Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 08-10-2025 **Time:** 02.00pm to 03.30pm

School: SOE	**Program:** PHY	
Course Code : PHY1001	**Course Name:** Material Physics	
Semester: III	**Max Marks**:50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks					

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	Define a crystalline and an amorphous solid with an example for each.	2 Marks	L1	CO1
2	Explain ionic bonding with an example.	2 Marks	L1	CO1
3	A plane in a cubic crystal has intercepts at (2,3,4) along the x, y, and z axes, respectively. Determine the Miller indices of this plane.	2 Marks	L3	CO1
4	What is shear stress and how is it different from normal stress?	2 Marks	L1	CO2
5	Define hardness and mention the tests used to determine the hardness.	2 Marks	L1	CO2

Part B

Answer the Questions. **Total Marks 40M**

6.	a.	a. Describe the seven types of crystal structure with their lattice parameters. b. Derive the relation between atomic radius and lattice constant for SC. If the lattice constant is 0.4 nm. Determine the atomic radius.	10 Marks (5+5)	L1 and L3	CO 1
		Or			
7.	a.	Derive expressions for the atomic packing fraction and coordination number for BCC structure.	10 Marks	L2	CO 1

8.	a.	Explain about different types of point defects in detail.	10 Marks	L1	CO 1
		Or			
9.	a.	Derive Bragg's law and explain its significance in X-ray diffraction. A beam of X-rays of wavelength 0.071 nm is diffracted by the (110) plane of a cubic crystal with a lattice constant of 0.28 nm. Find the second-order diffraction angle.	10 Marks	L3	CO 1

10.	a.	a. Explain ductility and brittleness in materials. How are they measured experimentally? b. An elastic spring, designed for high-impact vehicles, is subjected to a load of 102 kg distributed over a surface area of 2000 cm^2. Your supervisor requires the stress to be calculated in kilopascals (kPa) to align with the company's standard reporting format. Can you determine the stress accurately? (g = 9.8 m/s^2, 1 $kg \cdot m/s^2$ = 1 Newton (N), 1 Pascal (Pa)=1 N/m^2)	10 Marks (5+5)	L1 and L3	CO 2
		Or			
11.	a.	Explain the concept of engineering stress and discuss its various classifications with diagrams.	10 Marks	L1	CO 2

12.	a.	Explain Young's modulus, Bulk modulus, Shear modulus, and Poisson's ratio.	10 Marks	L1	CO 2
		Or			
13.	a.	Discuss the concepts of ductility and brittleness in materials, and illustrate their characteristics using a stress-strain curve.	10 Marks	L1	CO 2