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RAN-1010

Third Year B. Sc. Sem V Examination

March / April - 2019

Physics : Paper - IX

(Old or New to be mentioned where necessary)

[Total Marks: 50

સૂચના : / Instructions

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

Name of the Examination:

☛ **Third Year B. Sc. Sem V**

Name of the Subject :

☛ **Physics : Paper - IX**

Subject Code No.: **1 0 1 0**

Seat No.:

Student's Signature

Instructions:

(1) Draw neat diagrams wherever necessary.
(2) Symbols used in the paper have their usual meaning.
(3) Figures to the right indicate full marks of the question.
(4) Scientific calculator may be used.

1. Answer the following questions in brief: (08)

1. What is an inertial reference frame?
2. What do you mean by proper time?
3. What is the value of the velocity of photon?
4. What do you mean by microcanonical ensemble?
5. What do you mean by ensemble?
6. On which variables the density of phase point depends?
7. Why the Lorentz transformation is called space time transformation?
8. Give the set of Hamiltonian dynamical equation.

2. **(a)** Classify an ensembles and derive the equation of probability distribution function for canonical ensemble. **(10)**

OR

(a) Derive the equation of fluctuations in the number of particles of a system in a grand canonical ensemble. **(10)**

(b) Calculate the fractional fluctuation in energy for a perfect gas for N=l. **(04)**

OR

(b) Discuss the condition for statistical equilibrium. **(04)**

3 **(a)** Prove that mass-less particles must travel at the speed of light. **(10)**

OR

(a) Derive the Lorentz Transformation equation. **(10)**

(b) A rocket leaves the earth at a speed of 0.6c. A second rocket leaves the first at a speed of 0.9c with respect to the first. Calculate the speed of second rocket with respect to earth if it is fired in a direction opposite to the first. **(04)**

OR

(b) The average lifetime of μ-mesons at rest is 2.3×10^{-6} s. A laboratory measurement on μ-meson gives an average lifetime of 6.9×10^{-6} s, then what is the speed of the meson in the laboratory. **(04)**

4. **Attempt any Two.** **(14)**

1. Write a short note on phase space.
2. Explain the microscopic state and macroscopic state with examples.
3. Derive the Einstein's law of addition of velocities.
4. Explain relativity of simultaneity.
