

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

CLASS: IMSC
BRANCH: PHYSICS

SEMESTER: V
SESSION: MO/2022

SUBJECT: PH302: SOLID STATE PHYSICS

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.
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		CO	BL
Q1 (a)	What are Bravais lattices? Why the end-centered tetragonal lattice is not a distinct Bravais lattice?	[2] A	02
Q1 (b)	Define Miller indices. Determine the Miller indices of a plane that makes intercepts of 1, 2, and 3 Å on the crystallographic axes of an orthorhombic crystal with a : b : c = 3 : 2 : 1	[3] A	04
Q2 (a)	Find the linear density of atoms along the body diagonal of an fcc unit cell of length a .	[2] A	03
Q2 (b)	Calculate the angles which [111] direction of a cubic lattice makes with [100] and [110] directions.	[3] A	04
Q3 (a)	What are Brillouin zones? Draw the first Brillouin zone of a rectangular lattice.	[2] A	01
Q3 (b)	Prove Bragg's Diffraction law in reciprocal space.	[3] A	
Q4 (a)	What are phonons?	[2] B	02
Q4 (b)	Explain the Einstein model of molar heat capacity for metals.	[3] B	
Q5	Derive dispersion relationship for a one-dimensional chain of diatoms having mass M and m such that ($M > m$). Explain the nature of acoustical and optical modes.	[5] B	04

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