Roll No.											

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 13 – 12- 2025 **Time:** 09:30am – 12:30pm

School: SOE	**Program:** B. Tech (Civil)	
Course Code: PHY1001	**Course Name:** Material Physics	
Semester: III	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**24**	**24**	**26**	**26**	**-**

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. 10Q x 2M=20M

1.	What is a unit cell? Give the difference between primitive and non-primitive cells.	2 Marks	L2	CO1
2.	Mention the different types of bonds in solids	2 Marks	L2	CO1
3.	An aluminum bar of length 1.2 m is subjected to a strain of 0.0015. Calculate the change in its length.	2 Marks	L3	CO2
4.	Define hardness and mention the tests used to determine the hardness.	2 Marks	L2	CO2
5.	A copper block absorbs 420 J of heat to raise its temperature by 10 °C. If its mass is 0.4 kg, calculate its specific heat.	2 Marks	L3	CO3
6.	What is thermal shock resistance? Mention one material with high resistance.	2 Marks	L2	CO3
7.	Mention any two methods used to prevent corrosion.	2 Marks	L3	CO3
8.	Why nanomaterials exhibit enhanced surface reactivity compared to bulk materials.	2 Marks	L3	CO4

9.	Distinguish between the top-down and bottom-up approaches used for nanomaterial synthesis with one example each.	2 Marks	L4	CO4
10.	Mention two synthesis methods used for nanomaterials.	2 Marks	L2	CO4

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Describe the seven crystal systems and 14 Bravais lattices.	10 Marks	L2	CO1
	b.	Derive expressions for the atomic packing fraction and coordination number for FCC structure.	10 Marks	L2	CO1
Or					
12.	**a.**	Describe the different types of atomic bonding in solids with examples.	10 Marks	L2	CO1
	b.	Define Miller indices and explain the steps involved in finding them. Derive the Miller indices for a plane intersecting the axes at (2,3,4).	10 Marks	L3	CO1

13.	**a.**	Explain the concept of engineering stress and discuss its various classifications with diagrams	10 Marks	L2	CO2
	b.	Explain Young's modulus, Bulk modulus, Shear modulus, and Poisson's ratio and derive the relation between them.	10 Marks	L2	CO2
Or					
14.	**a.**	Explain in detail the elastic and plastic deformation using stress-strain curves.	10 Marks	L3	CO2
	b.	Explain in detail the procedure of Brinell test and Vickers test.	10 Marks	L2	CO2

15.	**a.**	What is the thermoelectric effect? Explain Seebeck, Peltier, and Thomson effects with neat diagrams.	10 Marks	L2	CO3
	b.	Write a note on the applications of thermoelectric materials and thermopiles.	10 Marks	L2	CO3
Or					
16.	**a.**	Explain the different types of corrosion with suitable examples.	10 Marks	L2	CO3
	b.	Define corrosion. Explain the electrochemical theory of corrosion with the mechanism of rusting of iron.	10 Marks	L2	CO3

17.	**a.**	How the properties of materials change when their size is reduced to the nanoscale. Explain the size-dependent various properties of nanomaterials.	10 Marks	L2	CO4
	b.	Define nanomaterials and classify them based on their dimensionality. Discuss the significance of quantum confinement in nanomaterials.	10 Marks	L2	CO4
		Or			
18.	**a.**	Describe the structure, properties, types, and applications of Carbon Nanotubes (CNTs). How do CNTs differ from conventional materials?	10 Marks	L2	CO4
	b.	Explain the different characterization techniques of nanomaterials	10 Marks	L2	CO4