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**B—172—2019**

**FACULTY OF SCIENCE**

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

**MARCH/APRIL, 2019**

**(CBCS/CGPA Pattern)**

**PHYSICS**

**Paper-VII**

**(Statistical Physics, Electromagnetic Theory and Relativity)**

**(MCQ & Theory)**

**(Monday, 8-4-2019)**

**Time : 2.00 p.m. to 4.00 p.m.**

*Time—2 Hours*

*Maximum Marks—40*

- N.B. :—*
- (i) Attempt *all* questions.
  - (ii) Q. No. 1 is MCQ type. Answer MCQs on OMR sheet only.
  - (iii) Q. Nos. 2, 3 and 4 are descriptive type questions.
  - (iv) Use separate answer book/sheet for MCQ type questions and descriptive type questions.
  - (v) Allow log-table for calculations.
  - (vi) Negative marking system is applicable for MCQs.

**MCQs**

1. Attempt *All* Multiple Choice Questions : 10
- (i) The value of combination  ${}^7C_3$  is.....
    - (a) 12 (b) 18
    - (c) 21 (d) 24
  - (ii) If we toss a coin A times and we get head B times then the frequency of the event is.....
    - (a) A/B (b) A/B+A
    - (c) B/A+B (d) B/A

P.T.O.

(iii) In distribution law the value of distribution modulus.

(a)  $\beta = KT$

(b)  $\beta = KT^2$

(c)  $\beta = 1/KT$

(d)  $\beta = 1/KT^2$

(iv) In the equilibrium condition, the black body radiations can be considered as :

(a) Monoatomic gas

(b) Photon gas

(c) Ideal gas

(d) Simple gas

(v) In B-E statics, maximum probability distribution is directly proportional to.

(a)  $\frac{1}{e^{\alpha+\beta E_i} - 1}$

(b)  $\frac{1}{e^{\alpha+\beta E_i}}$

(c)  $\frac{1}{e^{\alpha+\beta E_i} + 1}$

(d)  $e^{\alpha+\beta E_i}$

(vi) The medium is supposed to be source free *i.e.* medium does not have any.....

(a) Energy or Power

(b) Charge or Current

(c) Intensity or Induction

(d) Permeability or Permittivity

(vii)  $\nabla \cdot D = S$  this equations represents differential form of.....in electrostatics.

(a) Ampere's law

(b) Faraday law

(c) Gauss's law

(d) Coloumb's law

(viii) The body which appear to be a square to an observer at rest relative to a moving observer will be :

(a) Rectangle

(b) Square

(c) Circle

(d) Cuboid

- (ix) If 3 kg of substance totally converted into energy then energy produced is :
- (a)  $2.7 \times 10^{16}\text{J}$  (b)  $270 \times 10^{16}\text{J}$   
 (c)  $27 \times 10^{16}\text{J}$  (d)  $0.27 \times 10^{16}\text{J}$
- (x) The law of addition of velocities applied only when two velocities are in :
- (a) Proportion (b) Same direction  
 (c) Different direction (d) Perpendicular to each other

### Theory

2. Attempt any *five* of the following questions : 10
- (i) Define term Micro and Macro state.  
 (ii) Define phase space.  
 (iii) Define poynting vector.  
 (iv) Define electron gas.  
 (v) Define term entropy  
 (vi) State Mass-Energy relation  
 (vii) State postulates of Special Theory of Relativity.
3. Attempt any *two* of the following questions :
- (i) Explain Entropy and Thermodynamics Probability Relation.  
 (ii) Write note on Fermi-Dirac distribution law.  
 (iii) Explain electromagnetic wave equation in terms of  $\vec{H}$ .  
 (iv) Explain length of contraction in theory of relativity.
4. Attempt any *one* of the following questions :
- (i) Derive the expression for B-E (Bose-Einstein) distribution law.  
 (ii) Derive the expression for Lorentz transformation.