B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017
(Supplementary – 2014 Admission)
SEMESTER II - COMPLEMENTARY COURSE (PHYSICS)
PHY2EMTE – ELECTRIC AND MAGNETIC PHENOMENA, THERMODYNAMICS
AND ELEMENTARY SOLID STATE PHYSICS
(For Chemistry)

Time: Three Hours   **Maximum Marks: 60**
PART A
I.   Answer all questions. Each question carries 1mark

1.   What is a dielectric material?
2.   Define flux density. What is its unit?
3.   Define the term coercivity.
4.   State first law of thermodynamics
5.   Explain what is adiabatic process
6.   Which form of matter has less entropy? Why?
7.   Define basis of a crystal lattice.
8.   What are the lattice parameter values of a triclinic system?

                                                        (8 × 1 = 8)

PART B
II.   Answer any six questions. Each question carries 2 marks

9.   State Curie – Weiss law.
10. Distinguish between polar and non polar dielectrics. Give examples
11. Establish the relation between magnetic susceptibility and relative permeability
12. Compare the properties of dia and para magnetic materials .
13. Explain different types of equilibrium states of systems.
14. What is the principle of refrigerator?
15. State and explain principle of increase of entropy
16. Explain the scheme used in finding Miller indices of a plane
17. Calculate the number of atoms per unit cell of a bcc structure.
18. Name different crystal systems. Write their lattice parameters

                                                        (6 × 2 = 12)

PART C
III. Answer any four questions. Each question carries 4 marks

19. The dielectric constant of water is 78. What is its electric permittivity? Given $\epsilon_0 = 8.85 \times 10^{-12}$ $C^2N^{-1}m^{-2}$.

20. A specimen of iron is in the form of a rod is placed along the axis of a solenoid with 10 turns per cm. The cross sectional area of the cross sectional area of the specimen is 1 cm^2 and the relative permeability is 900. Calculate the magnetic flux through the iron when a current of 2 A is passed through the winding.

21. Calculate the efficiency of a Carnot cycle working between the two temperatures 100°C and $0\,^\circ$C.
22. 80 gm of hydrogen at $27\,^\circ$C undergoes an isothermal change so that its volume is doubled, calculate the work done if $R = 8.26$ Jmole^{-1} K^{-1}.
23. The distance between adjacent atomic planes in a crystal is 0.4nm. Find the smallest angle of Bragg scattering for 0.03 nm X-rays.
24. A material crystallized in fcc phase has a density of 6379 kgm^{-3} and molecular mass 60.2 amu. Calculate its lattice constant

$$(4 \times 4 = 16)$$

PART D

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

25. Derive Gauss's law for a dielectric medium.
26. Explain Weiss theory in ferromagnetism. Also mention anti ferro and ferri magnetism
27. Derive Maxwell's thermodynamic relations.
28 Explain the spacing of planes in crystal lattice. Obtain an expression for the interplanar distance for a simple cubic structure of crystal.

$$(2 \times 12 = 24)$$