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| **University of Kerala** | | |
| Discipline: CHEMISTRY |  | Time: 1 Hour 30 Minutes (90 Mins.) |
| Course Code: UK1DSCCHE102 |  | Total Marks: 42 |
| Course Title: CHEMICAL FRONTIERS – BONDING TO ENVIRONMENTAL PERSPECTIVES |  |  |
| 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. | What is the general electronic configuration of s- block elements? | Remember | CO-1 |
| 2. | What will be the geometry of a molecule with four bonding pairs and no lone pairs on the central atom? | Remember | CO-2,3 |
| 3. | Which organometallic compound has been linked to Minamata disease due to environmental pollution? | Understand | CO-4 |
| 4. | What do you mean by a standard solution? | Understand | CO-5,6,7 |
| 5. | What is the effect of carbon monoxide on human health? | Understand | CO-5,6,7 |
| 6. | Name two major causes of air pollution. | Understand | CO-5,6,7 |

**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. | How does ionization energy vary along a period and Group | Understand | CO-1 |
| 8. | Explain how organomercury and organoarsenic compounds differ in their biological effects and environmental impact. | Understand | CO-4 |
| 9. | Although the geometries of NH3 and H2O molecules are distorted tetrahedral, bond angle in water is less than that in ammonia. Why? | Apply | CO-2,3 |
| 10. | Find the molarity of a solution of H2SO4 having 4.9g of it dissolved in 500 mL of solution? | Apply | CO-5,6,7 |

**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 electronegativity and electron affinity. How does it vary along a period and down a group. Explain with examples.  OR  b. Using energy sequence rule,  (i) write down the ground state electronic configuration of Cr. Why is the configuration you have written more preferred? (2 marks)  (ii) State the rules behind the electronic configuration of an atom? (3 marks)  (iii) Write the four quantum numbers for 3d orbital of Cr? (2 marks) | Understand | CO-1 |
| 12. | a. Outline the applications of organometallics in agriculture and horticulture.  OR  b. Discuss the biological and environmental aspects of organometallic compounds. | Understand | CO-4 |
| 13. | a. Why energies levels of MOs for B2, C2 and N2 are different?  OR  b. Explain the concept of hybridization, detailing the characteristics of sp, sp², sp³, dsp², dsp³, sp³d², and sp³d³ hybridizations, along with examples for each type. | Apply | CO-2,3 |
| 14. | a. Analyze the differences in redox titration methods, specifically permanganometry and dichrometry, in terms of their applications, mechanisms, and the significance of endpoint detection.  OR  b. (i). For your agricultural field or garden, you have developed a compost producing pit. Discuss the process in the light of bad odour, flies and recycling of wastes for good produce. (3 marks)  (ii). What would have happened if the greenhouse gases were totally missing in the earth’s atmosphere? Discuss. (4 marks) | Analyze | CO-5,6,7 |