THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

Course Code: PHY 3453/3673 **Time: 3 Hrs**

Course Title: Thermodynamics and Statistical Mechanics / Thermodynamics and Statistical Physics

Max : 75 marks

Part-A

Answer any Five Questions **5 X 15 =75**

1. Elaborately discuss about the equation of state of an ideal gas and a real gas with necessary diagrams.
2. Describe Carnot's cycle and deduce the efficiency of a Carnot's engine in terms of the temperatures between which it works.
3. With necessary diagrams explain the phase transitions of a system consisting of liquid and vapor phases of a substance and thereby derive Clausius-Clapeyron equation.
4. Explain Fermi –Dirac statistics and hence obtain an expression for thermodynamic probability and average occupation number.
5. Deduce an expression for B-E distribution function and explain with an suitable example.
6. Explain quantized linear oscillator. And describe quantization of energy levels for various θ values. Also deduce expressions for internal energy and specific heat capacity.
7. Using M-B statistics a) find the possible macro states of the system if the energy U= 7ε for six indistinguishable particles b) find the total thermodynamic probability of the system c) calculate the average occupation number of levels of the system.