B. Sc. DEGREE (C.B.C.S.S) EXAMINATION, MARCH 2017
(2016 Admission – Regular & 2015 Admission – Supplementary/Improvement)
SEMESTER II - COMPLEMENTARY COURSE (PHYSICS)
PH2CC2TB - 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 1 mark

1.   What is Magnetization?
2.   What is Curie temperature?
3.   What is an isothermal process?
4.   Define coefficient of performance of a refrigerator.
5.   What is meant by space lattice?

                                                                (5×1=5)

PART B

II.   Answer any five questions. Each question carries 2 marks

6.   Explain the difference between the terms Curie temperature and Neel temperature.
7.   Derive the relation connecting permeability and magnetic susceptibility.
8.   What is an adiabatic process? What are the conditions for a process to be adiabatic?
9.   Obtain the relation between coefficient of performance of a refrigerator and efficiency of the engine.
10. What is an indicator diagram? Explain its importance.
11. Write the expression for the work done in one cycle of a Carnot engine. Explain the symbols.
12. What are primitive and non-primitive translational vectors?
13. Obtain the packing fraction for *hcp* structure.

                                                                (5×2= 10)

PART C

III.   Answer any five questions. Each question carries 5 marks.

14. An iron rod of diameter 0.4 cm is kept parallel to a magnetic field. The rod acquires a pole strength of 12 Am. If the magnetic permeability is 62.8×10^{-5} H/m, find the magnetizing field. ($\mu_o = 4 \times 10^{-7}$ H/m)
15. A magnetic specimen has a magnetization of 3000 Am^{-1} and flux density 0.0044 Web/m^2. Calculate the relative permeability and magnetizing field intensity.
16. The efficiency of a reversible heat engine is 25%. If temperature of the source is increased by 300K, its efficiency will be doubled. Calculate the temperatures of the source and sink.

17. Calculate the change in entropy when 1kg of water at 0° C is heated to 100° C. Specific heat capacity of water= 4190 J/kg.

18. A rapidly spinning paddle wheel raises the temperature of 200mL of water from 21 degrees Celsius to 25 degrees. How much a) work is done and b) heat is transferred in this process?

19. An ideal gas heat engine operates in Carnot cycle between 227°C and 127°C.It absorbs 2520 J of heat at the higher temperature. Calculate the amount of heat supplied to the engine from the source in each cycle.

20. The principal planes of NaCl are separated by 2.82 A^{o}. The first order Bragg reflection takes place at 10°. Find the wavelength of incident radiation and glancing angle for the second reflection.

21. Find the interplanar spacing of (321) planes of Cu which has an fcc structure having atomic radius 0.1278nm.

(5×5= 25)

PART D

IV. Answer any two questions. Each question carries 10 marks.

22. Explain diamagnetism, paramagnetism and ferromagnetism. Give two examples to each type of material.

23. Derive Maxwell's thermodynamical relations (any three)

24. What is meant by entropy of a substance? Show that for a reversible cycle. Entropy is constant.

25. Explain different symmetry operations in crystals.

(2×10=20)