Reg. No.....Name.....

B.SC DEGREE END SEMESTER EXAMINATION MARCH 2017

SEMESTER – 6: PHYSICS (CORE COURSE)

COURSE: U6CRPHY11 –: CONDENSED MATTER PHYSICS

(For Regular - 2014 Admission)

Time: Three Hours Max. Marks: 60

PART A

(Answer **all** questions; each question carries 1 mark)

1. The co-ordination number of fcc lattice is.....
2. What is meant by a primitive cell?
3. The bonding in NaCl is.....
4. At absolute zero, probability of occupation of energy levels below Fermi level is.....
5. Drift velocity of charge carriers produced per unit applied electric field is called.....
6. For vacuum, magnetic susceptibility is .....
7. Dipole moment per unit volume of a dielectric is called.....
8. At critical temperature, critical field of a superconductor is.....
9. Electron is a fermion whereas cooper pair is a .....
10. Fullerene is made of.....atoms. (1 x 10 = 10)

PART B

(Answer **any seven** questions; each question carries 2 marks)

11. Name the seven crystal systems.
12. Describe NaCl structure.
13. Explain Bloch theorem.
14. Draw the nature of potential used in Kronig-Penny model.
15. What is meant by polarizability of a dielectric? Give the relation between polarization and polarizability of a dielectric.
16. Explain the origin of paramagnetism
17. What is meant by critical field of a super conductor? Give the relation representing temperature dependence of critical field.
18. What is meant by quantum dots?
19. What is Meissner effect? (2 x 7 = 14)

PART C

(Answer **any four** questions; each question carries 4 marks)

20. In a crystal a lattice plane intercept x, y, z axes at 2a,3b and 4c where a, b and c are lattice constants. Find the Miller indices of the plane.
21. When abeam of x-rays of wavelength 0.842A is incident on a crystal at glancing angle $8^0 35'$ first order Bragg reflection is obtained. Calculate the glancing angle for third order reflection.
22. The mobilities of electrons and holes in a sample of intrinsic germanium at 300K are o.36 $m^2V^{-1}S^{-1}$ and 0.17m2$V^{-1}S^{-1}$ respectively .If the conductivity of the specimen is 2.12 per ohm.m, compute the charge carrier concentration.
23. Discuss the origin of ferroelectricity. Explain the ferroelectric behavior of barium titanate crystal.
24. Explain type-1 and type-11 superconductors with necessary graphs.
25. The London penetration depth for Pb at 3K and 7.1 K are 39.6nm and 173nm respectively. Caiculate its transition temperature as well as depth at 0K.

(4 x 4 =16)

PART D

(Answer **any two** questions; each carries 10 marks)

26. What are Miller indices? How can we find Miller indices of a set of planes? Derive an Expression for the interplanar spacing of a set of planes.
27. (a) Obtain an expression for electrical conductivity of an intrinsic semiconductor.

    (b) Discuss Hall effect. Obtain an expression for Hall coefficient $R_{H.}$
28. What is diamagnetism? Explain Langevins theory of diamagnetism and derive Langevins equation for diamagnetic susceptibility.
29. What is Josephsons tunneling? Discuss dc and ac Josephson effects. Explain SQUID with a diagram.

    (10 x 2 = 20)

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