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V—127—2017

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

OCTOBER/NOVEMBER, 2017

(CBCS/CGPA)

PHYSICS

Paper VII

(Statistical Physics, Electrodynamic Theory and Relativity)

(MCQ+Theory)

(Tuesday, 21-11-2017) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Question No. **1** is MCQ types. Answer MCQs on OMR sheet only.

(*iii*) Question Nos. **2, 3, 4** are descriptive type questions.

(*iv*) Use separate answer-book/sheet for MCQ type questions and descriptive type questions.

(*v*) Negative marking system is adopted for MCQ type.

MCQ

1. Attempt all multiple choice questions : 10

(*i*) The branch in which the macroscopic approach is applied to a system of large no. of particles by using the laws of probability is called as .....

(A) Geophysics (B) Biophysics

(C) Statistical physics (D) Astrophysics

(*ii*) A point in the space represented by position co-ordinates (x, y_z) and momentum co-ordinates (P_x, P_y, P_z) is called as .....

(A) Co-ordinate space (B) Phase space

(C) Momentum space (D) Space charge

P.T.O.

(*iii*) According to quantum statistics volume of the phase cell is equal to .....

(A) h (B) h^2

(C) h^3 (D) h^4

(*iv*) Identical indistinguishable particles of half integral spin obeying Pauli exclusion principle are called as .....

(A) Fermions (B) Bosons

(C) Mesons (D) Both (A) and (B)

(*v*) In 1924, S.N. Bose introduced the concept, considering thermal radiation as a photon gas and obtained Planck's formula and this statistics is known as .....

(A) M.B. Statistics

(B) B.E. Statistics

(C) F.D. Statistics

(D) Both (A) and (B)

(*vi*) The line integral of magnetic induction around any closed forth is equal to μ_0 times the total current flowing through the path, this is the statement of ..... law

(A) Gauss's law

(B) Faraday's law

(C) Lenz's law

(D) Ampere's law

(*vii*) When the insulator is subjected to an external electric field the bound charges move through small distance and they give rise to small currents. These currents are called as .....

(A) Permeability (B) Permittivity

(C) Current density (D) Displacement current

(*viii*) The time interval between two events occurring at a given point in the moving frame S′ appears to be longer to the observer in the stationary frame S. This effect is called as .....

(A) Time contraction (B) Time dilation

(C) Time decay (D) Time period

(*ix*) The relativistic formula for the variation of mass with velocity is given by $m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$:

In this equation m_0 is called as .....

(A) Mass of the moving body

(B) Rest mass of the body

(C) Decrease in mass with velocity

(D) Increase in mass with velocity

(*x*) The Einstein's mass energy relation forms the basis of understanding nuclear reactions such as fission and fusion and is given by .....

(A) $E = mc^2$ (B) $E = m - c^2$

(C) $E = \frac{m}{c^2} + K.E + P.E.$ (D) $E = cm^2$

Theory

2. Attempt any *five* of the following questions : 10

(*i*) Define the term micro and macro states.

(*ii*) Define probability. When will the probability be one ?

(*iii*) Write the equation for maximum probability distribution in Fermi-Dirac.

(*iv*) What is photon gas ?

(*v*) Write any *two* Maxwell's equations.

(*vi*) State Poynting vector.

(*vii*) Define frame of reference. What are the types of frame of reference ?

P.T.O.

3. Attempt any *two* of the following questions : 10

(*i*) Write a short note on permutations and combinations.

(*ii*) Explain entropy and probability.

(*iii*) Derive wave equations for electric field (E) for free space condition.

(*iv*) Derive any *two* Maxwell's equations.

4. Attempt any *one* of the following questions : 10

(*i*) Derive and expression for Bose-Einstein's distribution law.

(*ii*) Derive an expression for Lorentz transformation.