ring, disc, solid sphere, hollow sphere and cylinder about all axes – angular velocity, angular momentum and K.E of rotation – Torque and angular acceleration – Relation between them – Expression for a acceleration of a body rolling down an inclined body without slipping.

Unit III Gravitation

Newton's law of gravitation – G by Boy's method – Mass and density of earth – Acceleration due to gravity – Variation of g with altitude, depth and rotation of earth - Value of g at poles and equator.

Gravitational field – Gravitational potential – Gravitational potential due to spherical shell – Gravitational potential due to a solid sphere (inside and outside)

Unit IV Elasticity

Elasticity – Stress, Strain - Hooke's law – Elastic moduli – Poisson's ratio – Beams – bending of beams – Expression for bending moment – Theory of uniform and non – uniform bending - Determination of young's modulus by uniform and non- uniform bending methods – Torsion of a body – Expression for couple per unit twist – Work done in twisting a wire – Torsional oscillations of a body - Rigidity modulus by dynamic torsion method (Torsional pendulum)

Unit V Surface Tension and Viscosity

Surface tension – definition – Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – work done in increasing the area of a surface – Excess pressure inside a curved liquid surface – Excess pressure inside a liquid drop and soap bubble.

Viscosity – Co efficient of viscosity – Streamlined and turbulent motion – critical velocity – Bernoulli's theorem – Proof – Applications – Venturimeter – Pitot tube

Text Book

1. Mechanics: D.S. Mathur S. Chand & Co, Edition 2002.
2. Elements of properties of matter – D.S. Mathur – S. Chand & Co., 2004.
3. Properties of matter – R. Murugesan – S. Chand & Co., 2004.

Reference Books

1. Mechanics Part I and Part II, Narayanamoorthy National Publishing Company, 2001.
2. Fundamental of Physics, D. Halliday , Resnick and J Walker, 6th Edition, Wiley, New York 2001.
4. Properties of matter – Brijlal and Subramanian S. Chand & Co., 2006.



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SEMESTER I

SKILL BASED -1

CREDIT -2

PROGRAMMING IN – BPHAS11

Objective: The purpose of this course is to introduce students about the key features and implementation of C , which is a powerful general purpose programming language available in all platforms and provide an in depth knowledge and skill in it.

Unit I: Introduction to C

Basic structure of C programs –Character set – C tokens –keyword and identifiers – Constants – Variables – Data types – Declaring variables – Initializing variables – type conversions.

Unit II: Operators, Expressions & I/O functions

Types of operators – Arithmetic operators - Relational, logical, and assignment operators - Increment and decrement operators – Conditional operators – Bit wise and special operators – arithmetic expressions – Mathematical functions – priority of operators- Data input and output – getchar(), putchar() , gets() , puts() - scanf() , printf() - escape sequence

Unit III: Control Statements

Simple IF statement – Simple IF- ELSE statement – Block IF Statement – Block IF-ELSE statement – looping operation using while statement – for statement – Break statement – continue statement - Switch statement – Goto statement – Simple programs. (To find the solution of quadratic equation - Fibonacci series – To find the biggest of three nos, factorial of a no, odd or even.) **Unit IV: Functions**

Defining a function – Accessing a function – Category of function – Passing arguments to function –Recursion- Library function. Programs using functions – Binomial coefficient, Sin series, summing the numbers 1 to n using recursion

Unit V: Arrays

Defining an Array – Processing an array – one, two dimensional arrays – Simple programs using arrays: - (addition of two matrices - subtraction of two matrices – Multiplication of two matrices- ascending and descending order.)

Text Book

1. Theory and problems of programming with C – By Byron Gottfried Second edition – Tata Megraw Hill, 2004.
2. Programming in C – Pradip Dey and Manas Ghosh, Oxford University Press, Second Edition.

Reference Books

1. Programming in C – By E. Balagurusamy – Third Edition – Tata Megraw Hill, 2004.
2. Programming in C by S. Ramasamy and P. Radhaganesan, Scitech Publications (India) Private Limited, Chennai and Hyderabad, 2006.



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SEMESTER – I

**SKILL BASED -2
SOLAR ENERGY - BPHAS12**

CREDIT -2

Objective: To make the students to understand the present day crisis and need for conserving energy alternatives are provided.

Unit I

Various forms of energy – renewable and non renewable energy system – Coal, oil and natural gas – availability – Merits and demerits.

Unit II

Solar energy– Nature of solar radiation– Components– Solar heaters– Crop dryers– space cooling.

Unit III

Solar ponds – Solar cooker – Water desalination – Photo voltaic basics – Merits and demerits.

Unit IV

Geothermal energy– Wind energy– Ocean thermal energy conversion (OTEC)– Energy from waves and tides– (Basic ideas, nature, application, merits & demerits.

Unit V

Biomass energy– classification– photo synthesis– Bio mass conversion– Gobar gas plants– ethanol from wood.

Text Book

1. Non – conventional energy resources B. Khan – Tata McGraw Hill – 2000.

Reference Books:

1. G.D. Rai – solar energy utilization – Edn – 1995.
2. S.P. Sukhetme – Solar Energy Tata McGraw – Edn II 1995
3. Godfrey Byle – Renewable Energy Power for a sustainable nature: Alden Oess limited oxford 1996.



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SEMESTER –I

NON MAJOR ELECTIVE – 1

CREDIT – 2

FUNDAMENTALS OF PHYSICS –I

Objective: To introduce some basic concept of Physics like measurement of physical quantities, states of matter, kinds of energies and energy sources to students studying other than Physics.

Unit 1

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Book for Study

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

Reference Books

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



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SEMESTER II

CORE SUBJECT – 2

CREDITS -4

THERMAL PHYSICS AND ACOUSTICS – BPHAC21

Objective: To understand the phenomena connected with heat capacities, conduction, convection and radiation, the process of making use of heat energy to do mechanical work.

Unit I: Calorimetry

Isothermal and adiabatic change- derivation of equations for both- C_v and C_p of a gas- Relation between them- Experimental determination of C_v by Jolly's method- determination of C_p by Regnault's method- Specific heat of a gas by Calendar and Barnes method.

