

**THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS), PERAMBALUR
(FOR THE CANDIDATES ADMITTED DURING THE
ACADEMIC YEAR 2018-2019 ONWARDS)
ALLIED PHYSICS FOR MATHS AND CHEMISTRY**

Semester: I

ALLIED PHYSICS – I

18UMA1AC1/18UCH1AC1

Objectives:

- To study the concepts of Properties of Matter, Surface tension and viscosity.
- To understand the principles of musical sound, sound waves and fiber optic communication.
- To study the concepts of thermal physics.

Unit I: Properties of Matter

Stress – strain - Hooke's Law – Elastic behavior of a material – Relation between elastic constants – Work done per unit volume in longitudinal strain – Poisson's ratio - Expression for bending moment – Experimental determination of Young's modulus by Non-uniform bending (Pin and microscope method).

Unit II: Sound

Simple Harmonic Motion – Composition of two simple harmonic motion - along a straight line and at right angles to each other – Lissajou's figures and their applications - Acoustics of buildings - Reverberation – Reverberation time – Sabine's formula - Conditions for good acoustics – Law of vibration of Stretched Strings – Sonometer.

Unit III: Surface Tension & Viscosity

Definition and dimension of surface tension – Variation of surface tension with temperature – Experiment to determine the surface tension of given liquid by Drop weight method and capillary rise method - Co-efficient of viscosity and its dimension – Poiseuille's formula – Experiment to determine the Coefficient of viscosity (Poiseuilles Method).

Unit IV: Thermal Physics

Newton's law of cooling – Verification – Specific Heat Capacity of liquid by Cooling – Bomb Calorimeter – Conduction - Coefficient of thermal conductivity – Good and bad conductor- Stefan's law of radiation – Solar Constant – Angstrom's Pyroheliometer - Temperature of the Sun.

Unit V: Optics

Electromagnetic Spectrum – Spectral response of human eye – UV and IR spectroscopy – Raman Effect – Experimental arrangement – Applications of Raman Effect.

Fiber Optic communication: Introduction – Optic Fiber – Numerical Aperature – Coherent bundle – Fiber optic communication system and its advantages – Multimode Fibre - Optic Sensors.

Book for Study:

1. R. Murugesan, Er. Kiruthiga Sivaprasath, Properties of Matter and Acoustics, S. Chand & Co., New Delhi, 2012 (Unit I-III).
2. Brij Lal and N.Subrahmanyam, Heat and Thermodynamics, S. Chand and Company Ltd., New Delhi, 2008 (Unit IV).
3. Brij Lal and N.Subrahmanyam, Text Book of Optics, S. Chand and Co., Delhi, 2010 (Unit V).

References

1. A.S.Vasudeva, Modern Engineering Physics, S. Chand and Company Ltd., 1988.
2. Brij Lal and N.Subrahmanyam, Text book of Sound, Vikas Publications Pvt. Limited, 2000.
3. Ajoy Ghatak, Optics, Tata Mc Graw Hill, Delhi, 2nd Edition, 2004.
4. R.Murugesan, Modern Physics, S.Chand and company Ltd., New Delhi, 2006.

Semester: I & II**18UMA2AC2P/18UCH1AP1****ALLIED PHYSICS – II (PRACTICAL)**

(Any twelve)

1. Non-Uniform Bending – Pin and Microscope method.
2. Sonometer – Verification of laws of transverse vibrations.
3. Specific heat capacity of a liquid – Newton’s law of cooling method.
4. Thermal conductivity of a bad conductor – Lee’s disc method.
5. Meter Bridge – Specific resistance of a material of a coil.
6. Newton’s Rings – Determination of Radius of Curvature(R).
7. Spectrometer – Refractive Index (μ) of solid prism.
8. Spectrometer - Determination of wavelength using Grating.
9. Characteristics of Junction Diode.
10. Characteristics of Zener Diode.
11. Co-efficient of Viscosity a liquid- Poiseuille’s method.
12. Surface Tension and Interfacial Tension of a liquid - Drop Weight method.
13. Construction of Full Wave Rectifier.
14. Study of Logic Gates - discrete components.
15. Potentiometer measurement of current.
16. Potentiometer measurement of resistance.
17. Surface tension- capillary rise method.
18. Figure of Merit-B.G.

References

1. Srinivasan M.N., Balasubramanian S. & Renganathan R., A Text book of Practical Physics, Sulthan Chand & Sons, New Delhi, 2000.
2. Somasundram S., Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

Semester: II

18UMA2AC3/18UCH2AC2

ALLIED PHYSICS – III

Objectives:

- To study Gauss law and its applications
- To understand the knowledge of magnetic field in various conducting media
- To learn about atomic and nuclear physics

Unit I: Electrostatics

Gauss law - proof – force between two point charges in vacuum – applications of Gauss law - electric field due to a line charge - an infinite plane sheet of charge - infinite charged conducting plate - charged spherical shell and charged sphere – Coulomb's law from Gauss law – capacitors – parallel plate capacitor with dielectric and dielectric with varying thickness.

Unit II: Magnetism and Current Electricity

Magnetizing field - intensity of magnetization - flux density – hysteresis – energy loss in hysteresis - Ampere's law – Biot-Savarts law – magnetic field due to straight conductor carrying current – magnetic field on the axis of a circular coil carrying current – magnetic field due to a solenoid – force between two parallel conductors – Potentiometer – principle and measurement of resistance and current.

Unit III: Atomic Physics

Sommerfield, Vector Atom models - quantum numbers in vector atom model - Pauli's exclusion principle - Continuous and characteristic X-Rays - Moseley's law and its importance - Bragg's law - Miller indices - Determination of crystal structure - powder crystal method.

Unit IV: Nuclear Physics

Nuclear Size - charge – mass – spin - nuclear models - liquid drop model - shell model – Particle detectors - cloud chamber - bubble chamber - photographic emulsion technique - Elementary particles (fundamental ideas only).

Unit V: Electronics and Digital Electronics

Modulation - necessity of modulation - Methods of modulation - Amplitude Modulation- junction diode detector for AM signal - Number systems – Decimal, Binary, Octal, Hexadecimal and their mutual conversions - binary arithmetic operations - Basic logic gates - AND, OR, NOT, NOR, NAND – NOR and NAND gate as universal gates - Laws of Boolean Algebra - De Morgan's theorems, their verifications using truth tables.

Books for study:

1. Brijlal and N. Subrahmanyam, Text book of Electricity and Magnetism, Ratan prakasan Mandir
Publisher London, 1997 (Unit I & II).
2. Murugesan, Modern Physics, S. Chand & Co., New Delhi, 2010 (Unit III & IV).
3. B.L. Theraja, Basic Electronics, S. Chand & Co., New Delhi, 2008 (Unit V).

References:

1. Gupta and Kumar, Hand Book of Electronics, Pragati Prakasan.
2. A. Sundaravelusamy, Allied Physics – II.