

B. Sc DEGREE END SEMESTER EXAMINATION MARCH 2018**SEMESTER – 6: PHYSICS (CORE COURSE)****COURSE: 15U6CRPHY11 – CONDENSED MATTER PHYSICS***Common for Regular (2015 Admission) & Supplementary (2014 Admission)*

Time: Three Hours

Max. Marks: 60

PART AAnswer **all** questions; each question carries 1mark

1. The packing fraction of fcc structure is.....
2. Group of atoms associated with a lattice point is called
3. bonding is prominent in inert gas.
4. At absolute zero, probability of occupation of energy levels above Fermi level is
5. If the Hall coefficient is positive the majority charge carriers are.....
6.of a dielectric can be defined as the induced dipole moment per unit electric field.
7. Magnetic susceptibility is negative for amaterial
8. What is isotope effect of a superconductor?
9. Magnetic Flux density inside a type-1 superconductor is
10. Fullerene is made of atoms. (1 x 10 = 10)

PART BAnswer **any seven** questions; each question carries 2 marks

11. What is the unit cell of a crystal lattice? What are unit cell parameters?
12. Describe CsCl structure.
13. What is meant by Fermi level and Fermi energy?
14. What is Hall effect?
15. Explain electronic polarization.
16. Soft iron is preferred more to make electromagnets whereas steel is preferred to make permanent magnets. Why?
17. What is Meissner effect?
18. List any four applications of super conductors.
19. What are nanocomposites? (2 x 7 = 14)

PART CAnswer **any four** questions; each carries 4 marks

20. Show that for a simple cubic lattice $d_{100} : d_{110} : d_{111} = \sqrt{6} : \sqrt{3} : \sqrt{2}$.
21. For a certain crystal (111) planes have a separation of 1.181Å. If these planes are irradiated with xrays of wavelength 1.54Å how many orders of Bragg reflections can be observed in this case?

22. Discuss Brillouin zones in two dimensions with the help of an E versus K graph.
23. The dielectric constant of a medium is 3. Electric field in the dielectric is 10^6Vm^{-1} . Calculate the electric displacement vector and polarization.
24. The critical temperature for mercury is 4.185K and isotopic mass is 199.5 amu .If the isotopic mass changes to 203.4 amu ,calculate its new critical temperature.
25. Explain dc and ac Josephsons effects. (4 x 4 = 16)

PART D

Answer **any two** questions; each question carries 10 marks

26. Derive an expression for binding energy of an ionic crystal. Find out Madelung constant for a one dimensional chain of ions.
27. Explain Bloch theorem. How Kronig and Penny explained the potential variation of an electron through a one dimensional crystal lattice?
28. Discuss the origin of paramagnetic behavior. Explain Langevins theory of paramagnetism and derive Curie law of paramagnetics.
29. Discuss the effect of magnetic field on superconductivity. Distinguish between type-1 and type -11 superconductivity.

(10 x 2 = 20)
