

<b>PHDX 02</b>	<b>MATERIALS SCIENCE FOR</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>SDG: 4</b>	<b>ENGINEERING</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
	(For Polymer)				

### **COURSE OBJECTIVES:**

**COB1:** To impart knowledge on the fundamentals of materials science and engineering.

**COB2:** To provide a basis for understanding properties and applications of dielectric materials.

**COB3:** To expose the students to different classes of materials, their properties, structures and imperfections

**COB4:** To aid the teaching learning process through relevant illustrations, animations, web content and practical examples

### **MODULE I CLASSIFICATION OF MATERIALS 6**

Concept of amorphous, single crystals and polycrystalline materials, crystallinity and its effect on physical properties, metal, ceramic, polymers, classification of polymers, structure and properties, additives for polymer products, effect of environment on materials, composites

### **MODULE II PROPERTIES OF MATERIALS 10**

Mechanical Properties: Stress-strain response of metallic, ceramic and polymer materials, yield strength, tensile strength and modulus of elasticity, toughness, plastic deformation, fatigue, creep and fracture- Electronic Properties: Free electron theory, Fermi energy, density of states, band theory of solids, semiconductors, Hall effect, dielectric behaviour, piezo, ferro, pyroelectric materials - Magnetic Properties: Origin of magnetism in metallic and ceramic materials, para-magnetism, diamagnetism, ferro and ferrimagnetism- Thermal Properties: Specific heat, thermal conductivity and thermal expansion, thermoelectricity- Optical Properties: Refractive index, absorption and transmission of electromagnetic radiation in solids, electro-optic and magneto-optic materials.

### **MODULE III CRYSTALLOGRAPHIC STRUCTURES AND IMPERFECTIONS 7**

Crystal symmetry, point groups, space groups, indices of planes, close packing in solids, bonding in materials, coordination and radius ratio concepts, point defects, dislocations, grain boundaries, surface energy and equilibrium shapes of crystals.