15BECC103, 15BTCC103  ENGINEERING PHYSICS  3 0 0 3

OBJECTIVE:
- To enhance the fundamental knowledge in Physics and its applications relevant to various branches of Engineering and Technology

INTENDED OUTCOME:
- The students will have the knowledge on the basics of physics related to properties of matter, fiber optics, quantum, crystal physics and that knowledge will be used by them in different engineering and technology applications

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS (9)
Three types of modulus of elasticity – basic definitions, relation connecting the modulii (Derivation), poison ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending
Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II  LASER AND FIBER OPTICS (9)
Introduction – emission and absorption process- Einstein’s coefficients derivation. Types of LASER - CO₂, Semiconductor LASER- Applications of LASER in industry and medicine.
Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III  QUANTUM PHYSICS (9)
Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger’s wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV  CRYSTAL PHYSICS (9)
Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V  ULTRASONICS AND NUCLEAR PHYSICS (9)
Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications - Sonogram

Total- 45
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WEBSITES:

- www.nptel.ac.in
- www.physicsclassroom.com
- www.oyc.yale.edu
- www.physics.org
OBJECTIVE:

- To develop basic laboratory skills and demonstrating the application of physical principles.

INTENDED OUTCOME:

- The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of Young’s modulus of the material – Non uniform bending or Uniform bending.
5. Spectrometer Dispersive power of a prism.
7. Particle size determination using Diode Laser
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

ENGINEERING CHEMISTRY

OBJECTIVE:

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

INTENDED OUTCOME:

- The students will be outfitted with hands-on knowledge in quantitative chemical analysis of water quality parameters and corrosion measurement.

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using BaCl₂ vs Na₂SO₄.
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe²⁺ / KMnO₄ or K₂Cr₂O₇).
10. Estimation of Ferric iron by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
OBJECTIVE:

- To enrich the understanding of various types of materials and their applications in engineering and technology

INTENDED OUTCOME:

- The students will have the knowledge on different types of materials and that knowledge will be used by them in different engineering and technology applications

UNIT I CONDUCTING MATERIALS (9)

UNIT II SEMICONDUCTING MATERIALS (9)

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS (9)
Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS (9)

UNIT V ADVANCED MATERIALS (9)
Metallic glasses: preparation, properties and applications. 
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications. 
Composite materials, Aircraft materials and non-metallic materials. 

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**WEBSITES:**

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org
OBJECTIVE:

- To enrich the understanding of the solar system, earth structure, Earthquake and the Physical Oceanography.

INTENDED OUTCOME:

- The students will have the knowledge on the solar system, earth structure, Earthquake, Physical Oceanography and that knowledge will be used by them in different engineering and technology applications.

UNIT I  ORIGIN OF EARTH
(9)

UNIT II  STRUCTURE OF EARTH
(9)
Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth’s gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy.

UNIT III  MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH
(9)
Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle.

UNIT IV  SEISMOLOGY
(9)
Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth’s internal structure derived from seismology, Earthquake mechanism and Anderson’s theory of faulting, Continental drift and plate tectonics: its essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V  OCEANS
(9)
Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management. 

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1. [www.ocw.mit.edu](http://www.ocw.mit.edu)
2. [www.physicsclassroom.com](http://www.physicsclassroom.com)
3. [www.nptel.ac.in](http://www.nptel.ac.in)
4. [www.physics.org](http://www.physics.org)
OBJECTIVES:

- To provide mathematical basis for acoustics waves and the characteristic behaviour of sound in pipes, resonators and filters.
- To introduce the properties of hearing and speech

INTENDED OUTCOME:

- The students will have the knowledge on acoustics waves, the characteristic behaviour of sound in pipes, resonators and filters and that knowledge will be used by them in different engineering and technology applications

UNIT I INTRODUCTION

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES
Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS

UNIT IV ARCHITECTURAL ACOUSTICS

UNIT V TRANSDUCTION
Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers

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1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu