Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Master's Degree Examination – June / July 2021
II Semester

Class : I PG **Time : 3 Hours**
Major : Physics **Max. Marks: 100**

20MPHC08 Statistical Mechanics

Part A **10 x 1 = 10**
Choose the Correct Answer

1. How many microstates are there? CO1K1
   a.1 b. 2
   c. 3 d. total number of distinct arrangements

2. Which macro state has maximum multiplicity. CO1K1
   a. 50 students in a class b. 25 students in a class
   c. no student in a class d. 1 student is present

3. Thermodynamic variables V,E,N are CO2K2
   a. canonical b. micro canonical
   c. grand canonical d. macro canonical

4. Partition function is CO2K1
   a. sum over mini states b. sum over macro states
   c. sum over microstates d. Ensemble

5. Fermion will have spin CO3K2
   a. 1/2 b.1
   c.1/4 d.1/8

6. Statistical behaviour of a thermodynamic system was described by CO3K4
   a. Boltzman b. Fermi
   c. Gauss d. Bose

7. Chemical potential is partial molar CO4K2
   a. Gibb's free energy b. kinetic energy
   c. potential energy d. shell

8. Anti particle of electron is CO4K1
   a. positron b. meson
   c. muon d. neutrino

9. Specific heat of a mole of solid elements is CO5K2
   a. 3R b. 2E
   c.1d d. 2R

10. What are the three parts of a phase diagram? CO5K3
    a. solid b. liquid
    c. Gas d. solid, liquid, gas

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a.	Discuss about Gibbs - Duhem relation for entropy.	CO1K2
	(or)	
11.b.	Compare micro and macro states in quantum systems.	CO1K2
12.a.	Validate correct formula for entropy.	CO2K6
	(or)	
12.b.	Establish the relation for one orbital partition function.	CO2K2
13.a.	Give examples for thermodynamic quantities.	CO3K2
	(or)	
13.b.	Examine the classical limit.	CO3K3
14.a.	Assess the pressure and density of bosons.	CO1K5
	(or)	
14.b.	Generalise mass less Fermi gas at any temperature.	CO1K2
15.a.	Interpret heat capacities of metals.	CO1K2
	(or)	
15.b.	Focuss on the phase diagrams for pure system.	CO1K4

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a.	i) Analyse Euler relation, densities	CO1K4
	ii) Deduce Maxwell's thermodynamical relations	CO1K2
	(or)	
16.b.	Disucss about: i. Microstate and macrostate in quantum systems	CO1K4
	ii. Denstity of states	CO1K2
17.a.	State and prove Equi partition and Viral theorem.	CO2K2
	(or)	
17.b.	Correlate grand canonical and canonical partition function.	CO2K4
18.a.	Explain – Bolltzmann distribution law for microstates in a classical gas.	CO3K3
	(or)	
18.b.	Derive Boltzmann equation for change of states without collisions.	CO3K2
19.a.	Associate black body radiations and Planck' distribution law.	CO4K2
	(or)	
19.b.	Express thermodynamic relations for noninteracting Fermi gas.	CO4K5
20.a.	Enumerate Debye's theory for specific heats.	CO5K1
	(or)	
20.b.	Express ideas on one dimensional using model and arrive at a solution by variational method.	CO1K4

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