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 – May – 2017**

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| **Code :** | **16CH2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ATOMIC STRUCTURE, THERMODYNAMICS, AND ELECTROCHEMISTRY** | **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 the Bohr’s atomic model with a neat diagram? | CO1 | 8 |
| b. | If the mass of an electron is 10-27 kg and the uncertainty in position is equal to 10-11 m, find the uncertainty in velocity. | CO1 | 4 |
| c. | Discuss quantum numbers. | CO1 | 8 |
| (OR) | | | | |
| 2. | a. | Describe the experiment for demonstrating the particle nature of radiation. Mention the colclusions derived from the experiment. | CO1 | 8 |
| b. | Write short notes on: i) Quantum Theory of Radiation  ii) Photoelectric effect | CO1 | 2x6 |
| 3. | a. | Briefly explain Daniell cell. | CO2 | 6 |
|  | b. | Define (i) electrolysis and (ii) equivalent conductance. | CO2 | 6 |
|  | c. | Explain the applications of the measurement of electrode potential. | CO2 | 8 |
| (OR) | | | | |
| 4. | a. | Give the statement of the Faradays first law of electrolysis. | CO2 | 4 |
|  | b | Define Kohlrausch’s law. Explain the applications of Kohlrausch’s law. | CO2 | 8 |
|  | c | Derive Nernst equation for electrode potential. | CO2 | 8 |
| 5. | a. | What is chemical equilibrium? Show that the value of chemical potential is the same in every phase of a system in equilibrium at constant T and P. | CO3 | 10 |
|  | b. | Mention any three advantages of phase rule. | CO3 | 6 |
|  | c. | Define: thermal equilibrium. | CO3 | 4 |
| (OR) | | | | |
| 6. | a. | Explain with a neat phase diagram the water system. | CO3 | 10 |
|  | b. | Write the number of phases and components in the following equilibria:   1. CaCO3 (s) ⇆ CaO (s) + CO2 (g) 2. NH4Cl (l) ⇆ NH3 (s) + HCl (l) | CO3 | 10 |
| 7. | a. | Give the statements of the first law of thermodynamics. | CO2 | 4 |
|  | b. | A gas starts with 200 J of internal energy. While you add 180 J of heat to the gas, the gas does 70 J of work. What is the final internal energy of the gas? | CO2 | 8 |
|  | c. | Derive the general expression for Maxwell’s thermodynamic relations. | CO2 | 8 |
| (OR) | | | | |
| 8. | a. | Give the statements of the second law of thermodynamics. | CO2 | 4 |
|  | b. | Explain the reasons why the second law of thermodynamics was needed to be introduced. | CO2 | 10 |
|  | c. | Define Cp and Cv. | CO2 | 6 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Derve the law of mass action from chemical potential. | CO3 | 10 |
|  | b. | Derive Van’t Hoff reaction isotherm. | CO3 | 10 |

ALL THE BEST