Unit II: Transmission of heat

Conduction- Coefficient of thermal conductivity- Lees disc method of determination of thermal conductivity of bad conductor- Convection current in atmosphere- lapse rate- stability of atmosphere- green house effect- atmospheric pollution- Radiation- Stefan's law of radiation- experimental determination of Stefan's constant- derivation of Newton's law from Stefan's law- solar constant- temperature of sun- Angstrom's Pyrheliometer.

Unit III: Kinetic theory of gases

Postulates of kinetic theory of gases- mean free path- Transport Phenomena- diffusion, viscosity and thermal conductivity of gases- derivation of ideal gas equation- degrees of freedom- Boltzmann's law of equipartition of energy- Maxwell's law of distribution of molecular speed- Atomicity of gases- ratio of specific heat capacity of gases- calculation for monoatomic and diatomic gases.

Unit IV: Thermodynamics

Zeroth law of Thermodynamics - First law of thermodynamics - Heat engines- Reversible and irreversible process – Carnot's Theorem- Second law of thermodynamics- Entropy- change of entropy in reversible and irreversible process- change of entropy in converting ice to steam- Maxwell's thermodynamical relations- Clausius – Clapeyron latent heat equation.

Unit V: Acoustics

Expression for velocity of sound in fluid medium- Newton's formula- Laplace correction- effect of temperature, pressure, humidity, density of medium and wind- velocity of longitudinal wave in a rod- Kundt's tube experiment- Laws of transverse vibration in a string- sonometer- Melde's string.

Reverberation- Sabine's Reverberation formula (No derivation) - Acoustics of building- factors affecting acoustics of building- sound distribution in an auditorium- Requisites for good acoustics.

Text Book:

1. Heat and Thermodynamics : Brijlal & Subramanyam, Chand & co.
2. Heat and thermodynamics : R. Murugesan , S.Chand & co

Reference Book:

1. Heat and Thermodynamics : D.S Mathur , Chand & co
2. A text book of Sound : Brijlal & Subramanyam, Chand & co.

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www.mkudde.org**SEMESTER – II****SKILL BASED – 3****CREDIT – 2****ASTROPHYSICS - BPHAS21****Unit I**

Birth of Modern Astronomy – Geocentric and Heliocentric — Celestial sphere – Kepler's laws of planetary motion – Newtonian gravitation- Planets-Terrestrial and Jovian planets (Planets individual description is not required in detail) - Asteroids- Meteoroids- Comets.

Unit II

The orientation of Earth in space- Arc and time units- local time-Standard time Elements of the telescope-Properties of images - Kinds of Optical telescopes- Refracting and Reflecting telescopes- Radio telescope- Spectrograph – limitations.

Unit III

Sun- physical properties- composition- Core- Nuclear reactions- Photosphere- Chromosphere- Corona- Sunspots- Sunspot cycle-Solar wind- Auroras.

Unit IV

Classification of Stars-The Harvard Classification system-Hertzsprung-Russel Diagram-Luminosity of a Star-Stellar Evolution-White Dwarfs-Neutron stars-Black holes- Physics of Black Holes.

Unit V

Galaxy nomenclature-Types of Galaxies-Spiral-Elliptical-irregular galaxies- Milky Way and its structure- Star clusters-Galactic clusters-Pulsars.

TEXT BOOKS:

1. Nicolais. A. Pananides and Thomas Arny, 1979, Introductory Astronomy, Addison Wesley Publ. Co.
2. A. Mujiber Rahman, Introduction to Astrophysics, KAMS Publications, Uthamapalayam.

REFERENCES:

1. Abell, Morrison and Wolf, 1987, Exploration of the Universe, 5th ed., Saunders College Publ.

2. Carrol and Ostlie, 2007, Introduction to Modern Astrophysics, 2nd ed., Pearson International.
3. William J. Kaufmann, III, 1977, Macmillan Publishing company, London.
4. Abhyankar, K.D., Universities Press.



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SEMESTER – II

**SKILL BASED – 4
MEDICAL PHYSICS - BPHAS22**

CREDIT – 2

Objective: To understand the basics about the biological systems in our body, their behaviour, and the diagnostic devices.

Unit I

Basic Anatomical Terminology- Modeling and Measurement – Forces on and in the Body – Physics of the Skeleton – Heat and Cold in Medicine- Energy work and Power of the Body

Unit II

Pressure system of the body- Physics of Cardiovascular system- Electricity within the Body – Applications of Electricity and Magnetism in Medicine.

Unit III

Sound in medicine- Physics of the Ear and Hearing- Light in medicine- Physics of eyes and vision.

Unit IV

X-rays- Production of X-rays- X-ray spectra- continues spectra and characteristic spectra- Coolidge tube- Electro Cardio Graph (ECG) - Block diagram- ECG Leads- Unipolar and bipolar-ECG recording set up.

Unit V

Electro Encephalo Graph (EEG) - origin- Block diagram- Electro Myograph (EMG) – Block diagram- EMG recorder- Computer Tomography (CT) principle- Block diagram of CT scanner.

Text Books

1. Medical Physics –John R. Cameron and James G.Skofronick, 1978, John Willy & Sons.
2. Bio medical instrumentation – E D II, Dr M. Arumugam, Anuradha Agencies 1997.



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SEMESTER –II

NON MAJOR ELECTIVE- II

CREDIT – 2

FUNDAMENTALS OF PHYSICS –II

Unit – I

Electric current- voltage and resistance- Ohm's law- Kirchoff's law- Resistances in series and in parallel.

Unit – II

DC Source – Primary cells – Leclanche and Daniel cell – Secondary cells – Lead Acid Accumulator – DC generator.

Unit – III

Alternating current generation by hydro, thermal and atomic power stations– RMS value – Peak value (Quantitative) – AC generator – no derivation.

Unit – IV

Measurement of Electric power by Wattmeter- simple calculations- Induction coil- Wattless current- Power factor.

Unit – V

Simple electrical circuits – resistor, capacitor and inductor connected to AC source (independently) – Relationship between emf and current in each case. Diode – Bridge Rectifier.

