

## FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2015

(CUCBCSS—UG)

Complementary Course

CHE 1C 01—GENERAL CHEMISTRY

Time : Three Hours

Maximum : 64 Marks

## Section A (One Word/Sentence)

*Answer all questions.**Each question carries 1 mark.*

1. The weight of oxalic acid ( $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ ) required to prepare two litres of 0.05 N solution is \_\_\_\_\_
2. The equivalent weight of  $\text{K}_2\text{Cr}_2\text{O}_7$  is \_\_\_\_\_
3. 0.100 mole of NaCl is dissolved in 180 grams of pure  $\text{H}_2\text{O}$ . The mole fraction of NaCl in the solution is \_\_\_\_\_
4. According to Bronsted-Lowry concept acids are \_\_\_\_\_ donors.
5. Haemoglobin is a \_\_\_\_\_ protein.
6. Name the metal ion other than magnesium that is involved in photosynthesis.
7. Which is more polar HF or HCl ?
8.  $\text{KMnO}_4$  is a powerful \_\_\_\_\_ agent.
9. A subshell with  $n = 6$  and  $l = 3$  is designated as \_\_\_\_\_
10. \_\_\_\_\_ are the elements having the same number of neutrons.

(10 x 1 = 10 marks)

## Section B (Short Answers)

*Answer any seven questions.**Each question carries 2 marks.*

11. Calculate the approximate volume at STP of : (i) 8 gram  $\text{O}_2$  and (ii)  $6.02 \times 10^{20}$  molecules of  $\text{CO}_2$ .
12. What is meant by atomic radius ? How do the atomic radii of elements vary when we move (i) down the group ; and (ii) across a period.
13. Differentiate between molarity and molality.
14. Mention any *two* advantages of double burette titration method.

Turn over

15. **Classify the following as acid-base, redox and complexometric indicators :**  
**(a) Phenolphthalein ; (b) Eriochrome black-T ; (c) Diphenylamine ; and (d) Methyl Red.**
16. **Differentiate between accuracy and precision.**
17. **H<sub>2</sub>O is a liquid while H<sub>2</sub>S is a gas. Why ?**
18. **Write down the Schrödinger wave equation. Explain the terms involved.**
19. **State Soddy's Group displacement law.**
20. **Explain how the mass defect and binding energy of a nucleus are related ?**

**(7 x 2 = 14 marks)**

### **Section C (Paragraphs)**

*Answer any **four** questions.  
 Each question carries **5** marks.*

21. **What is electronegativity ? Discuss Pauling's scale of electronegativity.**
22. **Define ionisation energy. What are the factors affecting the ionisation enthalpy of an element ?**
23. **Explain Lewis concept of acids and bases. Which of the following can act as Lewis acids ?**  
**(a) H<sub>2</sub>O ; (b) AlCl<sub>3</sub> ; (c) SO<sub>2</sub> ; (d) OH e (e) CO<sub>2</sub> ; (f) Ag<sup>+</sup>.**
24. **State VSEPR theory and predict the geometry of BF<sub>3</sub> and NH<sub>3</sub>.**
25. **What is radiocarbon dating ? A fresh piece of wood gives **16,100 counts of beta ray emission** per minute per kg and an old wooden bowl gives 13,200 counts per minute per kg. Calculate the age of the wooden bowl. The half life period of <sup>14</sup>C is 5,568 years.**
26. **Give an account of sodium potassium pump in biological systems.**

**(4 x 5 = 20 marks)**

### **Section D (Essays)**

*Answer any two questions.  
 Each question carries **10** marks.*

27. **Discuss the mechanism of the intake of oxygen by haemoglobin and myoglobin.**
28. (i) **What are quantum numbers ? How are they significant ?** (5 marks)  
 (ii) **Explain the working of a nuclear reactor.** (5 marks)
29. **Write briefly on common ion effect and solubility product. Explain the application of these qualitative analysis.**
30. (i) **Explain on the basis of MO theory as to why He<sub>2</sub><sup>+</sup> exists where as He<sub>2</sub> does not.** (4 marks)  
 (ii) **Sketch the MO diagram of O<sub>2</sub> molecule and compare the stability of O<sub>2</sub> with O<sub>2</sub><sup>2+</sup> and O<sub>2</sub><sup>2-</sup>**

**(6 mark**

**[2 x 10 = 20 marks]**