DRR-3216
Third Year B. Sc. (Sem. VI) Examination
March / April - 2016
Physics : Paper - IX

Time : 2 Hours] [Total Marks : 50

Instructions :

(1) Fill up strictly the details of signs on your answer book.

- Name of the Examination :
  THIRD YEAR B. SC. (SEM. VI)

- Name of the Subject :
  PHYSICS : PAPER - 9

- Subject Code No. : 3 2 1 6

(2) All symbols have their usual meanings.

(3) Draw neat diagram wherever necessary.

(4) Figures on the right indicate full marks of the question

1 Answer the following in brief. [08]
   (1) What do you mean by free energy?
   (2) Give an example of Boson.
   (3) What are paramagnetic atoms?
   (4) What do you mean by quasistatic equilibrium process?
   (5) Why Lagrangian formation is more convenient compared to the Newtonian formulation?
   (6) What do you mean by world point?
   (7) Explain the principle of covariance.
   (8) What is meant by space-like interval?

2 (a) Prove that $<P>V = NKT$ for an ideal gas. [10]
   OR
   (a) Derive the Curie's law of paramagnetism by considering only simplified model. [10]
(b) Why the lowest energy of a gas obeying F.D. statistics is much higher than that of the gas obeying B.E. statistics? [4]

OR

(b) Find the possible microscopic states of 2 fermions system which has three fold degeneracy.

3 (a) Find the relativistic Lagrangian of a single particle and justify it. [10]

OR

(a) Explain "The Lorentz transformation can be regarded as a rotation of coordinate axes in space time". [10]

(b) Show that length of a four vector is unchanged under a Lorentz transformation. [4]

OR

(b) Derive the position Four Vector. [4]

4 Attempt any two: [14]

(1) Write a short note on Gibb’s Paradox.

(2) Give the physical interpretation of \( a \).

(3) Derive the Lorentz gauge condition for Maxwell’s equation to be invariant.

(4) Deduce the four velocity components in four dimensional Minkowski-space.