Reference Books

1. Electricity and Magnetism – R. Murugesan – S. Chand & Co 2004.



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SEMESTER I & II

PHYSICSPRACTICAL-I

CREDIT - 3

BPHAC1P

LIST OF EXPERIMENTS

ANY FOURTEEN

1. Young's Modulus – Uniform bending – Pin & Microscope
2. Young's Modulus – Non-Uniform bending – Scale and Telescope
3. Young's Modulus – Cantilever – Pin & Microscope
4. Young's Modulus – Cantilever – Dynamic method
5. Rigidity Modulus – Static Torsion – Searle's method
6. Rigidity Modulus – Torsion Pendulum 7. Moment of Inertia – Torsion Pendulum
8. A.C. Frequency – Sonometer
9. Verification of laws – Sonometer
10. Frequency of tuning fork – Sonometer
11. Frequency of vibrator – Melde's Apparatus
12. Velocity of sound – Kundt's tube
13. Compound Pendulum – "g"
14. Thermal conductivity of bad conductor – Lee's Disc
15. Viscosity of liquid – Stoke's method
16. Viscosity of liquid – Burette method
17. Surface Tension – Capillary Rise
18. Surface Tension – Drop weight method



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SEMESTER – III

CORE SUBJECT- 3

CREDIT – 4

ELECTRICITY AND ELECTROMAGNETISM – BPHAC31

Unit I

Coulomb's law- Electric field- Electric field due to a point charge- Electric flux- Gauss law- its proof- Applications of Gauss law- Electric field due to a charged sphere- Electric field due to a plane sheet of charge- Coulomb's theorem- Mechanical force on the surface of a charged conductor- Electric potential- Relation between electric field and electric potential- Potential due to a charged spherical conductor.

Unit –II

Capacitance- Principle of capacitor- Expressions for the capacitance of i) spherical capacitor ii) cylindrical capacitor and iii) parallel plate capacitor with and without partly filled dielectrics- Energy of a capacitor- Loss of energy when two charged conductors share the charges- Types of capacitors- fixed capacitor, variable capacitor, electrolytic capacitor and sliding capacitor.

Unit – III

Kirchhoff's laws- Application of Kirchhoff's laws to Wheatstone's bridge- sensitiveness of the bridge- Carey Foster's bridge- Determination of the resistance of the given wire with the necessary theory.

Potentiometer- principle of potentiometer- comparison of emfs of two cells using potentiometer- Determination of internal resistance of the cell using potentiometer- Calibration of voltmeter(low range and high range)- Calibration of ammeter.

Unit IV

Faraday's laws of Electromagnetic induction, - Lenz's law – self inductance – energy stored in an inductance – Experiment to determine self inductance by Rayleigh method with theory – Mutual inductance – Determination of Mutual inductance using B.G. (with theory) Coefficient of Coupling – Eddy Currents.

Unit V

Mean value of alternating emf – RMS value of the alternating current/voltage- Alternating current applied to LR, Cr and LCR circuits – Series Resonance Circuit – Parallel Resonance Circuit – Power in an A.C. Circuit – Wattless Current – Power factor – Q factor – choke – skin effect – A.C. bridges – Maxwell's bridge – Anderson's bridge and owen's bridge.

Text Book

1. Electricity and Magnetism by Sehgal, Chopra & Sehgal Sultan, Chand & Sons. 1998.

Reference Books

1. Electricity and Magnetism 20th revised edition – Brijlal & Subramaniam , Ravi Offset Printers & Publishers Pvt., Ltd., 1997.
2. Electricity & Electromagnetism – R. Murugesan
3. Electricity and Magnetism 2nd revised edition – Narayanamoorthy & Nagarathinam , National Publishing & Co. 1997.
4. Electricity & Magnetism – A. Ambrose and T. Vincent Devaraj



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SEMESTER – IV

CORE SUBJECT- 4

CREDIT – 4

OPTICS AND SPECTROSCOPY - BPHAC41

Objective:

- To familiarize the fundamental laws concerning reflection and refraction.
- To understand the phenomena like, interference, diffraction, and polarization.
- To perceive the basic concept of spectroscopy.

Unit I:

Snell's law of reflection and refraction- reflection and refraction at spherical surfaces- Deviation produced by thin lenses- focal length of two thin lenses in and out of contact- Cardinal points- Refraction through a thin prism- Dispersion- deviation without dispersion- dispersion without deviation- Aberration- chromatic aberration in lenses- achromatic combination of two lenses- Spherical aberration and its removal- Aplanatic lenses- Oil immersion objective.

Unit II

Interference- Coherent sources- interference in thin films- Air wedge- Newton's rings- Michelson's interferometer and its application- Fabry- Perot interferometer- sharpness of fringes- Resolution- Holography- Construction and reconstruction of a hologram.

Unit III

Diffraction- Theory of plane diffraction grating(normal incidence only)- Experiment to determine wave length- Zonal plate- Theory- Comparison with convex lens- Fresnel's diffraction- Diffraction at a straight edge- circular aperture- rectangular aperture- Fraunhofer diffraction at a single slit- double slit- Cornu's spiral- Resolving power of optical instruments- Telescope and grating.

Unit IV

Polarization- Polaroid and its application- Double refraction- Nicol Prism- Nicol prism as Polarizer and Analyzer- Huygens explanation of double refraction- QWP and HWP- production and analysis of plane, circularly and elliptically polarized light- Optical activity- Fresnel's explanation- Specific rotation- Lorentz half shade polarimeter

Unit V

Spectroscopy- Introduction – Electromagnetic spectrum – IR radiations – properties, production, detection and uses – UV radiations – properties, production, detection and uses – Raman effect – Theory and experimental study – Applications. Electromagnetic spectrum- IR radiations- properties, production, detection and uses- UV radiations- properties, production, detection and uses – Raman effect – Theory and experimental study- Applications- Raman Effect- theory, experiment, characteristics of Raman lines- Applications- Doppler effect in optics and its application.

Text Book:

1. Optics and Spectroscopy – Kakani and Bhandari Sultan Chand & sons New Delhi.
2. Spectroscopy – B. K. Sharma, Goel Publishing House, Meerut 2006

Reference Books:

1. Optics - Subramaniam & Brijlal S. Chand & Co 2002
2. Optics and Spectroscopy – R. Murugesan, Vivekananda Press, Madurai.



