PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION MAY 2018
(Second Semester)

Branch – PHYSICS

APPLIED THERMODYNAMICS AND STATISTICAL MECHANICS

Time : Three Hours   Maximum : 75 Marks

Answer **ALL** questions

ALL questions carry **EQUAL** marks   (5 x 15 = 75)

1 a i) Describe the probability density.   (7)

    ii) Explain the probabilities of micro and macro states.   (8)

OR

  b i) Discuss the sharpness of the probability distribution of a macroscopic.   (8)

    ii) Explain the general calculation of mean values for the random walk.   (7)

2 a i) Obtain the thermal equilibrium of two arbitrary systems.   (7)

    ii) What is the effect of
      a) shifting the zero level of energy
      b) decomposition of the system in the partition function.   (8)

OR

  b Obtain expressions of entropy, specific heat at constant volume and partition function for a perfect monoatomic gas on employing micro canonical ensemble.   (15)

3 a Obtain the ideal gas equation with intensive and extensive variable for classical ideal monoatomic ideal gas and deduce entropy, pressure and heat capacity.   (15)

OR

  b Describe the Maxwell's relations for exact thermodynamics potential functions in two neighbouring equilibrium states of a closed PVT system.   (15)

4 a Write notes on (i) Grand canonical ensemble (ii) Chemical potential.

OR

  b Describe the heat capacity at constant volume of a one dimensional array of N-coupled linear oscillators and it is assumed that both longitudinal and transverse wave can propagate along the array. Evaluate the specific heat capacity at constant volume in the low and high temperature.

5 a State and explain the statements of the second law of thermodynamics.

OR

  b Derive a relationship between the efficiency of a Carnot engine an the coefficient of performance of the same engine when operates as a refrigerator. Is a Carnot engine whose efficiency is very high particularly suited as a refrigerator? give the reason.

Z-Z-Z   END