Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 07-10-2025 **Time:** 02.00pm to 03.30pm

School: SOE	**Program:** B.Tech. (PET)	
Course Code: PET2031	**Course Name:** Overview of Material Science	
Semester: V	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	14	14	12	10	-	-

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 2 marks. **5Q x 2M=10M**

1.	Explain the role and significance of Material Science in Petroleum Refining Engineering with suitable examples.	**2 Marks**	**L2**	**CO1**
2.	Summarize the physical characteristics of a brittle type material.	**2 Marks**	**L2**	**CO1**
3.	Explain the term “Defect” of a ceramic or metal type material.	**2 Marks**	**L2**	**CO2**
4.	Locate the (1 0 1) crystalline plane in a unit cell.	**2 Marks**	**L2**	**CO2**
5.	Explain coordination number of a metal.	**2 Marks**	**L2**	**CO3**

Part B

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

6.	**a.**	Describe the key factors to be considered while selecting the right material from the many available options (five points only).	**10 Marks**	**L2**	**CO1**
	b.	Imagine you are tasked with designing a material for a smartphone screen that needs to be transparent, have mechanical strength, and have high thermal resistance. Recognize the best-fitted or suitable material type from the following: crystalline, semi-crystalline, and amorphous material. Also, explain the reasons behind not selecting the other types of material available here very clearly.	**10 Marks**	**L2**	**CO1**
		Or			
7.	**a.**	Solve that a Hexagonal Closed Pack (HCP) crystal lattice has 26% void space. (Do not skip any step)	**10 Marks**	**L3**	**CO2**
	b.	Calculate the equilibrium number of vacancy per cubic meter for copper at 1000°C. The energy for vacancy is 0.9 eV/atom; the atomic weight and density (at 1000°C) for copper are 63.5 g/mol and 8.4 g/cm^3, respectively. [Boltzman's constant (K) = $8.62\times10^{-5} eV/atom$.K] (Do not skip any step)	**10 Marks**	**L3**	**CO2**

8.	**a.**	Employ the concept of stress–strain relationships to examine the mechanical behavior of brittle, ductile, and elastic materials using suitable stress–strain curves.	**10 Marks**	**L3**	**CO3**
	b.	Apply the concept of stress–strain behavior to justify the selection of suitable materials for drilling operations.	**10 Marks**	**L3**	**CO3**
		Or			
9.	**a.**	Analyze how the concept of safety factors influences decision-making in mechanical design under uncertain loading and material variability.	**10 Marks**	**L4**	**CO4**
	b.	Breakdown the role of property variability in determining the suitability of engineering materials for critical applications.	**10 Marks**	**L4**	**CO4**