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SEMESTER III & IV

PHYSICSPRACTICAL–II

CREDIT - 3

BPHAC2P

ANY FOURTEEN

- | | |
|----------------------------|--------------------------------------|
| 1. Refractive Index | : Spectrometer A and D |
| 2. Grating | : Spectrometer - N and λ |
| 3. Air Wedge | : Thickness of wire |
| 4. Newton's Rings | : Radius and Wavelength measurements |
| 5. Carey Foster Bridge | : Resistance and specific resistance |
| 6. Carey Foster Bridge | : Temperature coefficient |
| 7. Potentiometer | : Calibration of low Range voltmeter |
| 8. Potentiometer | : Calibration of ammeter |
| 9. Potentiometer | : Comparison of EMF's |
| 10. Determination of B_H | : Axial coil 11. |
| Determination of M | : Axial coil |

12. Determination of M and B_H : Tan C method
 13. Spot Galvanometer : Figure of Merit
 14. Spot Galvanometer : Charge sensitivity
 15. Spot Galvanometer : Comparison of EMF's
 16. Spot Galvanometer : Comparison of capacities
 17. Owen's Bridge : C1/C2
 18. De Sauty's Bridge : C1/C2



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SEMESTER – V

CORE SUBJECT- 5

CREDIT – 4

MODERN PHYSICS - BPHAC51

Objectives:

- To give an introductory account of the basic principles of atomic physics.
- .To impart knowledge on the theory of Relativity
- To introduce the origin of Quantum theory

Unit I

Bohr atom model –Bohr's theory of Hydrogen atom- Bohr - Sommerfeld theory – Somerfield's relativistic atom model – Critical potentials- Experimental determination Davis and Goucher's experiment- Explanation for the fine structure of H_α line- Relativistic variation of atomic mass– Vector atom model– Quantum numbers – coupling schemes – Pauli's exclusion principle – Arrangement of electrons in atoms- Magnetic dipole moment due to orbital motion of the electron – magnetic dipole moment due to electron spin - Stern and Gerlach experiment.

Unit II

Optical spectra – spectral terms and notations – selection rules -Fine structure of sodium D lines –Zeeman effect – theory and experiment – quantum theory of Zeeman effect – Anomalous Zeeman effect – Stark effect.

X – Ray spectra- Duane and Hunt law- Moseley's law- Bragg's law- Bragg's X-ray spectrometer- measurement of wave length- Compton effect- theory and experimental verification.

Unit III

Frames of reference- inertial frames of reference- Galilean transformation- Newtonian relativity- Michelson Morley experiment- Postulates of special theory of relativity- Lorentz transformation- Lorentz- Fitzgerald contraction- time dilation- relativistic addition of velocities- variation of mass with velocity- Mass-energy equivalence- Relation between total energy, rest mass energy and momentum

Unit IV

Planck's quantum theory of radiation – Dual nature of matter and radiation – De-Broglie's hypothesis of matter waves – Expression for wavelength – Davisson's and Germer experiment – G. P. Thomson experiment with relativistic correction- Concept of wave packet– Group velocity, wave velocity and their relation – Heisenberg's Uncertainty principle – Experimental illustration.

Unit V

Basic postulates of wave mechanics – Derivation of time dependent and time independent Schrodinger's wave equations– wave function - Physical significance of wave function– Eigen functions and Eigen values.

Schrodinger equation for a free particle in one dimensional potential well- Its Eigen function and Eigen value- Applications of Schrodinger wave equation- Particle in one dimensional Box –Barrier penetration problem - Linear harmonic oscillator – The rigid rotator.

Text Book:

Modern Physics (sixth revised edition 1998 – R. Murugesan, S. Chand & Company Ltd.)

Reference Books:

1. Modern Physics: Seigal Chopra and Seigal
2. Quantum Mechanics : Sathyaprakash, Ratan Prakasan Mandir 1994



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SEMESTER – V

CORE SUBJECT- 6

CREDIT – 4

NUCLEAR PHYSICS – BPHAC52

Objective: The student must be able to

- Understand the basic properties of nuclei and the atomic nucleus
- Describe radioactivity and related phenomena
- Explain the various interactions of nuclear radiation with matter

Unit I

Isotopes – Isotones – Isobars – Atomic mass unit – Properties of the nucleus – Nuclear Binding Energy – Nuclear forces – Yukawa’s theory (no derivations) – theories of nuclear composition – proton – electron hypothesis – Model of nuclear structure - the liquid droop model – Binding energy formula – Shell model – Collective model.

Unit II

Particle Accelerators – Synchro – cyclotron – Betatron – proton synchrotron – electron synchrotron – detectors – Wilson cloud chamber – bubble chamber – photographic emulsion technique – fundamental particles – particles and antiparticles – particles instability – conservation laws.

Unit III

Laws of radio activity – Half life period – Mean life – Radio Carbon dating – α rays – Geiger Nuttal law – experimental determination by Geiger- Nuttal law – α disintegration energy – theory of α decay, β decay – electron capture, γ rays – determination of wavelength by diamond crystal spectrometer – origin of rays – internal conversion.

Unit IV

Nuclear transmutations by α particles, protons, deuterons, neutrons and electrons – Photo disintegration – nuclear fission – energy release. Explanation – (C.N Cycle and P.P Cycle) Nuclear fusion – Thermo nuclear reaction – Controlled thermo nuclear reaction – Cosmic rays – origin – primary – secondary – Azimuthal effect – East-West effect pair production & annihilation - Van Allen Belt.

Unit V

Utilisation of nuclear energy - principle and action of atom bomb & Hydrogen Bomb – production of electricity from energy – Nuclear reactors – General features of nuclear reactors – Different types of nuclear reactors – Pressurized water reactors – Boiling water reactors – Fast Breeder reactors – Radio isotopes and their application.

Text Book:

1. Modern Physics – R. Murugesan, S.Chand & Co., 1998.
2. Modern Physics by Seghal, Chopra and Seghal, Sultan Chand 1998.
3. Nuclear Physics by Keplan.I – Marosa Publishing House, 1995.



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SEMESTER – V

CORE SUBJECT- 7

CREDIT – 4

ANALOG ELECTRONICS – BPHAC53

Objective: To enable the students to understand the aspects of analog electronics in a lucid and comprehensive manner.

UNIT I:

Semiconductors- n type and p type- PN junction diode- characteristics- Zener diode characteristics- Full wave rectifiers- Bridge rectifier- Filter circuits- General theory- low pass, high pass, band pass and band elimination filters.

UNIT II

Transistors- three types of configuration- relation between α , β and γ - Biasing circuits- Field Effect Transistor (FET)- construction – n channel, p channel – FET polarities- working- FET characteristics- MOSFET- characteristics.

