

SEMESTER: I / III PART: III	22UPHYA01 ALLIED PHYSICS - I	CREDIT: 4 HOURS: 60
--	---	--------------------------------

Course Objectives:

1. To understand the concept of elasticity and strength of solid materials, viscous properties of liquids and surface tension.
2. To acquire knowledge on centre of gravity, state of equilibrium and stability of floating.
3. To study the heat capacity, conduction, convection, and radiation
4. To understand conversion of heat into mechanical work.
5. To know the phenomena of light such as interference, diffraction, polarization, and their applications

UNIT I : Properties of matter

12 Hours

Elasticity: Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending and uniform bending.

Viscosity: Turbulent and streamline flow - Viscous force – Coefficient of viscosity of a liquid – Poiseuille's formula.

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

UNIT II : Mechanics

12 Hours

Centre of Gravity – solid hemisphere – Hollow hemisphere – solid cone – solid tetrahedron.

States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example - Stability of Floating bodies – Metacenter – Determination of Metacentric height of a ship.

UNIT III : Heat

12 Hours

Specific heat capacity of solids and liquids – Dulong and Petit's law – Newton's law of cooling – Specific heat capacity of a liquid by cooling - Heat conduction – coefficient of thermal conductivity by Lee's disc method – Convection- Land and sea breeze- Black body radiation – Wien's distribution law, Rayleigh Jeans law, Wien's displacement law – Planck's radiation law – Stefan's law of radiation

UNIT IV: Thermodynamics

12 Hours

Laws of thermodynamics (zeroth, first and second) – isothermal and adiabatic processes - Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Third law of Thermodynamics-Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas – change in entropy when ice is converted into steam.

UNIT V: Optics

12 Hours

Interference – conditions for interference maxima and minima – Air wedge – thickness of a thin wire – Newton's rings – determination of wavelength using Newton's rings.

Diffraction – Difference between Fresnel and Fraunhofer diffractions – Theory of transmission grating – normal incidence.

Polarization - optical activity – Biot's law – Specific rotatory power – determination of specific rotatory power using Laurent's half shade polarimeter.

Course Outcomes:

Students studying this course would understand the following:

1. Fundamentals of elasticity, theory of bending, flow of liquids and viscous forces and surface tension
2. centre of gravity of bodies of different shapes, equilibrium of states and forces involved in stability of floating.
3. transmission of heat by the process of conduction, convection, and radiation.
4. various laws involved in heat transformation, thermodynamics, and the concept of entropy
5. the phenomena like interference diffraction, and polarization, optical activity of liquids and its uses

Text Books:

1. Brijlal and Subramanyam M, (1983), *Properties of matter*, Eurasia Publishing co., III Edition
2. Brijlal & Subramanyam M, (2005), *Heat and Thermodynamics*, S.Chand & Co, 16th Edition
3. Subramanyam M & Brijlal, (2004), *A Textbook of Optics*, S. Chand and co., New Delhi, 22nd Edition

Supplementary Readings:

1. Mathur D S, (1976), *Element of properties of matter*, S. Chand & Company Ltd, 10th Edition
2. Mathur D S, (2014) *Heat and Thermodynamics*, Sultan Chand & Sons, 5th Edition.
3. Murugesan R, (2008), *Optics and Spectroscopy*, S. Chand and co., New Delhi

COURSE OUTCOME MAPPING

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

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

SEMESTER: II / IV PART : III	22UPHYA02: ALLIED PHYSICS II	CREDIT: 4 HOURS: 60
---	-------------------------------------	--------------------------------

Course Objectives:

1. To understand the concept and laws of electrostatics, working of capacitors.
2. To acquire knowledge on current electricity, electromagnetic induction and resonance circuits.
3. To understand the atom models, X-rays and nuclear properties and reactions.
4. To study fundamentals of solid-state electronics diodes and transistors.
5. To know the number system, logic gates and basic digital circuits.

UNIT I: Electrostatics**12 Hours**

Coulomb's inverse square law – Gauss law and its applications (Intensity at a point due to a charged sphere & cylinder) – Electric potential – Electric potential due to a point charge – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges – Capacitors in series and parallel – Types of capacitors.

UNIT II: Current Electricity and Electromagnetism**12 Hours**

Resistance in series and parallel connections – Kirchoff's laws – Wheatstone's network – condition for balance – Carey-Foster's bridge – measurement of specific resistance – determination of temperature coefficient of resistance

Electromagnetic Induction – Faraday's law – Lenz law – Self Inductance – Mutual Inductance – Coefficient of Coupling.

A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit – impedance – resonant frequency – sharpness of resonance.

UNIT III : Atomic and Nuclear Physics**12 Hours**

Bohr's atom model – radius and energy – Atomic excitation – Ionization potential – Frank and Hertz Method – Vector atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits – X-rays – Production – properties – Derivation of Bragg's law – uses in industrial and medical fields – Nucleus – Nuclear properties – Mass defect – Binding energy – Radioisotopes – Uses of radioisotopes – Nuclear fission and Nuclear fusion.

UNIT IV : Analog Electronics**12 Hours**

Semiconductor – PN junction diode – Bridge rectifier – Zener diode – Regulated power supply.

