

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: B.Tech.
BRANCH: ECE/PROD**

**SEMESTER : VII
SESSION : MO/2023**

SUBJECT: PH306 MATERIALS SCIENCE AND NANOTECHNOLOGY

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
-

		CO	BL
Q.1(a)	Define space lattice and unit cell. Calculate the atomic packing fraction of the hexagonal close-packed structure.	[5] 1	1
Q.1(b)	Classify the defects based on their geometry. Explain point defects in detail.	[5] 1	2
Q.2(a)	Describe Hooke's law. Draw a stress-strain plot of a wire and explain it.	[5] 2	1
Q.2(b)	Define plastic deformation. Discuss the role of dislocation in plastic deformation.	[5] 2	1
Q.3(a)	Classify ceramic materials on the basis of their application. Explain glasses and glass ceramics.	[5] 3	2
Q.3(b)	Discuss AX, A_mX_p and $A_mB_nX_p$ types of ceramics structure.	[5] 3	2
Q.4(a)	Explain different types of polymer structures. Differentiate between thermoplastic and thermosetting polymers.	[5] 4	2
Q.4(b)	Define fibre-reinforced composites. Explain the effect of fibre length on the mechanical properties of the composites.	[5] 4	2
Q.5(a)	Discuss quantum well structure. Explain how the electronic and optical properties of the nanomaterials are affected by the size.	[5] 5	2
Q.5(b)	Explain top-down and bottom-up approaches. Discuss the CVD method for the growth of the nanostructure.	[5] 5	2

:::29/11/2023 M:::