

E 2446

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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2016

Second Semester

**ELECTRIC AND MAGNETIC PHENOMENA, THERMODYNAMICS AND ELEMENTARY
SOLID STATE PHYSICS**

[Complementary Physics for B.Sc. Chemistry, B.Sc. Geology and B.Sc. Chemistry and
Water Management]

(2013 Admission onwards)

Time : Three Hours

Maximum Marks : 60

Part A (Very Short Answer Questions)

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

1. Mention the different mechanisms of polarisation in a dielectric.
2. Explain the significance of permittivity of a medium.
3. State Curie law for paramagnetism.
4. What is a crystal ?
5. Explain the term Unit cell.
6. What is packing efficiency ?
7. State the conditions for thermal equilibrium of a system.
8. Write down the equation for an adiabatic process and explain.

(8 × 1 = 8)

Part B

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

9. Bring out the dielectric displacement vector.
10. Differentiate between dia and para magnetisms.
11. How does a crystal differ from a lattice ? Explain.
12. State and explain Bragg's law.
13. Obtain the expression for packing fraction for fcc.
14. Give the structure of sodium chloride.
15. Explain the differential form of first law of thermodynamics.
16. Distinguish between isothermal and adiabatic changes with examples.

Turn over

17. Bring out the entropy for reversible and irreversible processes.
18. Explain reversibility of Carnot engine.

(6 × 2 = 12)

Part C

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

19. The capacity of a capacitor with dielectric is 10 μF . Find the ratio of plate area to distance between the plates if the value of dielectric is 5.
20. The susceptibility of paramagnetic FeCl_3 is 3.7×10^{-3} at 27°C . What will be the value of its relative permeability at 200°K and 500°K ?
21. Copper has fcc structure with lattice constant $a = 0.361 \text{ nm}$. Calculate the radius of copper atom.
22. For a simple cubic lattice of lattice parameter 0.204 nm , calculate the spacing of lattice plane (2 1 2).
23. One mole of helium at 300 K is adiabatically compressed so that its pressure increases to 10 times of its initial value, find the final temperature attained if γ for helium is 1.67.
24. A Carnot engine works between 27°C and 127°C . What is the thermal efficiency of the engine?

(4 × 4 = 16)

Part D

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

25. Give a detailed account on ferromagnetism and hysteresis analysis.
26. Bring out all the seven systems of crystals with salient features.
27. What are the requirements for heat engine? Describe Carnot cycle and obtain the expression for efficiency.
28. Derive the Maxwell's thermodynamic relations. Discuss any two applications.

(2 × 12 = 24)