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| **University of Kerala** | | |
| Discipline: CHEMISTRY |  | Time: 1 Hour 30 Minutes (90 Mins.) |
| Course Code: UK1DSCCHE101 |  | Total Marks: 42 |
| Course Title: FUNDAMENTALS OF CHEMISTRY I |  |  |
| Type of Course: DSC |  |  |
| Semester: 1 |  |  |
| Academic Level: 100-199 |  |  |
| Total Credit: 4, Theory: 3 Credit |  |  |

**Part A.**

**6 Marks. Time: 6 Minutes**

**Objective Type. 1 Mark Each. Answer All Questions**

**(Cognitive Level: Remember/Understand)**

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| **Qn.**  **No.** | **Question** | **Cognitive**  **Level** | **Course Outcome (CO)** |
| 1. | The quantum number n=3, l=1 corresponds to …………orbital | Remember | CO-1 |
| 2. | According to Mulliken’s approach, how is electronegativity calculated? | Remember | CO-2,3 |
| 3. | What do you mean by entropy of a system? | Understand | CO-4 |
| 4. | Define molarity. | Understand | CO-5,6 |
| 5. | Sketch dx2-y2 orbital. | Understand | CO-1 |
| 6. | Explain why chromium (Cr) has the unusual electron configuration. | Understand | CO-1 |

**Part B.**

**8 Marks. Time: 24 Minutes**

**Short Answer. 2 Marks Each. Answer All Questions**

**(Cognitive Level: Understand/Apply)**

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| **Qn.**  **No.** | **Question** | **Cognitive Level** | **Course Outcome (CO)** |
| 7. | Predict the hybridization and geometry of xenon in xenon tetrafluoride (XeF4) using VSEPR theory. | Understand | CO-2,3 |
| 8. | What is the significance of bond dissociation energies in determining the stability of molecules? | Understand | CO-4 |
| 9. | State Hund's rule of maximum multiplicity. Apply the rule to show the electronic configuration of nitrogen and fluorine atom | Apply | CO-1 |
| 10. | Methyl orange is not a suitable indicator for the titration of weak acid against strong base. Why? | Apply | CO-5,6 |

**Part C.**

**28 Marks. Time: 60 Minutes**

**Long Answer. 7 marks each.**

**Answer all 4 Questions, choosing among options within each question.**

**(Cognitive Level: Understand/Apply/Analyze)**

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| **Qn. No.** | **Question** | **Cognitive Level** | **Course Outcome (CO)** |
| 11. | a. Define ionisation energy and discuss its trend along a period and group in the periodic table. Explain why the first ionisation potential of nitrogen is higher than that of carbon and oxygen.  OR  b. Sketch s, p and d orbitals. Also discuss the filling of orbitals in the ground state using Aufbau principle. | Understand | CO-1 |
| 12. | a. Predict the dipole moment of CO2 and H2O. Justify your explanation.  OR  b. Appling the concept of hybridization, predict the geometry and shape of CH4, NH3 and H2O molecules. | Apply | CO-2,3 |
| 13. | a. Calculate the enthalpy of formation of formation of benzene represented by the following reaction;  6C (s) + 3H2 (g)→C6H6 (l), the standard enthalpy of benzene is -3266.0 kJ and the standard enthalpies of formation of CO2 (g) and H2O (l) are -393.1 and -286.0 kJ respectively.  OR  b. Derive an expression for the variation of heat of reaction with temperature. | Apply | CO-4 |
| 14. | a. Analyse the titration curves for the titration of  (i) a strong acid with a strong base  (ii) a weak acid with a strong base  OR  b. Analyse the principle and application of thin layer chromatography | Analyze | CO-5,6 |