

B.Sc. DEGREE END SEMESTER EXAMINATION - MARCH/APRIL 2019**SEMESTER - 2: PHYSICS (COMPLEMENTARY COURSE FOR CHEMISTRY)****COURSE: 15U2CPPHY4: ELECTRIC AND MAGNETIC PHENOMENA, THERMODYNAMICS AND
ELEMENTARY SOLID STATE PHYSICS**

(Common for Regular 2018 / Supplementary/Improvement 2017/ 2016/2015/2014 Admission)

Time: Three Hours

Maximum Marks: 60

PART A (Very short answer questions)***Answer all questions. Each question carries 1 Mark***

1. What do you mean by a polar dielectric? Give an example.
2. What is dielectric susceptibility?
3. What happens to diamagnetic materials, when placed in a magnetic field? attracted or repelled?
4. What do you mean by an isochoric process?
5. Is it possible to convert heat energy completely to mechanical work in a process?
6. State the third law of thermodynamics.
7. What do you mean by basis in a crystal?
8. Compare the periodicity in crystalline and amorphous solids. (1 x 8 = 8)

PART B (Short Answer)***Answer any six questions. Each question carries 2 Marks***

9. What are ferroelectric materials? Give an example.
10. Compare the properties of paramagnetic, diamagnetic and ferromagnetic materials in terms of their susceptibility and relative permeability.
11. What are the basic elements of a Carnot heat engine? List the processes involved in a Carnot engine.
12. Distinguish between reversible and irreversible processes. List the reasons for irreversibility of processes.
13. Discuss the concept of entropy. How is it related to the degree of disorder in a system?
14. Name the seven crystal systems.
15. Discuss the NaCl crystal structure.
16. What is the scheme used in finding the miller indices of a plane? (2 x 6 = 12)

PART C (Problem/Derivations)***Answer any four questions. Each question carries 5 Marks***

17. Determine the polarization in a dielectric having dielectric constant 2.8 and electric displacement vector 3×10^{-7} coulomb/m².
18. The magnetization and magnetic flux density in a material is 2800 Am^{-1} and $28\pi \times 10^{-4} T$, respectively. Calculate the magnetizing field intensity and permeability of the material.

19. Air at NTP is compressed adiabatically to half of its volume. What is the change in its temperature?
Given, $\gamma = 1.4$.
20. Calculate the change in entropy when 0.0273 kg of ice at zero degree Celsius is converted into water at the same temperature. Given latent heat = 80 cal/g.
21. The lattice constant of a cubic crystal is 6.23 \AA . Estimate the inter-planar distance between the (111) planes in the crystal.
22. Obtain the packing fraction in a bcc lattice. (5 x 4 = 20)

PART D (Essay)

Answer any two questions. Each question carries 10 marks

23. Explain the domain theory of ferromagnetism. Draw and explain a typical hysteresis curve of a ferromagnetic material and discuss the terms retentivity and coercivity.
24. Using an indicator diagram, obtain expressions for work done during an isothermal and adiabatic processes. Show that the slope of an adiabatic is γ times that of an isothermal.
25. What are the basic thermodynamic potentials? Obtain Maxwell's thermodynamic relations from the thermodynamic potentials.
26. Obtain Bragg's law of X-ray diffraction in crystals. (10 x 2 = 20)