UNIT III

Amplification - small signal CE amplifier- input impedance, output impedance, current gain, voltage gain and power gain- single stage amplifier- frequency response - push-pull amplifier- Op-amp characteristics- application as adder, subtractor, integrator and differentiator.

UNIT IV

Feedback-positive & negative feedback- Barkhausen criteria- transistor oscillators- Hartley, Colpitt's, Phase shift oscillators with mathematical analysis.

UNIT V

Modulation-Types of modulation- Modulation Factor-Amplitude modulation-power in AM wave-block diagram of AM transmitters and receivers-Frequency modulation-block diagram of FM transmitters and receivers-Digital modulation(qualitative)-Pulse amplitude modulation-Pulse time modulation.

Text Book:

1. Principles of electronics - V.K.Mehta ; S.Chand &co
2. A textbook of applied electronics -R.S.Sedha ;S.Chand & co

Reference Books:

1. Basic electronics -B.L. Theraja; S.Chand & co
2. Electronic devices and circuits: Salivahanan, Sureshkumar Tata McGraw Hill
3. Electronic communication system - George Kennedy



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NANOPHYSICS – BPHAS51

OBJECTIVES

- To create the basic knowledge in nano materials.
- To understand the scientific perspective of nanomaterials.
- To identify the techniques suitable for nanomaterial synthesis.
- To know the significance of nanomaterials.

Unit I Nanomaterials

History of Nanotechnology- Nanostructures- synthesis of oxide nano particles- Synthesis of semiconductor nano particles- Synthesis of metallic nano particles

Unit II Quantum Heterostructure

Super lattice- preparation of Quantum nanostructure- Quantum well laser- Quantum cascade laser-Quantum wire- Quantum dot- Application of Quantum dots

Unit III Carbon Nanotubes

Discovery of Nanotubes- Carbon Allotropes- Types of carbon Nanotubes- Graphene sheet to a single walled nanotube- Electronic structure of Carbon Nanotubes- Synthesis of Carbon Nanotube

Unit IV

Nanocrystalline soft material- Permanent magnet material- Theoretical background- Super paramagnetism- Coulomb blockade-Quantum cellular Automata

Unit V Application of nanotechnology

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

Text Book:

- 1) Text book of Nanoscience and Nanotechnology – B. S. Moorthy, P. Sankar, Baldev Raj, B. B. Rath and James Murdy University Press – IIM
- 2) Nanophysics, Sr. Geradin Jayam, Holy Cross College, Nagercoil (2010)

Reference:

- 1) ‘Nanoscience and Nanotechnology: Fundamentals to Frontiers’
M.S. Ramachandra Rao, Shubra Singh, Wiley India pvt. Ltd., New Delhi. (2013).
- 2) ‘Nano the Essentials’ - T. Pradeep, Tata Mc.Graw Hill company Ltd (2007)
- 3) ‘*The Chemistry of Nano materials : Synthesis, Properties and Applications*’, Volume 1
C. N. R. Rao, A. Müller, A. K. Cheetham, , Germany (2004).



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CLASSICAL AND STATISTICAL MECHANICS – BPHAC61**Objective:**

- To understand the mechanics of systems of particles and their equations of motion.
- To study the concept of statistics of molecules.

Unit I

External and Internal force, Centre of Mass – Conservation of Linear momentum- Conservation of Angular momentum – Conservation of Energy (K.E., P.E.) – Work-energy theorem- Conservative forces- examples- constraints- Types of Constraints- Examples- Degrees of freedom under constraints- Generalized Coordinates (Transformation Equations) – generalized velocities- generalized momentum.

Unit II

Principle of Virtual Work – D'Alembert's principle- Lagrangian Equations from D'Alembert's Principle (Derivation) – Simple applications- Newton's equation of motion, simple pendulum, Atwood's machine, compound pendulum- Hamilton's principle- deduction of Hamilton's principle from D'Alembert's principle- Lagrangian equation from Hamilton's principle- Deduction of Lagrangian equation of motion from variation principle- simple application- simple pendulum, Atwood's machine, compound pendulum.

Unit III

Hamiltonian Function H- conservation of energy(Jacobi's Integral) – Physical significance- Hamilton's Equations (Derivation) – variation principle- Hamilton's Equation of motion from variation principle- Applications- Harmonic oscillator, motion of a particle in central force field, Charged particle moving in an electromagnetic field, compound Pendulum, Two Dimensional Harmonic Oscillator

Unit IV

Classical statistics- microscopic and macroscopic systems- ensembles- Basic postulates of statistical mechanics- Probability- Thermodynamic probability- Boltzmann theorem on entropy and probability- Maxwell-Boltzmann statistics- Maxwell-Boltzmann energy distribution law- - Maxwell Boltzmann velocity distribution Law.

Unit V

Quantum statistics- introduction- phase space- Planck's law of black body radiation (derivation) - Deduction of Wien's and Rayleigh Jean's law- Bose-Einstein statistics- Bose-Einstein distribution law- Photon gas- Fermi-Dirac Distribution Law- Electron gas- Comparison of the three Statistics.

TEXT BOOKS:

1. J.C. Upadhyaya, July 2005, **Classical Mechanics**, Published by Himalya Publishing House, Mumbai
2. Brijlal & Subramaniam, Reprint 1998, **Heat & Thermodynamics**, S. Chand & Company Ltd
3. Agarwal, '**Statistical Physics**' S.Chand & co New Delhi 1996

REFERENCES:

1. Gupta, B.D., Satyaprakash, 1991, **Classical Mechanics**, 9th ed., Kadernath Ramnath Publ., Meerut
2. Gupta, Kumar, Sharma, 2005, **Classical Mechanics**, PragatiPrakashan Publ., Meerut.
3. Murray R. Spiegel, 1981, Theoretical Mechanics, Schaum's outline series, Mc Graw Hill Publ. Co., New Delhi.



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SEMESTER – VI

CORE SUBJECT- 9

CREDIT – 4

SOLID STATE PHYSICS - BPHAC62

Objective:

- To understand the different types of bonding in solid substances,
- To understand the magnetic and dielectric properties of crystalline structures.

UNIT I:

Bonding in Solids – Types of bonding in solids – ionic, covalent, metallic, molecular and hydrogen bonds – Crystal Structure – Crystal lattice and crystal structure – unit cell – Bravi's lattice, classification of crystals – Miller indices – structure of diamond and zinc blende – Thermal Properties – Concept of phonon – Heat capacity of solids – Limitations of Einstein's theory, Debye's theory of lattice specific heat; thermal expansion of solids (qualitative).

