Department of Humanities and Sciences
National Institute of Technology Goa
Farmagudi, Ponda, Goa - 403 401

Subject: Material Science **Minor-I** **Time: 60 minutes**
Course Code: PH150 **Max Marks: 10**

Answerer all the questions

1.	Calculate the interplanar spacing for a (321) plane in a simple cubic lattice whose lattice constant is 4.2×10^{-10}m.	1 M
2.	A NaCl crystal is used as a diffraction grating with X-rays. For the d_{121} spacing of the chloride ions, the angle of diffraction 2θ is 60. If the lattice constant of the crystal is 0.73 nm, what is the wavelength of X-rays?.	1 M
3.	In a crystal whose primitives are 1.1 Å, 1.2 Å and 1.8 Å. A plane (111) cuts an intercept of 1.4 Å along the X-axis. Find the lengths of intercepts along the Y and Z axes	1 M
4.	Draw the following planes in a cubic unit cell (0 1 1), (1 0 1) and (1 1 1).	1 M
5.	Copper has sc structure of atomic radius 0.1278 nm. Calculate the interplanar spacing for (1 2 1) plane.	1 M
6.	Determine the Coulomb interaction energy for a NaCl. Given that the distance between oppositely charged ions is 2.6 Å.	1 M
7.	What are point defects? Explain, in detail, the different types of point defects with suitable sketches.	1.5 M
8.	Define the terms coordination number, atomic radius, and packing density. Calculate the above factors for a simple cubic, body centred cubic and face centred cubic crystals	1.5 M