

Q.P. Code – 50623

First Year B.Sc. Degree Examination

SEPTEMBER/OCTOBER 2013

(Directorate of Distance Education)

(DSA 260) Paper I – CHEMISTRY

Time : 3 Hours]

[Max. Marks : 75/85

Instructions to Candidates :

- 1) *The question paper contains five Sections. Answer all Sections.*
- 2) *Section A contains **one** mark questions and should be answered in the first **two** pages of the main answer book. The questions of Section A answered in any other part of the answer book **will not** be valued.*
- 3) *Write equations and neat diagrams **wherever** necessary.*
- 4) *Section-E is **compulsory** for **85** marks scheme **only**.*

SECTION – A

Answer **ALL** the following in a word, a phrase or in a sentence : **10 × 1 = 10**

1. What are nucleophiles?
2. Write the structural formula of 2, 4 – dimethyl-2-pentene.
3. Define ebullioscopic constant of a solvent.
4. What are gels?
5. State Heisenberg's uncertainty principle.
6. Define electron affinity.
7. Which quantum number determines the shape of a orbital?
8. What are isotonic solutions?
9. Define critical pressure.
10. State Markownikoff's rule.

Q.P. Code – 50623

SECTION – B

Answer any **FIVE** of the following :

5 × 3 = 15

11. (a) Define critical solution temperature. **1**
(b) What are azeotropic mixtures? Give examples. **2**
12. (a) Define hybridization. **1**
(b) Predict the structure of formation of ethane on the basis of hybridization. **2**
13. (a) Write the functional groups present in aldehydes and ketones. **1**
(b) Give the mechanism of addition of water to acetylene. **2**
14. (a) Define gold number in colloids. **1**
(b) Explain Hardy and Schulze rule. **2**
15. Derive the relationship between relative lowering of vapour pressure and molar mass. **3**
16. Define ionic radius. Give reason; A cation is smaller while an anion is larger than parent atom. **3**
17. What are paints? Mention the constituents of paints, giving examples for each constituent. **3**

SECTION – C

Answer any **FIVE** of the following :

5 × 6 = 30

18. (a) What is a fuel? Why gaseous fuels are more advantageous than solid fuels? **4**
(b) Give the composition of Portland cement. Why gypsum is used in cement? **2**
19. (a) How do you prepare cycloalkanes from
(i) Freund's method
(ii) Dieckmann's condensation method. **4**
(b) Name any two hydrocarbon fuels. What is their main source? **2**

Q.P. Code – 50623

20. (a) Explain the critical solution temperature of Phenol-water system. What is the effect of impurity on the system? **4**
- (b) Write all possible values of quantum numbers l , m and s when $n = 2$. **2**
21. (a) The critical pressure and critical temperature of a gas obeying van der Waals equation have values 73 atm. and 37°C. Calculate constants 'a' and 'b'. The value of the gas constant, R is 0.082 atm. degree⁻¹. **4**
- (b) Explain any two applications of colloids. **2**
22. (a) Explain in how many ways can fission of covalent bond take place? **2**
- (b) How is an alkane prepared by Wurtz reaction? **2**
- (c) Define (i) reverse osmosis (ii) propellants. **2**
23. (a) Derive an expression for the determination of wave length of a moving particle. **2**
- (b) What is the difference between ortho hydrogen and para hydrogen? **2**
- (c) Write the general formula of alkynes and give the IUPAC name of the following alkyne. **2**
- $\text{CH}_3 - \text{CH}_2 - \text{C} \equiv \text{C} - \text{H}$
24. (a) State Nernst distribution law. Mention an application of the law. **2**
- (b) What is an adsorption isotherm? Write the equation for Freundlich adsorption isotherm and explain the terms. **2**
- (c) Give a brief account of Sasche-Mohr's theory of strainless rings. **2**

SECTION – D

Answer any **TWO** of the following :

2 × 10 = 20

25. (a) Define osmotic pressure Describe Berkley-Hartley's method of determining the osmotic pressure of a dilute solution. **4**
- (b) Discuss the diagonal relationship between Li and Mg. **3**
- (c) 0.5 g of a substance gave 0.324 g of AgCl in Carius estimation. Calculate the percentage of chlorine in the substance. Given the atomic mass of AgCl is 143.5 g/mol. **3**

Q.P. Code – 50623

26. (a) How is glass manufactured by tank furnace method? **4**
(b) Write a note on stability of carbocations. **3**
(c) Why do alkaline earth metals form bivalent ions though the second ionization energy is much higher than first ionization energy? **3**
27. (a) The freezing point depression of a solution of 0.684 g of cane sugar in 100 g of water is 0.037 K. Calculate the molal depression constant (K_f) of water. Given the molecular weight of cane sugar is 342. **4**
(b) Discuss any three factors which influence ionization energy. **3**
(c) Explain nitration of benzene with mechanism. **3**
28. (a) How does hydrogen bromide react with propane? Explain the mechanism of addition of HBr to propene in presence of peroxide. **4**
(b) Define electronegativity. How does electronegativity varies in case of alkaline earth metals on moving down the group? **3**
(c) Explain the electropositive character of alkali metals. **2**
(d) 'Beryllium and Magnesium do not impart any colour to Bunsen flame' Why is it so? **1**

SECTION – E

Answer any **ONE** of the following :

1 × 10 = 10

(Compulsory question for 85 marks scheme only)

29. (a) How is molar mass of a non volatile solute is determined by Walker-Lumsden method? **4**
(b) Explain the mechanism of SN^2 reaction with a suitable example. **3**
(c) Explain Mulliken's scale of electronegativity. **2**
(d) Define inversion temperature. **1**
30. (a) Describe the common varieties of glass with their composition and uses. **4**
(b) Calculate the root mean square velocity of nitrogen gas at N.T.P. Given atomic mass of Nitrogen is 14 and $R = 8.314 \times 10^7$ ergs/degree/mol. **3**
(c) Arrange the following in increasing order of flocculation value for a negative sol.
 $MgCl_2$, $Al_2(SO_4)_3$, Na_3PO_4 **2**
(d) State Pauli's exclusion principle. **1**