TB142380A **Reg.No……..**

Name…….

B. Sc. DEGREE (CBCSS) EXAMINATION, APRIL 2015
SECOND SEMESTER – COMPLEMENTARY COURSE (PHYSICS)
PHY2EMTE – ELECTRIC AND MAGNETIC PHENOMENA, THERMODYNAMICS AND ELEMENTARY SOLID STATE PHYSICS

Time: 3 Hours **Maximum: 60 Marks**

Part A
Answer *All* questions. (Each question carries 1 mark)

1. Write down Gauss's law for dielectric medium.
2. Distinguish between antiferromagnetism and ferrimagnetism.
3. Define the intensity of magnetisation.
4. The air escaping from a cycle tube becomes cool, on removing the valve. Why?
5. State Zeroth law of thermodynamics.
6. Distinguish clearly between temperature and heat.
7. Amorphous substances do not melt at a sharp temperature; rather these have a softening range. Explain this observation.
8. Distinguish between single crystals and polycrystalline solids.

(8 X 1 = 8 marks)

Part B
Answer Any *Six* questions. (Each question carries 2 marks)

9. What is ferroelectrcity? Give an example of ferroelectric crystal.
10. Define the susceptibility of a dielectric medium. How is it related to the dielectric constant.
11. What is meant by hysteresis in magnetic materials?
12. What are hard and soft magnetic materials? Mention their uses.
13. What is the change in entropy in a Carnot cycle?
14. Obtain the expression for the work done in isothermal process.
15. A reversible engine works between two temperatures. In order to increase the efficiency, show that it is better to reduce the temperature of the sink rather than to increase the temperature of the source.
16. How does a crystal differ from lattice?
17. Briefly explain the scheme used in finding Miller indices of a plane.
18. Explain, without calculations, why fcc and hcp structures have the same packing fraction.

(6 x 2 = 12 marks)

Part C
Answer Any *Four* questions. (Each question carries 4 marks)

19. Calculate the electric displacement vector and the polarisation for a dielectric material in which the electric field intensity is 10^6 V/m and susceptibility is 5.
20. The maximum value of permeability of a material is 0.20 N/A^2. What is the relative permeability and magnetic susceptibility?
21. The quantity of dry air at N.T.P is allowed to expand four times of its original volume adiabatically. Calculate the final temperature if ° = 1.4.
22. In a refrigerator, heat from inside at 273K is transferred to a room at 303K. How much joule of heat will be delivered to the room for each joule of work done?
23. The first order spectrum of a beam of X rays diffracted by a Silicon crystal corresponds to an angle of 3^o. The distance between the corresponding parallel planes is $3A^0$. Calculate the wave length of X rays used.
24. The Bragg's angle for first order reflection by (220) plane of a nickel crystal is 38.2^o when X-rays of wavelength $1.54A^0$ is used. Find the lattice constant of the unit cell.

(4 X 4 = 16 marks)

Part D
Answer Any *Two* questions. (Each question carries 12 marks)

25. What is meant by polarisation in dielectrics? Explain. Obtain an expression relating Electric field intensity, Polarisation vector and Dielectric displacement vector of dielectric materials.
26. Discuss the classification of magnetic materials and distinguish between dia, para and ferromagnetic materials.
27. Describe the working of Carnot Engine with the P- V diagram. Obtain the expression for the work done in a Carnot cycle.
28. What are Bravais lattices? Give the features of the fourteen Bravais lattices.

(2 X 12 = 24 marks)