TB142370C   Reg. No:………………..

                                                       Name:………………….

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017
(Supplementary – 2014 Admission)
SEMESTER II - COMPLEMENTARY COURSE (PHYSICS)
PHY2EMTSR – ELECTRIC AND MAGNETIC PHENOMENA,
THERMODYNAMICS AND SPECIAL THEORY OF RELATIVITY
(For Mathematics)

Time: Three Hours   **Maximum Marks: 60**

PART A

I.   Answer all questions. Each question carries 1 mark

1. What is meant by a linear dielectric?
2. What is called polarization catastrophe?
3. What is the type of magnetism explained by Weiss theory?
4. Give an example for ferrimagnetic material.
5. Write notes on thermal equilibrium and zeroth law of thermodynamics.
6. Is there any increase or decrease in entropy during an irreversible process?
7. What is the absolute quantity according to classical concepts of mechanics?
8. What is relativity of simultaneity?

                                                       (8 $\times$ 1 = 8)

PART B

II. Answer six questions. Each question carries 2 marks

9. Derive the expression for the external work done when one mole of an ideal gas is suddenly expanded.
10. What do you mean by susceptibility of a dielectric medium? How is it related to the dielectric constant?
11. State and explain the principle of increase of entropy.
12. Plot the hysteresis curve of a ferromagnetic material.
13. Show that the slope of an adiabatic is   times the slope of the isothermal.
14. Derive the relation between   and   .
15. Define the thermodynamic potential enthalpy? Obtain the Maxwell's thermodynamic relation using it
16. What are the consequences of Lorentz transformation?
17. What is Newtonian principle of relativity?
18. What are the consequences of length contraction and time dilation?

                                                       (6 $\times$ 2 = 12)

PART C

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

19. A Carnot's engine whose source is at 127°C take in 4200J of heat in each cycle and gives out 2520J of heat to the condenser. Find the temperature of the condenser

20. An iron rod of diameter 0.1 cm is kept parallel to a magnetic field. It acquires a pole strength of 10 Am. If the magnetic permeability is 28 x 10^{-5} H/m, find the magnetizing field.

21. Find the change in entropy when 1g of ice at 0°C changes to water at 10°C. Specific latent heat of fusion of ice = 3.35×10^{5} J/Kg. Specific heat capacity of water = 4180J/Kg/K.

22. Find the polarization in a dielectric material having dielectric constant = 7 and D = 3.5×10^{-7} Cm^{-2}

23. In an experiment, the life time of a particle moving at a speed of 0.9 c is found to be 1.3 ns. Calculate the proper life time of the particle.

24. If the length of an object projected into space appears to be reduced to half its original length, calculate the speed of projection.

(4 × 4 = 16)

PART D

IV. Answer two questions. Each question carries 12 marks

25. Explain the origin of polarization in polar and non-polar dielectrics. Also explain the Polarization vector.

26. Explain dia, para and ferromagnetism and compare the properties exhibited by materials belonging to each of these categories.

27. Describe Carnot's reversible heat engine. With the help of an indicator diagram describe the various processes which make up the Carnot's cycle

28. Deduce the relativistic law of addition of velocities and prove that light has the maximum possible velocity attainable in nature.

(2 × 12 = 24)