Reg. No.: .....

Name:.....

U7501

**University of Kerala**
First Semester Degree Examination, November 2024
Four Year Under Graduate Programme
Discipline Specific Core Course
CHEMISTRY
UK1DSCCHE102 - CHEMICAL FRONTIERS – BONDING TO ENVIRONMENTAL PERSPECTIVES
Academic Level: 100-199

**Time: 1½ Hours** **Max.Marks: 42**

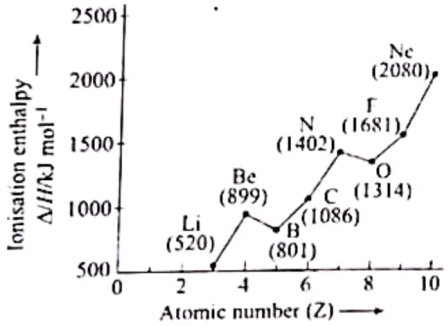
**Part A.**
**Answer All Questions, Objective Type. 1 Mark Each.**
**(Cognitive Level: Remember/Understand)**
**6 Marks. Time: 6 Minutes**

| Qn. No. | Question | Cognitive Level | Course Outcome (CO) |
|---|---|---|---|
| 1. | Which quantum number specifies the energy level of an electron in an atom? | Remember | CO-1 |
| 2. | Which will be more stable-$O_2$ or $O_2^+$? | Remember | CO-2,3 |
| 3. | Give two examples of organo mercury compounds in medicine. | Understand | CO-4 |
| 4. | Name a gas responsible for greenhouse effect. | Understand | CO-5,6,7 |
| 5. | Suggest an internal indicator for dichrometric titrations. | Understand | CO-5,6,7 |
| 6. | What is BOD? | Understand | CO-5,6,7 |

**Part B.**
**Answer All Questions, Short Answer. 2 Marks Each.**
**(Cognitive Level: Understand/Apply)**
**8 Marks. Time: 24 Minutes**

| Qn. No. | Question | Cognitive Level | Course Outcome (CO) |
|---|---|---|---|
| 7. | How do the magnetic quantum number ($m_l$) and the angular momentum quantum number (l) relate to orbitals? | Understand | CO-1 |
| 8. | Organoboron compounds find application in cancer therapy. Why? | Understand | CO-4 |
| 9. | Although the hybridization of central atom of $NH_3$ and $CH_4$ molecules are same, bond angle in ammonia is less than that in methane. Why? | Apply | CO-2,3 |
| 10. | Calculate the normality of 10% solution of NaOH. | Apply | CO-5,6,7 |

**Part C.**
**Answer all 4 Questions, choosing among options within each question.**
**Long Answer. 7 marks each. (Cognitive Level: Understand/Apply/Analyze)**
**28 Marks. Time: 60 Minutes**

| Qn. No. | Question | Cognitive Level | Course Outcome (CO) |
|---|---|---|---|
| 11. | a. (i) Using energy sequence rule, write down the ground state electronic configuration of Cu (Z=29). Why is the configuration you have written more preferred? (2 marks)<br><br>(ii) State the rules behind the electronic configuration of an atom. (3 marks)<br><br>(iii) Write the four quantum numbers for 3d orbital of Cu. (2 marks)<br><br>OR<br><br>b. Explain how ionization enthalpy vary across a period in a periodic table. Discuss the trend using the elements of second period as example.<br>  <br> | Understand | CO-1 |
| 12. | a. Outline the applications of organometallics in agriculture and horticulture.<br><br>OR<br><br>b. i) What will be the products when acetaldehyde reacts with ethyl magnesium bromide? (3 marks)<br><br>ii) Illustrate the properties of the organometallic compounds. (4 marks) | Understand | CO-4 |
| 13. | a. Apply the principles of molecular orbital theory to construct and compare the molecular orbital diagrams of $O_2$ and CO, and analyze how differences in electronegativity affect the shape and energy levels of their molecular orbitals. | Apply | CO-2,3 |

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|---|---|---|---|
| | OR<br><br>b. Apply your understanding of molecular geometry and dipole moments to compare polar and nonpolar molecules, using $NH_3$ and $CO_2$ as specific examples. How do their geometries and dipole moments determine their polarity? | | |
| 14. | a. Analyze the role of indicators in acid-base titrations, theory of indicators and how they are used to determine the endpoint of a titration.<br><br>OR<br><br>b. Analyze different methods for the treatment of industrial waste water. | Analyze | CO-5,6,7 |