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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17PH3002** | **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. | a. | Deduce Maxwells I and II relations from the first and second laws of thermodynamics. | CO1 | 15 |
| b. | Define thermodynamic potentials. | CO1 | 5 |
| **(OR)** | | | | |
| 2. |  | Obtain Gibbs-Helmholtz relation used in calculating Gibbs free energy of a system as a function of temperature. | CO2 | 20 |
|  |  |  |  |  |
| 3. | a. | Define phase space. | CO2 | 5 |
| b. | Classify microcanonical, canonical and grand cananonical ensembles with suitable examples. | CO2 | 15 |
| **(OR)** | | | | |
| 4. | a. | Briefly explain about Equal apriori probability theorem. | CO3 | 5 |
| b. | List the difference between statistical and thermodynamic probability. | CO3 | 5 |
| c. | Write the relationship between the probability and thermodynamic probability of a macrostate. | CO3 | 5 |
| d. | Comment on the most probable macrostate of a system. | CO3 | 5 |
|  |  |  |  |  |
| 5. |  | Comment on the incompressible fluids and elaborate the theorem that controls the motion of phase points in phase space representing the dynamical system of collection of non-interacting system. | CO4 | 20 |
| **(OR)** | | | | |
| 6. |  | Discuss the Einsteins model for thermal characteristics of a solid using quantum theory of radiation that could better explain the variation of specific heat and atomic heat with temperature. | CO4 | 20 |
|  |  |  |  |  |
| 7. | a. | Sum up the three different statistical methods or theories in statistical mechanics that are employed to explain the distribution of different types of particles. | CO5 | 15 |
| b. | Mention three important probability theorems that are used in statistical thermodynamics. | CO5 | 5 |
| **(OR)** | | | | |
| 8. |  | Find the distribution of ni Fermions out of the total n Fermions in gi cells of the ith compartment by choosing the appropriate distribution law. | CO5 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Differentiate between the first and second order phase transitions in detail with examples. | CO6 | 20 |