E 1556 (Pages : 2) Reg. No.....

Name.....

# B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2016

## Sixth Semester

Core Course—CONDENSED MATTER PHYSICS

(Common for B.Sc. Physics Model I , Physics Model II, Physics EEM and Physics Instrumentation)

[2013 Admissions]

Time : Three Hours Maximum : 60 Marks

## Part A

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

1. The crystalline state is a ——— energy state.
2. The lattice is a Mathematical concept, whereas the crystal ——— is a physical concept.
3. Most of the common metals and some alkali halides have ——— structures.
4. Ferromagnetic materials are called ——— magnets.
5. Diamagnetic susceptibility is ——— and very small in magnitude.
6. For ——— materials susceptibility is inversely proportional to the absolute temperature.
7. The minimum magnetic field required to destroy the superconducting property is known as ——— field.
8. Electrical resistivity is a measure of the irregularity of the ——— which is seen in alloys.

(8 × 1 = 8)

## Part B

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

9. What is a crystal ?
10. How does a crystal differ from lattices ?
11. What is a unit cell ?
12. What is reciprocal lattice ?
13. Explain van der Waal bonding ?
14. What is Hall effect ?
15. What is fcc structure ?

**Turn over**

16. State the physical significance of Clausius-Mosotti relation.
17. What are the properties of thin films ?
18. What is meant by nanostructure ?

(6 × 2 = 12)

## Part C

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

19. How many atoms are there in the primitive cell of diamond ? If the cube edge is 0.356 nm, what is the length of translation vector ?
20. Lattice constant of a cubic lattice is (a) Calculate the spacing between (211) and (001).
21. The grating space of the calcite is 0.3036 nm. Calculate the wavelength of the X-ray that undergo first order reflection at the glancing angle of 12°.
22. An iron rod of susceptibility $599 \times 10^{-11}$ with an area of cross-section 0.2 $cm.^2$ is subjected to magnetising field of 1200 $amp\text{-}m.^{-1}$ Determine the permeability and flux produced.
23. The critical fields 6K and 8K for a material are 7.616 and 4.284 respectively. Determine the transition temperature and critical field at 0 K.
24. Give an account on liquid crystals.

(4 × 4 = 16)

## Part D

*Answer any* **two** *questions.*
*Each question carries* **12** *marks.*

25. Describe Bragg's method for determining the wavelength of X-rays.
26. Describe the formation of energy bands in solids on the basis of band theory.
27. Discuss the domain theory for ferromagnetism.
28. Discuss the salient features of superconductivity with experimental support. Bring out the important applications.

(2 × 12 = 24)