**Reg. No. \_\_\_\_\_\_\_\_**

**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination - June 2011**

**Subject Title: THERMODYNAMICS AND STATISTICAL MECHANICS Time: 3 hours**

**Subject Code: 10PH203 Maximum Marks: 100**

#### **Answer ALL questions**

**PART – A (10 x 1 = 10 MARKS)**

1. Write down the unit of entropy

2. What is the major limitation of first Law of Thermodynamics?

3. Does the value of probability of an event be negative?

4. When will the probability be one?

5. How many dimensions does the phase space possess?

6. How many degrees of freedom exist on a system comprising N gas molecules?

7. What is the source of correction factor given in the van der waals equation.

8. How does the second virial co-efficient vary with temperature?

9. According to which statistics the energy at absolute Zero can not be Zero.

10. What is the spin of photon?

**PART – B (5 x 3 = 15 MARKS)**

11. What are intensive variables? Give two examples.

12. Define clearly the probability of Macrostate.

13. What do you mean by canonical ensemble? What type of system seeks the same?

14. Distinguish the key difference between ideal and real gas.

15. How does F.D. statistics differ from B.E., Statistics?

**PART – C (5 x 15 = 75 MARKS)**

16. a. What is internal energy of a system? Explain the fact that internal energy is s state function and not a path function. (9)

b. State and explain the first Law of thermodynamics. Give its physical significance. Also, point out its limitation. (6)

(OR)

17. a. Use Maxwells relations to obtain Cp – Cv = R, for an ideal gas. (8)

b. What are the four thermodynamic potentials? Deduce the second maxwells thermodynamical (F) relation. (7)

18. a. Explain the additive Law and Multiplication rule of probability. (10)

b. State and explain the static and dynamic system. (5)

(OR)

19. What are micro and macro states? Discuss the Life time of macro and micro state.

20. a. Explain the terms: Phase space, mu-space, degrees of freedom. (9)

b. Write down the fundamental postulates of statistical mechanics. (6)

(OR)

[P.T.O]

21. Write short notes on:

a. Partition function (6)

b. Relation between partition function and gibbs potential and specific heat at constant volume (9)

22. Deduce the van der waals equation for non-ideal gas.

(OR)

23. Discuss critically the equation of state & virial co-efficient.

24. Derive the Maxwells – Boltzmann’s distribution Law and hence show that

n (E)d E = E½ exp (-E/KT)dE.

(OR)

25. Write short notes on :

a. Photon gas b. Planck radiation Law (5+5)

c. A system consists of 5 particles arranged in two compartments. The first compartment is divided into 6 cells and the second into 8 cells. The cells are identical in size. Calculate the number of microstates in the macrostate (2,3), if the particles obey F-D statistics. (5)