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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **15PH3003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STATISTICAL MECHANICS AND THERMODYNAMICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Discuss the different laws of thermodynamics and its significance. | CO-1 | 20 |
| (OR) | | | | |
| 2. | a. | Derive the Clausius- clapeyron’s Equation (First latent heat equation) using the Maxwells II thermodynamical relation. | CO-1 | 10 |
| b. | What is the effect of Clausius- clapeyron’s Equation on the boiling point of liquid? | CO-1 | 5 |
| c. | What is the effect of Clausius- clapeyron’s Equation on the melting point of a solid? | CO-1 | 5 |
| 3. | a. | What you meant by ensemble? | CO-2 | 2 |
|  | b. | Write a note on canonical ensemble. | CO-2 | 6 |
|  | c. | Write a note on microcanonical ensemble. | CO-2 | 6 |
|  | d. | Write a note on grand canonical ensemble. | CO-2 | 6 |
| (OR) | | | | |
| 4. |  | Define and derive Bose-Einsteins energy distribution function. | CO-3 | 20 |
| 5. | a. | What is meant by thermodynamic probability of macrostate? How it is related to probability of occurrence of that state. (P∞ W) | CO-2 | 10 |
|  | b. | A container has 6 black and 3 white balls. What is the probability that on two successive draws, the balls drawn are both black? | CO-2 | 5 |
|  | c. | Calculate the probability that in tossing a coin 10 times, we get all heads | CO-2 | 5 |
| (OR) | | | | |
| 6. | a. | Consider a phase space representing a single particle of mass “m” in a volume “V”. Calculate the number of phase cells in energy range from 0 to E. | CO-2 | 15 |
|  | b. | What is Boltzmann – Entropy relation? | CO-3 | 5 |
| 7. | a. | For a single particle of mass “m” enclosed in volume “V”, show that the number of accessible microstates in the energy range E to E + dE is given by  Ω (E) =  where phase space is divided by the rule δpi.δqi = h | CO-3 | 10 |
|  | b. | Write a note on Density of Quantum states of energy of a particle | CO-3 | 10 |
| (OR) | | | | |
| 8. | a. | Define degrees of freedom. | CO-3 | 3 |
|  | b. | What is meant by position and momentum space? | CO-3 | 5 |
|  | c. | Define phase space and explain the types of phase space. | CO-3 | 12 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Give the basic postulates of Fermi-Dirac Distribution Law. | CO-3 | 5 |
|  | b. | Derive the F-D energy distribution function using the concept of most probable microstate. | CO-3 | 15 |

ALL THE BEST