B.Sc. (Part—III) Semester—VI Examination

CHEMISTRY (Old) (Upto S/16)

Time—Three Hours] [Maximum Marks—80

1. (A) Fill in the blanks : 2

(i) Inorganic polymers having different elements in the chain backbone are called _____.

(ii) A titration in which equivalence point is determined by the measurement of electrode potential at different stages is called _____.

(iii) A group which does not act itself as chromophore but when attached to it shifts the absorption band towards longer wavelength is called _____.

(iv) The light of only one wavelength is known as _____.

(B) Select the correct alternative : 2

(i) The small simple chemical units from which the polymers are formed are known as :

(a) dimers

(b) monomers

(c) trimers

(d) none of these

(ii) When a substance absorbs blue colour, the complimentary colour transmitted by it is :

(a) red

(b) orange

(c) green

(d) yellow

(iii) The type of bending vibrations in which two atoms move up and down the plane with respect to central atom is called :

(a) scissoring

(b) rocking

(c) wagging

(d) twisting

(iv) The pH of a solution is defined by equation :

(a) $pH = [H^+]$

(b) $pH = [OH^-]$

(c) $pH = -\log_{10}[H^+]$

(d) $pH = \log_{10}[OH^-]$

(C) Answer in one sentence : 4

(i) Define electromagnetic spectrum.

(ii) What are metalloporphyrins ?

(iii) What is chemical shift ?

(iv) What do you mean by an exoergic nuclear reaction ?

UNIT—VI

12. (A) Discuss liquid drop model of nucleus. What are its advantages ? 4

(B) How is the pH of a solution determined by using hydrogen electrode ? 4

(C) Calculate the Q value of the following nuclear reaction :

$$^{27}_{13}Al + ^{4}_{2}He \rightarrow ^{30}_{14}Si + ^{1}_{1}H + Q$$

(Given : $^{27}_{13}Al = 26.9815$ amu, $^{4}_{2}He = 4.0026$ amu

$^{30}_{14}Si = 29.9738$ amu, $^{1}_{1}H = 1.0078$ amu)

State whether the reaction is endoergic or exoergic (1 amu = 931.5 MeV). 4

OR

13. (P) Describe acid-base type of potentiometric titration. 4

(Q) Give two applications of radioisotopes in each of the following :

(i) Industry

(ii) Agriculture. 4

(R) What are the advantages of quinhydrone electrode in the determination of pH of a solution ? 4

(R) 0.24 g of an organic compound gave 0.1628 g of silver iodide in carius experiment. Find the percentage of iodine.

(Given : Atomic weight of iodine = 127

Molecular weight of silver iodide = 235). 4

UNIT—V

10. (A) State and explain Stark-Einstein law of photochemical equivalence. 4

(B) Explain the terms :

(i) Intersystem Crossing (ISC)

(ii) Internal Conversion (IC). 4

(C) The optical density of a 0.003 M solution of a substance is 2 at 660 mμ using 1 cm cell. Calculate its extinction coefficient. 4

11. (P) Explain non-radiative process. 4

(Q) Define quantum yield. Give reasons for high quantum yield in photochemical reactions. 4

(R) Calculate the energy of one Einstein of a light of wavelength 3000 Å.

(Given : $N = 6.02 \times 10^{23}$, $h = 6.62 \times 10^{-34}$ Js and $C = 3 \times 10^{8}$ s^{-1}). 4

UNIT—I

2. (A) Define with example :

(i) Labile complexes

(ii) Inert complexes. 4

(B) What is paper chromatography ? Explain ascending paper chromatography. 4

(C) Differentiate between a colorimeter and a spectrophotometer. 4

OR

3. (P) Explain SN2 mechanism in square planar complexes involving entering ligand as nucleophile. 4

(Q) What is Rf value ? Give the factors affecting it. 4

(R) What is Beer-Lamberts law ? Give its mathematical expression. 4

UNIT—II

4. (A) What are metal carbonyls ? How are they classified ? 4

(B) What are silicones ? Give their applications. 4

(C) Explain the role of haemoglobin and myoglobin in oxygen transport process. 4

OR

5. (P) Give the reaction of trimer of phosphonitrilic chloride $(PNCl_2)_3$ with :

(i) water

(ii) ammonia. 4

(Q) Describe the role of Ca^{2+} ion in biological activities. 4

(R) Explain the structure of $Ni(CO)_4$ on the basis of valence bond theory. 4

UNIT—III

6. (A) Define with example :

(i) Bathochromic shift

(ii) Hypsochromic shift. 4

(B) Calculate the number of fundamental modes of vibration for following molecules :

(i) NO

(ii) H_2O. 4

(C) How will you purify naphthalene by sublimation ? 4

OR

7. (P) Explain with example :

(i) $\sigma - \sigma^*$ (sigma – sigma star) transitions

(ii) $\pi - \pi^*$ (pi – pi star) transitions. 4

(Q) How will you distinguish following compounds on the basis of IR spectroscopy — acetaldehyde and acetone ? 4

(R) How will you purify benzoic acid by crystallisation ? 4

UNIT—IV

8. (A) Define with example :

(i) Equivalent protons

(ii) Non-equivalent protons. 4

(B) Explain in brief the principle of mass spectrometry. 4

(C) Calculate m/c value for molecular ion of each of the following :

(i) $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$

(ii) C_6H_5-OH. 4

OR

9. (P) Explain the mass spectrum of ethanol. 4

(Q) How many peaks you will observe in the NMR spectrum of :

(i) CH_3-CH_3

(ii) $CH_3-CH_2-CH_3$. 4