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

CLASS: **IMSC** **SEMESTER: V**
BRANCH: **PHYSICS** **SESSION: MO/2023**

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.

				CO	BL
Q1	(a)	What are Bravais lattices? Why the face-centered tetragonal lattice is not a distinct Bravais lattice?	[2]	CO1	02
Q1	(b)	Define Miller indices. Draw the $(11\bar{1})$ plane in the unit cell of a cubic lattice. Find the <110> directions that lie on this plane.	[3]	CO1	04
Q2	(a)	What is packing fraction? Calculate its value for a fcc lattice.	[2]	CO1	03
Q2	(b)	Prove Bragg's Diffraction law in reciprocal space.	[3]	CO1	04
Q3	(a)	What are phonons?	[2]	CO2	01
Q3	(b)	What are Brillouin zones? Construct the first Brillouin zone of a rectangular lattice.	[3]	CO2	03
Q4	(a)	Give the dispersion relation for one-dimensional monoatomic lattice.	[2]	CO2	02
Q4	(b)	Inspect the phonon dispersion curve for a linear diatomic chain. Name the different branches of the dispersion relation curve. Why are these branches named so?	[3]	CO2	04
Q5	(a)	Define the term Magnetization and magnetic susceptibility.	[2]	CO3	02
Q5	(b)	Classify among Paramagnetic, diamagnetic and ferromagnetic materials.	[3]	CO3	03

::::::21/09/2023 M::::::