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

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**End Semester Examination – Nov/Dec – 2018**

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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. | Explain Gibb’s – Helmholtz relation to calculate the Gibbs energy of a system as a function of temperature. | CO1 | 16 |
| b. | When an ideal gas expand isothermally with an energy loss of 2740 cal, find the change in Gibbs free energy where the change in enthalpy is zero. | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Deduce Maxwells first two thermodynamic relations. | CO1 | 16 |
| b. | For the reaction Hg + ½ Cl2 🡪1/2 Hg2Cl2 + 31300 cal at 25 oC, the available energy for useful work was 25,140 cal as per the II law of thermodynamics. Calculate the change in entropy of the above system. | CO1 | 4 |
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| 3. | a. | Distinguish between the gamma space and mu-space. | CO2 | 10 |
| b. | Classify canonical and microcanonical systems. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Define Equal a priori probability with examples. | CO2 | 10 |
| b. | Apply Equal a priori probability theorem for two systems in thermal contact with each other and find the condition for equilibrium. | CO2 | 10 |
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| 5. |  | Interpret the ideal monoatomic gas equation in terms of partition function. | CO3 | 20 |
| (OR) | | | | |
| 6. |  | Describe the paradox that allows for the entropy of closed systems to decrease, violating the second law of thermodynamics. | CO3 | 20 |
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| 7. | a. | Define Fermions with examples and derive the Fermi Dirac Statistics. | CO4 | 16 |
| b. | Calculate the number of ways in which 3 particles could be distributed in 4 energy states according to the F-D statistics. | CO4 | 4 |
| (OR) | | | | |
| 8. | a. | Discuss about bosons and hence derive the Bose Einstein Statistics. | CO5 | 16 |
| b. | Calculate the number of ways in which 2 particles could be distributed in 3 energy states according to the B-E statistics. | CO5 | 4 |
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|  | | **Compulsory**: |  |  |
| 9. |  | Classify the types of phase transition with emphasis on ferromagnetism. | CO6 | 20 |