

Total No. of Printed Pages:2

SUBJECT CODE NO: - BB - 2432
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc (CBCGS)(Pattern 2022) S.Y SEM III
Examination November / December 2025
Physics-VII Statistical Physics and Relativity

[Time: 1:30 Hours]**[Max. Marks:40]**

Please check whether you have got the right question paper.

N. B

- 1) All questions are compulsory
- 2) All questions carry equal Marks.
- 3) Draw neat diagram and give equations wherever necessary.
- 4) figures to the sight indicate full marks.
- 5) Use of Leganthmictable and Calculator is allowed.

Q1 Long Answer Questions (Solve any one)(A) Explain permutation and combination with suitable examples. **10**(B) Derive an expression for the Fermi-Dirac distribution law. **10****Q2 Long Answer Questions (Solve ANY ONE)**(A) Evaluate α and β using Maxwell-Boltzmann statistics. **10**(B) Derive an expression for the Lorentz transformation equations. **10****Q3 Short Answer Questions**(A) In a system of eight distinguishable particles distributed in two equal-sized compartments, calculate the probability of the macrostate (3,5). **05**(B) Write a short note on the need of quantum statistics. **05****OR**(A) Write a short note on Maxwell-Boltzmann energy distribution law. **05**(B) If 12 kg of a substance is fully converted into energy, how much energy is produced? **05****Q4 Multiple Choice Questions (MCQ)**1) If a die is thrown, the probability that the number coming up is less than 6 is: **10**

- | | |
|-------------------|-------------------|
| (a) $\frac{1}{6}$ | (b) $\frac{2}{3}$ |
| (c) $\frac{5}{6}$ | (d) $\frac{1}{3}$ |

2) The root-mean-square speed of gas molecules of mass m at temperature T is proportional to:

- | | |
|-----------|----------------|
| (a) m^0 | (b) $m^{-1/2}$ |
|-----------|----------------|

- (c) m (d) $m^{1/2}$
- 3) How many ways can two particles be arranged in three cells according to M.B statistics?
 (a) 6 (b) 4
 (c) 9 (d) 27
- 4) Clocks in a moving reference frame, compared to identical clocks in a stationary frame appears to run.
 (a) Slower (b) At same rate
 (c) Faster (d) Backward in time
- 5) Combination of four distinguishable objects taken three at a time are
 (a) Two (b) Six
 (c) Three (d) Four
- 6) According to which statistics, energy at absolute zero cannot be zero?
 (a) Bose-Einstein (b) Fermi-Dirac
 (c) Maxwell-Boltzmann (d) Both (a) and (c)
- 7) For an ideal gas, each molecule possesses average kinetic energy equal to:
 (a) $\frac{3}{2}kT$ (b) $\frac{1}{2}kT$
 (c) $\frac{3}{4}kT$ (d) $\frac{1}{4}kT$
- 8) The volume of a single cell in phase space is:
 (a) h (b) h^2
 (c) h^3 (d) h^4
- 9) According to classical mechanics, space, time, and mass these three fundamental concept of physics are all
 (a) Absolute and invariant (b) Absolute and variant
 (c) Absolute and zero (d) All of the above
- 10) According to Michelson-Morley experiment the velocity of Earth with respect to ether which is finally shows that the effect of ether are
 (a) Detectable (b) Undetectable
 (c) Less detected (d) All of the above

