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RR-0842

Third Year B. Sc. Examination

March / April – 2010

Physics : Paper - IX

(New Course)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ T. Y. B. Sc.

Name of the Subject :

☛ Physics - 9 (New)

☛ Subject Code No. : 0 8 4 2 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Symbols used have their usual meaning.

(3) Figures to the right indicate full marks of the question.

(4) Use scientific calculator wherever necessary.

1 Answer the following in brief : **14**

(i) Define μ-space and Γ – space.

(ii) You are holding an elliptical serving plate. How would you need to travel for the serving plate to appear round to another observer ?

(iii) What is a quasi static equilibrium process?

(iv) Define proper length and proper time.

(v) How would expect the relativistic variation of mass to effect the performance of cyclotron?

(vi) What is meant by the term "system" in thermodynamics?

(vii) What is a neutron star?

2 (a) If E' and B' are the electric and magnetic components of an electromagnetic field in one inertial frame (S'), obtain the values of E and B of the corresponding field in another inertial frame (S)?

(b) Suppose that an electromagnetic field is purely electric in inertial frame S, i.e., E $\neq$ 0 but B=0. Describe this field in inertial frame S'.

OR

2 (a) State and prove Lorentz transformation equations. **7**

(b) Show that the four dimensional volume element *dxdydzdt* is invariant under Lorentz transformation. **4**

3 (a) Explain the variation of mass with velocity. Obtain the necessary equation for it. **7**

(b) Calculate the mass of an n electron moving with the velocity 0.95 c. Rest mass of the electron is 9.11×10^{-31} kg. **4**

OR

3 (a) State the aim and describe the construction and theory of Michelson Morley's experiment. Draw neat diagram wherever necessary. **7**

(b) In Michelson Morley experiment the length of the two paths is 11 m each. The wavelength of the light used is 6000 $\mathring{A}$. The expected fringe shift is 0.4 fringe. Calculate the velocity of earth relative to the ether. **4**

4 (a) What is canonical ensemble? Obtain the expression for the probability distribution function in case of a canonical ensemble. **7**

(b) Show that the energy fluctuation in the canonical distribution is proportional to the specific heat of the system under consideration. **4**

OR

4 (a) State and obtain Curie's law of Para magnetism. **7**

(b) Show that entropy has an additive property. **4**

5 (a) Give the classical statement of Liouville's theorem and prove it. **7**

(b) Find the nature of the locus of a particle executing an SHM (in Cartesian space) in the phase space. **4**

OR

5 (a) State and prove the equipartition theorem. **7**

(b) Express entropy of a canonical system in terms of probability. **4**

6 Write notes on any **two** of the following : **12**

(a) Gravitational red shift

(b) Life cycle of a star

(c) Evidence of big bang

(d) Gibb's paradox.