Dr. Babasaheb Ambedkar Technological University, Lonere

Department of Physics

Syllabus (2023-24)

Course Title	Engineering Physics (Theory and Lab)
Course Code	BSC101/201
Credits	Theory Course (03) and Practical Course (01)
Evaluation reforms	Theory: CA-I (10 M), CA-II (10 M), Mid Sem (20 M), End SEM (60 M) Practical: CA-I (30 M), CA-II (30 M), IPR (20M), PR (20M)
Course Objective	1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and Technological problems. 2. To understand and study the Physics principles behind the developments of engineering materials.

UNIT-I: (10L)

Engineering Optics: Interference: in thin film due to reflected light, wedge shaped film, Newton' Rings, Applications, Polarization: types of polarization, optical activity, specific rotation and Laurent'z half shade polarimeter, Lasers: characteristics, Gas Laser, solid state Laser and semiconductor lasers, Applications of Lasers, Optical fibres: Acceptance cone, Numerical aperture, applications, Oscillations: free oscillations, forced oscillations and damped oscillation, resonance and it's condition.

UNIT-II: (6L)

Quantum Mechanics: Wave and particle duality of radiation – de Broglie concept of matter waves – Wave function and its physical significance, Heisenberg's uncertainty principle and it's application – Schrodinger's wave equation – eigen values and eigen functions, particle confined in one dimensional infinite square well potential, Introduction to quantum computing.

UNIT-III: (6L)

Electromagnetism: Differential and integral calculus: Operator, Concept of gradient, divergence and curl, Ampere's law, Faraday law, Gauss–Divergence theorem, integral and differential forms of Maxwell equations and their physical significance, EM waves in free space. Dielectrics: polarization, Types of Dielectric polarization, dielectric constant, polar - non polar dielectrics,

UNIT-IV: (6L)

Crystal Structure: Fundamental concepts, Crystal systems Cubic structure: Number of atoms, co-ordination number, packing fraction, Atomic radius, Miller indices, relation between 'ρ' and 'a', Nuclear Physics: Nuclear properties Introduction to mass defect & packing fraction, Nuclear reaction: Q value of Nuclear reaction,- Radioactivity – properties of α, β and γ rays, GM Counter

UNIT-V: (8L)

Physics of Advanced Materials: Types of magnetic materials, ferrites and garnets, magnetic domain and hysteresis curve, Semiconductors, conductivity of semiconductors, Hall Effect Superconductors: definition – Meissner effect – type I & II superconductors, Nanomaterials: introduction and properties – synthesis: top-down and bottom-up approach, Introduction to SCADA, XRD, FESEM, VSM and applications.

Course Outcomes:

CO1: Students acquired basic knowledge of differential equation and can create wave equation and analysis of the intensity variation of light due to interference and polarization. Students are able to understand the light propagation in fibre and use of Laser in Science and engineering.

CO2: Students can apply the knowledge of quantum mechanics to set Schrödinger's equations.

CO3: Students will familiar with some of the basic laws related to electromagnetism and Maxwell's equation as well as properties of dielectrics.

CO3. Students are able to understand key principle and application of nuclear physics. Identify planes in crystal and characteristics measurements of cubic system.

CO5. Students able to explain fundamental concepts of magnetism and they should analyze the properties of semiconducting materials and describe various applications of superconductor.

Text /Reference books:

1) Introduction to Electrodynamics –David R. Griffiths.
2) Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited.
3) Optics –Ajoy Ghatak. MacGraw Hill Education (India) Pvt. Ltd.
4) Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt.Ltd.
5) Solid State Physics – A.J. Dekker. McMillan India –Limited.
6) The Feynman Lectures on Physics Vol I, II, III.
7) Introduction to solid state physics – Charles Kittel. John Willey and Sons
8) Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar.S.Chand and Company LTD.
9) Engineering Physics - R.K. Gaur andS. L. Gupta. DhanpatRai Publications Pvt. Ltd.-New Delhi.
10) Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.
11) Nanotechnology: An Introduction To Synthesis, Properties And Applications Of Nanomaterials- Thomas Varghese , K. M. Balakrishna

List of the Experiments

At least 08 experiments should be performed from the following list.

1. Newton's rings - Determination of radius of curvature of Plano convex lens / wavelength of light

2. Wedge Shaped film - Determination of thickness of thin wire

3. Half shade Polarimeter - Determination of specific rotation of optically active material

4. Laser - Determination of wavelength of He-Ne laser light

5. Magnetron Tube - Determination of 'e/m' of electron

6. G.M. Counter - Determination of operating voltage of G.M. tube

7. Crystal Plane – Study of planes with the help of models related Miller Indices

8. Hall Effect - Determination of Hall Coefficient

9. Four Probe Method - Determination of resistivity of semiconductor

10. Measurement of Band gap energy of Semiconductors

11. Experiment on fibre optics

12. B-H Curve Experiment

13. Experiments on SCADA