UNIT II:

Free electron theory of metals; Electron drift, mobility, mean free path, relaxation time, Electrical and Thermal conductivities of metals – Wiedmann Franz law; Sources of resistivity of metals – Matthiessen's rule; Super conductivity – applications, BCS theory.

UNIT III:

Different types of magnetism – dia, para, ferro, antiferro and ferromagnetism: a. Langevin's theory of dia & para magnetism 2. Wie's theory of ferromagnetism – Magnetic materials – Properties and application – hard and soft magnetic materials, magnetostriction materials, ferrites and concepts of domains and hysteresis.

UNIT IV:

Dielectrics, polarization, polar and non-polar dielectrics – dielectric constant, Polarizability Clausius Mossotti relation – Different types of Polarization – electronic, ionic, orientational, space charge – Dependence of polarization on frequency and temperature; Dielectric loss sources; Dielectric strength and break-down – contributing.

UNIT V:

Laser materials – Instrumentation of radiation with matter (quantitative) – Emission and absorption of light spontaneous and stimulated emission; Laser Principle – Properties – applications; construction, working and characteristics of Ruby laser, He-Ne laser. Semiconductor laser.

Text Book:

1. Fundamentals of solid state physics by Saxena, Gupta Saxena – Pragati Prakashan X Revised Edition 1991.
2. Introduction to Solids by Azaraoff – TMH, Reprint 1978.



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SEMESTER – VI

CORE SUBJECT- 10

CREDIT – 4

DIGITAL ELECTRONICS – BPHAC63

Objective: To enable the students to understand the aspects of Digital electronics in a lucid and comprehensive manner.

UNIT I: Number System

Number system-Binary, decimal, octal, hexadecimal (conversion from one to another)- binary addition- binary subtraction- binary subtraction by 1's and 2's complement method- Basic laws of Boolean Algebra-properties-Principle of duality- De-Morgan's theorem-proof.

UNIT II: Logic Gates

Positive and negative logic-logic gates-OR, AND, NOT, NAND and EX-OR gates- DRL-OR gate, AND gate-RTL NOT gate-DTL NOR gate- DTL NAND gate- NAND as universal gate- NOR as universal gate--Sum of products(SOP)- Karnaugh's map-2 variable,3 variable and 4 variable-simplification using k-map.

UNIT III: Arithmetic circuits

Half adder- full adder- 4 bit binary adder- half subtractor- full subtractor- 4 bit binary subtractor- Multiplexer(MUX)- 4 to 1 MUX- Demultiplexer (DMUX)- 1 to 4 DMUX- Encoder- 8 to 3 encoder- decimal to BCD encoder- decoder- 3 to 8 decoder- BCD to decimal decoder-BCD to seven segment decoder.

UNIT IV: Timers, Flip-flops and registers

Timer- IC 555 monostable and astable multivibrators- flip flops- RS flip flops (using NAND and NOR)- edge triggered RS flip flop- JK flip flop- JK master slave flip flop- D flip flop- register- serial in serial out shift register.

UNIT V: Counters, memories and data converters

Counters- Ring counter- decade counter-semiconductor memories- ROM-PROM-applications- RAM- Dynamic RAM (DRAM)-Digital to analog converter(D/A)- binary ladder type-analog to decimal converter(A/D)- parallel A/D converter.

Text Book:

1. Digital principles and applications : Albert Paul Malvino , Donald P. Leach , Tata McGraw Hill
2. Digital logic circuits : P. Raja (second ed), Scitech Publications Pvt. Ltd.
3. Digital electronics and logic design :JaydeepChakravorty , University Press.



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SEMESTER – V

SKILL BASED - 6

CREDIT – 2

OPTO ELECTRONICS – BPHAS61

Objective:

- To give an introductory account of the basic principles of Optoelectronic devices
- To understand the principle and working of LASER
- To gain information about fibre optic communication

Unit I

Introduction – PN junction as a Light Source (LED) – LED materials – Advantages – LCD _ Characteristics and action of LCD – Advantages.

Unit II

Laser- Introduction– characteristics of Laser– Spontaneous and stimulated emission– Einstein coefficients- condition for population inversion– three level scheme– semi conductor.

Unit III

Photo detector- characteristics of photo detectors– PN junction photo detector– PIN photo diode- Avalanche photo diode- Photo transistor.

Unit IV

Introduction – principle of optical fibre – light transmission in a optical fibre – Acceptance angle – Numerical aperture.

Unit V

Fibre index profiles – Step index, graded fibre (transmission of signals) – Advantages of fibre optic communications, optical switching – Logic gates.

Text Book:

1. Semiconductor physics and Optoelectronics – P. K. Palanisamy, SCITECH Publication, Chennai 2002.
2. Optical fibres and Fibre Optic Communication – Sabir Kumar Sarkar IV Revised Edition 2003.

Reference Books:

1. Opto Electronics – Wilson & Hawker, Prentice Hall of India 2004.

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www.mkudde.org**SEMESTER V & VI****PHYSICSPRACTICAL–III****CREDIT – 5****BPHAC3P**

ANY FOURTEEN

- | | |
|--------------------------------|---|
| 1. LCR | : Series Resonance circuit- L and Q |
| 2. LCR | : Parallel Resonance circuit- L and Q |
| 3. Spot Galvanometer | : Determination of mutual inductance |
| 4. Spot Galvanometer | : Comparison of mutual inductance |
| 5. Spot Galvanometer | : High Resistance by leakage |
| 6. Spot Galvanometer | : Internal Resistance of a cell |
| 7. Anderson's Bridge | : Self Inductance |
| 8. Rayleigh's Bridge | : Self Inductance |
| 9. Maxwell's Bridge | : Self Inductance |
| 10. Small angled prism | : Refractive Index |
| 11. Spectrometer | : i – d curve |
| 12. Spectrometer | : i - i' curve |
| 13. Grating | : Minimum deviation |
| 14. Spectrometer | : Cauchy's constant |
| 15. Spectrometer | : Hartmann's Interpolation Formula |
| 16. Spectrometer | : Small angled prism - refractive index |
| 17. Impedance and power factor | : LR circuit |
| 18. Impedance and power factor | : CR circuit |



