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

****

**End Semester Examination – Nov/Dec – 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17PH3002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STATISTICAL MECHANICS AND THERMODYNAMICS** | **Max. marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Give examples for thermodynamic potentials and derive the first two Maxwell’s thermodynamic relations. | CO2 | 20 |
| (OR) | | | | |
| 2. | a. | Define different statements under II law of thermodynamics and explain its significance. | CO2 | 15 |
| b. | An inventor claims to have developed an engine which has an efficiency of 52 % and works between 600 K and 300 K. Comment on his claim. | CO4 | 5 |
|  |  |  |  |  |
| 3. |  | For a free particle of mass “m” moving in a volume V, calculate the number of phase cells in the energy range (i) 0 to E and (ii) E to E+dE. | CO4 | 20 |
| (OR) | | | | |
| 4. | a. | Explain the concept of cell in distributing ‘n’ distinguishable particles in ‘k’ compartment’s of unequal size. | CO4 | 15 |
|  | 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? | CO4 | 5 |
|  |  |  |  |  |
| 5. |  | Discuss on how the limitations of Einstein’s theory of specific heat is overcome by Debye’s theory of specific heat of solids. | CO6 | 20 |
| (OR) | | | | |
| 6. | a. | Define and derive Equipartition theorem to prove E=1/2 kT. | CO3 | 15 |
|  | b. | We throw a dice twice and get two numbers. What is the probability that these numbers are 6 and 4 precisely in that order? | CO3 | 5 |
|  |  |  |  |  |
| 7. |  | What are Fermions? Derive the Fermi-Dirac distribution law. | CO5 | 20 |
| (OR) | | | | |
| 8. |  | Give the basic postulates of M-B statistic and derive the M-B distribution law. | CO5 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Write a short note on first and second order phase transition. | CO3 | 10 |
|  | b. | Discuss the second order phase transitions in case of ferromagnetism. | CO3 | 10 |

**ALL THE BEST**