(An Autonomous Institution)

DEPARTMENT OF PHYSICS

B.E (SEM-I&II) Syllabus for CSE, CSE (AIML), CSE(AI), CSE(DS), ECE, CIVIL & MECH
(w.e.f 2025-2026)

Engineering Physics (Course Code: 25BS102PH)

L	T	P	Credits	CIE		SEE	
4	0	0	04	Marks: 40	Exam Duration: 1 Hr	Marks: 60	Exam Duration: 3 Hrs

Course objective	Course outcome
To **understand** the fundamental principles of lasers and optical fibers in communication.	Students will be able to **explain** the working and **demonstrate** applications of laser and fiber-based communication systems.
To **introduce** quantum mechanics and quantum computing concepts.	Students will be able to **apply** quantum principles to **analyze** qubits, quantum gates, and entanglement.
To **study** the structure and properties of magnetic, superconducting, and semiconductor materials.	Students will be able to **analyze** the behavior of advanced materials in devices like superconductors, QLEDs, and solar cells
To **comprehend** electromagnetic theory and ultrasonic wave principles.	Students will be able to **apply** Maxwell's equations and **evaluate** ultrasonic testing methods for engineering problems
To **explore** synthesis and applications of nanomaterials and thin films.	Students will be able to **evaluate** the role of nanomaterials and thin films in modern technologies like foldable electronics

UNIT-1 Laser & Optical Fiber

Characteristics of Laser, Stimulated Emission, Population Inversion, Einstein's Coefficients, Construction and working of CO_2 Laser & Semiconductor Laser, Advantages of Laser-Based Optical Communication in Space, Engineering Applications of Laser.

Construction of Optical Fiber, Types of Optical Fibers (Refractive Index Profiles), Fiber Drawing Process (Double Crucible Method), Basic principle of Optical fiber Sensors & its types, Block diagram of Optical fiber communication system, Applications of optical fibers

UNIT-2 Quantum Physics & Quantum Computing

Physical Significance of Wave Function, Schrodinger Time-Independent Wave Equation, Energy of Particle in 1-D Potential Box, Kronig-Penney Model (Qualitative).

Introduction to Quantum Computing, Types of Qubits & Quantum Gates, Quantum Entanglement & its properties, Applications of Quantum Computing.

UNIT-3 Advanced Materials

Types of Magnetic Materials, Weiss Molecular Field Theory, Hysteresis Curve, Soft and Hard Magnetic Materials, Applications of Magnetic Materials.

Superconductors, Meissner Effect, Type I and Type II Superconductors, BCS Theory (Qualitative), High-T_c Superconductors, Applications of Superconductors.

Direct and Indirect Bandgap Semiconductors, Hall Effect, Construction and Working of Quantum Light Emitting Diodes (QLEDs) & Solar Cell, Classification of Fabrication Techniques for Semiconductor Chips, Applications of Semiconductor Devices

UNIT-4 Electromagnetic Waves and Ultrasonic Waves

Displacement current, Maxwell's equations, Expression for Maxwell's Integral to Differential Equations, Poynting Theorem, Electromagnetic spectrum (brief) and Practical applications (microwave, terahertz, optical)

Properties of ultrasonic waves, Generation of ultrasonic waves (piezoelectric), Ultrasonic Pulse-Echo Testing Method, Types of computer methods for Ultrasonic Testing, Engineering applications of ultrasonic waves

UNIT-5 Nanomaterials and Thin Film Technology

Introduction to nano materials, Surface-to-Volume Ratio at Nano Scale, Bottom-Up Method (Sol-Gel), Top-Down Method (Ball Milling), Properties of nanomaterials in nanoelectronics & 2D Materials, Applications of Nano materials

Introduction to Thin Films, Thermal Evaporation Method, Electron Beam Evaporation Method, Properties of Foldable Electronic devices, Applications of thin films

Characterization Techniques (working) - Scanning Electron Microscope, Raman spectrometer

PRESCRIBED BOOKS

1. Modern Engineering Physics – I & II : S. Chandralingam, K. Vijayakumar, S. Chand & Co.
2. Engineering Physics: P.K. Palanisamy, Scitech Publishers.
3. Engineering Physics: S.O. Pillai, New Age International.
4. Nielsen M.A., I.L. Chuang, Quantum Computation & Quantum Information, Cambridge Univ. Press.
5. Thin Film Fundamentals, A. Goswami, New Age International, New Delhi.
6. Nano Materials, A.K. Bandyopadhyay, New Age Publishers.

