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SUBJECT CODE NO: - BB-2397
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. (CBCGS)(Pattern 2022) S.Y SEM III
Examination November / December 2024
Physics-VII Statistical Physics and Relativity

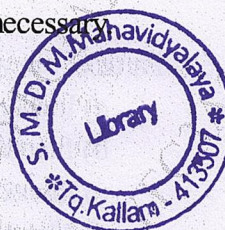
[Time: 1:30 Hours]

[Max. Marks: 40]

N. B

Please check whether you have got the right question paper.

- 1) All questions are compulsory.
- 2) All questions carry equal marks.
- 3) Draw neat diagram and give equations wherever necessary.
- 4) Figure to the right indicate full marks
- 5) Use of logarithmic table and calculator is allowed.

**Q.1 Long answer questions (Solve any one)**

- A) State and explain the principle of equal a priori probability. Define probability and frequency. 10
- B) Explain Fermi level and Fermi energy 10

Q.2 Long answer questions. (Solve any one)

- A) Explain Maxwell-Boltzmann distribution function for an ideal gas and evaluate g_i . 10
- B) Describe the Michelson - Morley experiment. 10

Q.3 Short answer questions.

- A) A card is drawn from a well shuffled pack of 52 cards. Find the probability for this card in king or queen. 5
- B) Distinguish between FD and BE- statistics. 5

OR

- A) Write short note on "mean or average speed ($\bar{V}$) of molecule" 5
- B) A person lives on the average 100 years in his rest frame. How long does he live, if he spends all his life on a spaceship going at 60% of the speed of light 5

Q.4 Multiple choice Questions (MCQ)

10

- 1) For 4 distinguishable objects, taking any 3 objects at a time, possible permutations are
a) 8 b) 24 c) 4 d) 3
- 2) If 5 distinguishable particles are distributed in 2 similar components then total numbers of macro states are.
a) 6 b) 3 c) 5 d) 4

3) According to Maxwell-Boltzmann distribution law $\Omega_1 =$ _____

- a) $g_i e^{\alpha+\beta u_i}$ b) $g_i e^{-\alpha+\beta u_i}$
 c) $g_i e^{\alpha-\beta u_i}$ d) $g_i e^{-\alpha-\beta u_i}$

4) In MB statistics, thermodynamic probability of most probable macro state is _____

- a) $h! \pi \frac{g_i^{h_i-1}}{h_i!}$ b) $h_i \pi \frac{g_i^{h_i}}{h_i!}$
 c) $h_i \pi \frac{g_i^{h_i}}{h_i!}$ d) $h_i \pi \frac{h_i^{g_i}}{h_i!}$



5) Particle obeying Maxwell-Boltzmann statistics are.

- a) Identical, distinguishable without any spin
 b) Identical, indistinguishable with integral spin
 c) Identical, indistinguishable with half integral spin.
 d) Identical, indistinguishable without any spin

6) Photons obey _____ statistics.

- a) Classical b) FD c) MB d) BE

7) Spin on fermions is.

- a) 1 b) $1/2$ c) 0 d) 0 or 1

8) Number of meaningful way of arranging 3 Bosons in 4 cells is _____

- a) 10 b) 15 c) 25 d) 20

9) Which of the following statement is not correct.

- a) Un-accelerated frame is called inertial frame.
 b) Accelerated frame is called non-inertial frame.
 c) Basic laws of Physics are not identical in inertial frame.
 d) Both 'a' and 'b' are not correct.

10) According to special theory of relativity _____

- a) Laws of Physics are same in all frame of reference
 b) Laws of Physics are not same in all inertial frame of reference
 c) Velocity of light is independent on relative motion of source and observer
 d) Velocity of light is variable
