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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2019

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 to 2016 Admissions]

Time : Three Hours

Maximum Marks : 60

Part A (Very Short Answer Questions)

Answer all questions.

Each question carries 1 mark.

1. Define dielectric susceptibility.
2. Explain the significance of permittivity of a medium.
3. Compare diamagnetism and paramagnetism.
4. What is a crystal ?
5. Define a unit cell.
6. What is Bragg's law ?
7. State Carnot's theorem.
8. State first law of thermodynamics.

(8 × 1 = 8)

Part B

Answer any six questions.

Each question carries 2 marks.

9. Briefly discuss on ferroelectricity.
10. Give the mathematical form of Gauss's law in dielectrics and explain the concept.
11. Explain the different sources of polarizability in dielectrics.
12. How does a crystal differ from a lattice ? Explain.
13. What are Miller indices ? How are they determined ?

Turn over

14. Briefly explain the crystal structure of sodium chloride.
15. Distinguish between Reversible and Irreversible processes.
16. What are the factors on which the efficiency of Carnot engine depend ?
17. When is a system said to be in the state of thermodynamic equilibrium ?
18. Explain the principle of increase of entropy.

(6 × 2 = 12)

Part C

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

19. The magnetic susceptibility of a medium is 948×10^{-11} . Calculate the permeability and relative permeability of the medium.
20. The capacity of a capacitor with dielectric is $10 \mu\text{F}$. Find the ratio of plate area to distance between the plates if the value of dielectric is 5.
21. Copper has fcc structure with lattice constant $a = 0.361 \text{ nm}$. Calculate the radius of copper atom.
22. In a single cubic crystal, find the ratio of (i) spacing of the (110) and (111) planes ; and (ii) the nearest neighbour distance to the next nearest neighbour distance.
23. A Carnot engine works between 27°C and 127°C . What is the thermal efficiency of the engine ?
24. A Carnot engine with efficiency 0.6 drives a Carnot refrigerator with co-efficient of performance 5. Determine the energy absorbed from the cold body by the refrigerator for each kilo joule of energy absorbed from the source by the engine.

(4 × 4 = 16)

Part D

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

25. Discuss on ferromagnetism, ferrimagnetism and antiferromagnetism. Describe the salient features and applications of each one.
26. Using the laws of thermodynamics, derive Maxwell's thermodynamic relations.
27. Explain all the seven systems of crystals with salient features.
28. What are the requirements for heat engine? Describe Carnot cycle and obtain the expression for efficiency.

(2 × 12 = 24)