Transistor – Working of a transistor – CE Configuration – Transistor Characteristics (CE mode) – CE amplifier – feedback – Hartley oscillator – Colpitts oscillator.

UNIT V : Digital Electronics**12 Hours**

Number system – Decimal – Binary – Octal and Hexadecimal system – Number Conversion(decimal to binary, decimal to hexadecimal and vice versa) - Binary addition, subtraction.

Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder – Laws and theorems of Boolean's algebra – De Morgan's theorems.

Course Outcomes:**Students studying Allied Physics-II would have learnt the following:**

1. Electric intensity, potential and capacitor principle and its types.
2. laws used in electrical circuits, specific resistance measurement and laws of electromagnetic induction.
3. various atom models, nuclear models, fission and fusion reactions.
4. solid state electronic devices diode and transistor, their characteristics and applications.
5. the number systems, conversion between them and logic gates and digital circuits.

Text Books :

1. Brij Lal & Subramanyam, (2005), *Electricity and Magnetism*, Ratan Prakashan Mandir Publishers.
2. Murugesan R, (2001), *Electricity and Magnetism*, S. Chand & co.
3. Murugesan R, (1998), *Modern Physics*, S. Chand & co.
4. Theraja B L, (2003), *Basic Electronics*, S. Chand & co.
5. Sedha R S, (2004) *A Textbook of Digital Electronics*, S. Chand & co, First edition,

Supplementary Readings:

1. Narayanamurthi, (1988) *Electricity and Magnetism*, The National Publishing Co, First edition,.
2. Vasudeva, D.N. *Electricity and Magnetism*, (Twelfth revised edition)
3. Rajam J B, (1990), *Atomic Physics*, S. Chand & Company Limited, New Delhi, First edition,.
4. Srivastava B N, (2005) *Basic Nuclear Physics*, Pragati Prakashan, Meerut.
5. Albert Paul Malvino, (2002), *Digital principles and Applications*, McGraw-Hill International Editions, New York.

CO – PO Mapping

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

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

SEMESTER: II / IV PART : III	22UPHYAP1 ALLIED PHYSICS PRACTICAL	CREDIT: 4 HOURS: 60
---	---	--------------------------------------

Course Objectives:

1. To know the method of determining elastic properties of solids
2. To learn the experimental method to determine surface tension and viscous properties of liquids
3. To acquire knowledge of measurement of optical properties of solid
4. To acquire knowledge to measure the size of very small objects.
5. To gain knowledge of finding thermal properties of liquids
6. To obtain the electrical properties of a conductor and to perform experiments to study the semiconductor devices and digital circuits.

LIST OF EXPERIMENTS
(Any 12 Experiments to be done)

1. Non-Uniform bending – Pin and Microscope.
2. Uniform bending-scale and Telescope.
3. Rigidity modulus – Torsional oscillation method.
4. Coefficient of viscosity of liquid – Variable Pressure head (burette) Method
5. Surface tension and Interfacial Surface tension by Drop weight Method.
6. Specific heat capacity of liquid – Newton's law of cooling Method.
7. Thermal conductivity of a bad conductor – Lee's disc Method.
8. Spectrometer – Refractive index of a solid prism.
9. Spectrometer – Grating – minimum deviation method.
10. Air wedge – Thickness of the given thin wire.
11. Newton's Rings – 'R' determination.
12. Meter bridge – Specific resistance.
13. Carey Foster's Bridge – Resistance Determination.
14. Potentiometer – low range voltmeter.
15. Characteristics of a PN junction diode – Forward resistance and knee voltage.
16. Characteristics of a Zener diode - Breakdown voltage.
17. Basic logic gates – AND, OR and NOT gates using discrete components.
18. Study of basic logic AND, OR and NOT gates – Integrated circuits (IC)
19. Verification of NAND and NOR as Universal gates.
20. Verification of De Morgan's theorem.

Course Outcomes:

After Completion of the Allied Physics Practical course the student would be conversant in measuring the 1)elastic properties 2) surface tension 3)viscous 4) thermal 5) electrical 6)optical properties and 7)acquired knowledge of semiconductor diodes and digital gates.

Text Books :

1. SomasundaramS (2012), *PracticalPhysics*,Apsara Publications, Tiruchirapalli.
2. SasikumarR (2011)*Practical Physics*, PHI Learning Pvt. Ltd, New Delhi.
3. AroraCL,*B.Sc. Practical Physics*, S.Chand & Co. limited.

Supplementary Readings:

1. SrinivasanS, *A Text Book of Practical Physics*, S.Sultan Chand Publications.
2. Ouseph C.C, U.J. Rao (30 May 2009) *Practical Physics and Electronics* Viswanathan, Printers & Publishers Pvt Ltd..Chand and co., New Delhi, 6th Edition.
3. Murugesan R, (2005) *Allied Physics I & II*, S. Chand & Co. First Edition.
4. Thangaraj K, Jayaraman D *Allied Physics*, Popular Book Department, Chennai.
5. Mathur D S, (1999) *Elements of Properties of Matter*, S. Chand & Co.

COURSE OUTCOME MAPPING

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

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH