



(Pages : 3)

G - 1000

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2019
First Degree Programme under CBCSS
PHYSICS
Core Course IX
PY 1641 : Solid State Physics
(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION - A

Answer **all** questions. **Each** question carries **1** mark.

1. What is a unit cell ?
2. What are the different space lattices in the cubic crystal system ?
3. State Bragg's law.
4. What is Meissner effect ?
5. How does the resistivity of a metal vary with temperature ?
6. What is the reciprocal lattice of fcc structure ?
7. Give an application of Hall effect.
8. What is a phonon ?
9. Define magneto-resistance.
10. What do you understand by magnetic susceptibility ? **(10x1=10 Marks)**

SECTION - B

Answer **any 8** questions. **Each** question carries **2** marks.

11. Write the names of seven crystal and their lattices.
12. List the different types of bonding in a crystal.

P.T.O.



13. What is meant by reciprocal lattice ?
14. What is super conductivity ? Give example.
15. Distinguish conductors, semiconductors and insulators on the basis of band theory.
16. Describe what is meant by Fermi Surface in K space. What is the significance of Fermi surface ?
17. How do you write the wave function of an electron in a periodic potential of a crystal on the basis of Bloch theorem ?
18. Distinguish Diamagnetism, Paramagnetism and Ferromagnetism.
19. How induced dipole moment is related applied electric field in a dielectric ?
20. What is piezoelectricity ? Give applications.
21. Distinguish Type I and Type II superconductors.
22. Explain 'critical field in super conductivity'. (8×2=16 Marks)

SECTION - C

Answer **any 6** questions. **Each** question carries **4** marks.

23. A metallic foil has 0.005 cm thickness and side 25 cm in the shape of square. Calculate the number of atom in the foil, if its unit cell has fcc structure of edge length 0.4049.
24. Aluminum (Al) has fcc structure. Find the edge length of unit cell, if the density of Al is 2.7 g/cm^3 and molecular weight is 27 u.
25. A beam of X ray incident on NaCl crystal of lattice spacing $0.3 \times 10^{-9} \text{ m}$. Bragg reflection is found to be at 8 degree, for first order. What is the wavelength of X-ray used.
26. Calculate the packing fraction of a bcc structure occupied by spherical atom of radius r .
27. Calculate the inter planar distance for a (321) plane in a simple cubic lattice with lattice constant $4.2 \times 10^{-8} \text{ cm}$.



28. Super conducting Tin (Sn) has a critical temperature of 3.7 Kelvin at zero magnetic field of 0.0306 tesla at zero Kelvin. Find the critical temperature at 2K.
29. Fermi energy of a metal is 5.0 eV. Find the probability that electrons have energy 1% above Fermi energy at 300 K.
30. Calculate the flux density and magnetization in a ferromagnetic alloy when a magnetic field of 3×10^6 A/m is applied across it. Given susceptibility of alloy is 0.5×10^5 .
31. Calculate the frequency of Josephson current when 1 Volt dc is applied across Josephson junction. (6×4=24 Marks)

SECTION - D

Answer **any 2** questions. **Each** question carries **15** marks.

32. Explain Miller indices. How they are determined ? Obtain the relation for interplanar spacing in between two planes of a crystal described by miller indices in terms of cube edges a, b, c.
33. Explain Kronig-Penney model for the description of an electron in one dimensional periodic potential.
34. Write short notes on photoconductivity and photoelectric effect.
35. What are the properties of superconductors ? Explain the theory of superconductivity. Explain Josephson effect and its applications. (2×15=30 Marks)



(Pages : 3)

G – 1398

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2019

First Degree Programme under CBCSS

PHYSICS

Core Course IX

PY 1641 : Solid State Physics

(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. What is a unit cell ?
2. What are the different space lattices in the cubic crystal system ?
3. State Bragg's law.
4. What is Meissner effect ?
5. How does the resistivity of a metal vary with temperature ?
6. What is the reciprocal lattice of fcc structure ?
7. Give an application of Hall effect.
8. What is a phonon ?
9. Define magneto-resistance.
10. What do you understand by magnetic susceptibility ? **(10×1=10 Marks)**

SECTION – B

Answer **any 8** questions. **Each** question carries **2** marks.

1. Write the names of seven crystal and their lattices.
2. List the different types of bonding in a crystal.

P.T.O.