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SEMESTER V & VI

PHYSICSPRACTICAL-IV
BPHAC4P

CREDIT – 5

ANY FOURTEEN

1. Transistor characteristics : Common Emitter
2. Zener diode characteristics
3. Zener voltage regulator
4. Single Stage Amplifier : gain and bandwidth
5. Clipper and Clamper : discrete components only
6. FET characteristics
7. Hartley Oscillator : Frequency and Inductance of coil
8. Colpitt's Oscillator : Frequency and Inductance of coil
9. Phase Shift Oscillator : Frequency
10. Wien's Bridge Oscillator : Frequency
11. Astable Multivibrator : using discrete components
12. Monostable Multivibrator : using discrete components
13. Integrator and Differentiator : using discrete components
14. Voltage Doubler and Voltage Tripler
15. Logic gates : using discrete components
16. Full wave rectifier : π filters
17. UJT characteristics
18. SCR characteristics



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SEMESTER V & VI

PHYSICSPRACTICAL-V

CREDIT – 5

BPHAC5P

1. Logic Gates : IC
2. NAND as Universal gate : IC
3. NOR as Universal gate : IC
4. Dual Power Supply - IC 7812 and IC 7912
5. De-Morgan's Laws - Verification
6. Half Adder and Full Adder
7. Four bit binary adder
8. Half Subtractor and Full Subtractor
9. Four bit binary subtractor
10. Astable Multivibrator -IC 555
- 11 Schmitt Trigger - IC 555
12. BCD counter
13. Astable Multivibrator -IC 741
14. Integrator and Differentiator -IC 741
15. Adder and subtractor -IC 741
16. Four bit binary counter
17. Ring Counter
18. Voltage Regulator -IC 7805



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B. Sc. ANCILLARY PHYSICS (SYLLABUS)

B.SC., ANCILLARY PHYSICS (SEMESTER) SYLLABUS

SEMESTER – I

CREDIT – 4

PAPER I : MECHANICS, PROPERTIES OF MATTERS AND SOUND

Unit I:

Forces in nature – Central forces – Gravitational and electromagnetic – Conservative and Non-Conservative forces – Examples – Nuclear force – Friction – Angle of friction – Motion of bodies along an inclined plane – Work done by a force – Work done by a varying force – Expression for Kinetic energy – Expression for potential energy – Power.

Unit II:

Angular velocity – Normal acceleration (no derivation) – Centrifugal and Centripetal forces – Torque and angular acceleration – Work and power in rotational motion – Angular momentum – K.E of rotation – Moment of Inertia – Laws of parallel and Perpendicular axes theorems – M.I of circular ring, Circular Disc, Solid sphere, hollow sphere and cylinder.

Unit III:

Kepler's laws of planetary motion – Laws of Gravitation – Boy's method for G – Compound pendulum – Expression for period – Experiment to find g - Variation of g with latitude, altitude and depth – Artificial Satellites.

Unit IV:

Elastic moduli – Poisson's ratio – beams – Expression for bending moment – Determination of Young's modulus by uniform and non-uniform bending – I section girders. Torsion – Expression for couple per unit twist - Work done in twisting – Torsional pendulum – Derivation Poiseuille's formula (analytical method) – Bernoulli's theorem – Proof of Application – Venturimeter – Pitot tube.

Unit V:

Simple harmonic motions – Progressive Waves Properties – Composition of Two S.H.M and beats stationary waves – Properties – Melde's experiments for the frequency of electrically maintained tuning fork – Transverse and longitudinal modes - Acoustics – Ultrasonic – Properties and Application.

Reference Books

1. Mechanics by D.S. Mathur – S. Chand & Co., 2008.
2. Properties of matter by Brijlal & N. Subramanyam 2004, S. Chand.
3. A Text Book of Sound by Brijlal & N. Subramanyam, S. Chand & Co 2004.
4. University Physics by Sears Zemansky and Gound, 6th edition (Naresa Publishing House, Chennai 1996)



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SEMESTER – II PAPER-II THERMAL PHYSICS CREDIT – 4

Unit I:

Expansion of Crystals – Determination of α by air wedge method – Expansion of anisotropic solids – solids of low expansivity and their uses – anomalous expansion of water – thermostats. Isolated and adiabatic changes – Derivation of equation for both C_v , and C_p of a gas – relation between them – experimental determination of C_v , by Joly's method- Determination of C_p by Regnault's method.

Unit II:

Lee's disc method for conductivity of bad conductor – air and cardboard / ebonite – analogy between heat flow and electric current Weidman – Franz law – Convection in atmosphere – lap rate – stability of atmosphere – green house effect – atmospheric pollution.

Unit III:

Radiation – Stefan's law – determination of Stefan's constant by filament heating method – solar constant measurement water flow Pyrheliometer – temperature of the Sun – Solar spectrum- energy distribution in black body spectrum – Planck's law (no derivation) – derivation of Wien's and Rayleigh Jeans laws from Planck's law.

Unit IV:

Kinetic theory of gases – Mean free Path – transport phenomena – diffusion – viscosity and thermal conductivity – Maxwell's law of distribution of molecular speed – experimental verification – degree of freedom – Boltzmann's law of equipartition of energy – calculation of C_p for monatomic and diatomic gases.

Unit V:

Thermodynamics – Carnot's theorem – Derivation of Efficiency – Second law of thermodynamics – entropy – changes of entropy in Carnot's Cycle – Change of entropy in conversion of ice into steam – Joule – Kelvin effect – simple theory of Porous – Plug experiment adiabatic – diamagnetism – Curie's law Giauque's Methods Superconductivity.

Reference Books

1. Heat and Thermodynamics by Brijlal & N. Subramanyam – S. Chand & Co.2004.
2. Ancillary Physics Vol.II by A. Ubald Raj & Jose Robin, Indira Publications, 2002



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SEMESTER-III PAPER-III ELECTRICITY AND ELECTRONICS CREDIT – 4

Unit I:

Gaus's law – proof – Applications – Field due to a charged sphere and an infinite plane sheet – Field near a charged conducting cylinder – Coulomb's theorem – Electronic potential – Relation between potential and field – Capacitors – Expression for C of parallel plate spherical (outer sphere earthed) and cylindrical capacitors – Energy of charged capacitor – Loss of energy due to sharing of charges.

