BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSC   SEMESTER: V
BRANCH: PHYSICS   SESSION: MO/2022

SUBJECT: PH306 MATERIALS SCIENCE AND NANOTECHNOLOGY

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	Define coordination number and space lattice.	[2]	1	1
Q1	(b)	Calculate the atomic packing fraction of the diamond structure.	[3]	1	4
Q2	(a)	Describe crystallographic directions. Discuss the procedure to determine the direction in the crystal system.	[2]	1	1
Q2	(b)	Classify point defects. Explain Schottky and Frenkel defects.	[3]	1	2
Q3	(a)	Calculate the number of atoms/mm^2 present in (1 1 1) planes for lead which has an fcc structure. The radius of the atom is 0.174 nm.	[2]	1	4
Q3	(b)	Discuss Hooke's law. Compute strain energy per unit volume for volume strain.	[3]	2	3
Q4	(a)	Define anelasticity.	[2]	2	1
Q4	(b)	Explain the stress strain diagram of a wire.	[3]	2	5
Q5	(a)	Define dislocation density.	[2]	2	1
Q5	(b)	Explain any two hardening mechanisms.	[3]	2	5

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