REFERENCE BOOKS

1. Solid State Physics – Charles Kittel, Wiley & Sons (Asia) Pvt. Ltd.
2. Fundamentals of Physics – Halliday, Resnick, Walker.
3. Engineering Physics – V. Rajendran, McGraw Hill Education.
4. Solar Photovoltaics – Fundamentals, Technologies and Applications, 3rd Edition, PHI.
5. Principles of Quantum Computation and Information – G. Benenti, G. Casati, G. Strini, World Scientific.

29/10/2025

Chairman, BOS (Physics)

Dr. Shaik Kareem Ahmmad

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DEPARTMENT OF PHYSICS

B.E (SEM-1&II) Syllabus for CSE, CSE(AIML), CSE(AI), CSE(DS), ECE, CIVIL & MECH
(w.e.f 2025-2026)

Engineering Physics Lab (Course Code: 25BS151PH)

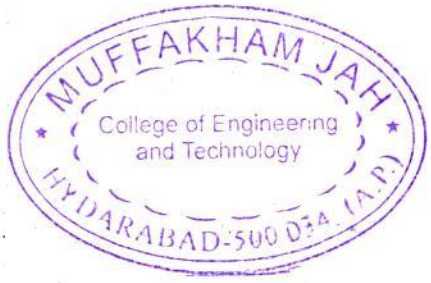
L	T	P	Credits	CIE		SEE	
0	0	2	1	Marks: 25	Exam Duration: 2 Hrs	Marks: 50	Exam Duration: 3 Hrs

Course objective	Course outcome
To understand fundamental concepts of semiconductors, optics, magnetism, and modern materials.	Apply physics principles to study electrical, optical, and magnetic properties of materials.
To perform experiments for measuring electrical, optical, and mechanical properties.	Analyze semiconductor, solar cell, and optical fiber characteristics for device applications.
To analyze and interpret experimental data scientifically.	Demonstrate computational skills for solving problems in quantum mechanics and electromagnetics.
To develop computational and simulation skills using Python/MATLAB.	Evaluate mechanical and elastic properties of materials using experiments and simulations.
To integrate experimental and computational methods for applications in advanced technologies.	Integrate theoretical and experimental results to understand lasers, nanomaterials, NDT, and quantum devices.

1. Study of I–V Characteristics of a P–N Junction Diode – Determination of Resistance & Cut-in Voltage.
2. Measurement of Energy Band Gap of a Semiconductor
3. Study of Hall Effect in Semiconductors – Determination of Hall Coefficient, Carrier Concentration, and Mobility.
4. Study of Thermistor Characteristics – Determination of Temperature Coefficient of Resistance and Constants A & B.
5. Plotting of B–H Curve for a Ferromagnetic Material and Determination of energy Loss.

6. Study of V–I Characteristics of a Solar Cell – Determination of Fill Factor and Series Resistance.
7. Determination of Planck's Constant using Photoelectric Effect (Work Function of Photometal).
8. Determination of Numerical Aperture (NA) and Acceptance Angle of an Optical Fiber.
9. Measurement of Wavelength of a Laser Source using a Diffraction Grating.
10. Determination of Rigidity Modulus of a Wire using Torsional Pendulum.
11. Determination of Wavelength of Light using Newton's Rings.
12. Visualization of Electromagnetic Wave Propagation – Python Simulation of Maxwell's Equations.
13. Ultrasonic NDT Using Python Simulation – Signal Analysis for Flaw Detection.
14. Visualization of Energy Bands in Kronig–Penney Model & Particle in a 1-D Potential Box using Python Simulation.
15. Prediction of Density and Elastic Properties of Oxide Glasses/Polymers using Machine Learning.

Note: Minimum eight experiments should be conducted in the Semester



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