Unit II:

Kirchhoff's laws – application of wheatstone's network – sensitiveness of bridge – Carey Foster Bridge – Measurement of resistance and temperature – Coefficient of resistance – principle of potentiometer – Calibration of ammeter and voltmeter – low and high range – measurement of resistance using potentiometer.

Unit III:

Torque on a current loop – mirror galvanometer, dead beat and ballistic – Current sensitiveness – voltage sensitiveness I B.G. theory – damping correction – experiments for charge sensitiveness – comparison of emf's and comparison of capacitors.

Electro motive force generated in a coil rotating in a uniform magnetic field – R.M.S and mean values – LCR circuit – impedances - Series and Parallel resonant circuits – Power factor – Wattless current – Choke.

Unit IV:

Junction diodes – Forward and Reverse bias – Diode characteristics – Types of diodes – (LED and Zener) Bridge rectifier using junction – II filter – Transistors- Characteristics (CE modes only) – Biasing and action of a single transistor (CE) amplifier – Frequency response Hartley oscillator – Modulation (qualitative study) – Op-Amp and its characteristics – virtual earth – voltage amplifier in inverting mode - Op-Amp as adder and Subtractor.

Unit V:

Binary number system – reason for using binary numbers – binary to decimal and decimal to binary conversions – addition and subtraction of binary numbers. Logic circuits – Boolean algebra – De Morgan's theorem – OR, AND, NOT, NOR and NAND Gates – NOR and NAND gates as universal building blocks – Ex-Or gates.

Reference Books:

1. Solid State Electronics - B.L. Theraja S. Chand 2003.
2. Electricity and Magnetism - Brijlal & N. Subramanyam, S. Chand 2007.



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SEMESTER– IV PAPER-IV

CREDIT – 4

OPTICS,SPECTROSCOPY AND MODERN PHYSICS Unit I:

Deviation produced by thin lens – Focal length of two thin lenses in and out of contact - Cardinal points – Refraction through a thin prism – Dispersion – Dispersive power – combination of thin prisms to produce (a) deviation without dispersion and (b) dispersion without deviation – Direct vision spectroscope – Chromatic aberration in lenses and its removal – Spherical aberration and its removal – Aplanatic surfaces – Oil immersion objective – Theory of primary and secondary rainbows.

Unit II:

Interference in thin films – Air wedge – Newton's rings (Reflected beam only) – Determination of wavelength – Jamin's Interferometer, principle and use. Diffraction; Theory of plane transmission grating (Normal incidence only) – Experiment to determine wavelengths.

Unit III:

Double refraction – Nicol prisms, constructions, action and uses – QWP and HWP – Optical activity (No theory) – Biot's laws – Specific rotator power – Half shade polarimeter –Determination of Specific rotator power – Fiber optics – Light propagation in fibers – Fiber optic communication system.

Unit IV:

Infra red radiations, Production, properties and uses – Ultra violet radiations sources, properties and uses. Quantum theory – Plank's quantum theory – Raman Effect – Simple theory Experimental study (Wood's apparatus) Application. Photo electricity – Laws of photo electricity – Einstein's equation Photocells and their uses, photo emissive, photoconductive and photo voltaic cells.

Unit V:

De Broglie's theory – Electron diffraction – G.P. Thomson's experiment. Michelson –Morley experiment – Significance of the negative results – Postulates of special theory of relativity – Lorentz transformation equations (No Derivation) – Length Contraction – Time dilation – Variation of mass with velocity and Mass – Energy relation (Simple derivation)

Reference Books:

1. A text book of Optics by Brijlal & N. Subramanyam, S.Chand 2002.
2. Optics and Spectroscopy by R. Murugesan, Vivekananda Press, Madurai 2004.



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LIST OF PRACTICAL

SEMESTER I & II

CREDIT – 1

ANCILLARY PHYSICS PRACTICAL – I

Any 14 Experiments

- | | | |
|---|---|------------------------------------|
| 1. Young's Modulus | - | Uniform bending – Pin & Microscope |
| 2. Young's Modulus
Telescope | - | Non-Uniform bending – Scale & |
| 3. Acceleration due to gravity | - | Compound Pendulum |
| 4. Determination of G and M. I | - | Torsion Pendulum |
| 5. Verification of laws | - | Sonometer |
| 6. Frequency of fork | - | Melde's Apparatus |
| 7. Calibration of low range voltmeter | - | Potentiometer |
| 8. Calibration of ammeter | - | Potentiometer |
| 9. Resistance and specific resistance | - | Potentiometer |
| 10. Comparison of capacities | - | Spot Galvanometer |
| 11. Comparison of EMF's | - | Spot Galvanometer |
| 12. Resistance and resistivity | - | Carey Foster Bridge |
| 13. Refractive index of prism | - | Spectrometer |
| 14. Thermal conductivity of bad conductor - | - | Lee's Disc |
| 15. Viscosity of liquid | - | Stoke's method |
| 16. Comparison of viscosity | - | Ostwald's Viscometer |

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SEMESTER I & II

CREDIT – 1

ANCILLARY PHYSICS PRACTICAL – II

Any 14 Experiments

- | | | |
|------------------------|---|----------------|
| 1. Thickness of wire | - | Air Wedge |
| 2. Radius of curvature | - | Newton's Rings |

- | | | |
|---|----|------------------------------------|
| 3. Determination of N and λ | - | |
| Spectrometer/Grating(Normal incidence) | 4. | Dispersive power of a prism |
| - Spectrometer | | |
| 5. Transistor characteristics | - | |
| Common Emitter | 6. | Bridge Rectifier along with Filter |
| 7. Single Stage Amplifier | - | Transistor |
| 8. Frequency of oscillation | - | Hartley Oscillator |
| 9. Verification of Truth table discrete component | - | Logic gates(AND, OR, NOT) |
| 10. Verification of Truth table component | - | Logic gates(NAND, NOR) discrete |
| 11. Static characteristics | - | Zener diode |
| 12. Adder and subtractor | -` | Op-Amp |
| 13. Comparison of capacities | - | De Sauty's Bridge |
| 14. Determination of L and Q | - | LCR Series Resonance circuit |
| 15. Determination of L and Q | - | LCR parallel Resonance circuit |
| 16. Voltage and current sensitivity | - | Mirror galvanometer |