

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

(C) Answer in one sentence : 4

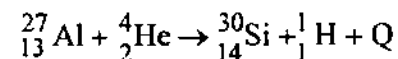
- (i) Define electromagnetic spectrum.
- (ii) What are metalloporphyrins ?
- (iii) What is chemical shift ?
- (iv) What do you mean by an exoergic nuclear reaction ?

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 :



(Given : ${}_{13}^{27}\text{Al} = 26.9815 \text{ amu}$, ${}_2^4\text{He} = 4.0026 \text{ amu}$

${}_{14}^{30}\text{Si} = 29.9738 \text{ amu}$, ${}_1^1\text{H} = 1.0078 \text{ amu}$)

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 m μ 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 R_f 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 $(\text{PNCl}_2)_3$ with :
- (i) water
- (ii) ammonia. 4
- (Q) Describe the role of Ca^{2+} ion in biological activities. 4
- (R) Explain the structure of $\text{Ni}(\text{CO})_4$ 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) $\text{CH}_3-\overset{\text{O}}{\underset{\text{||}}{\text{C}}}-\text{CH}_3$
- (ii) $\text{C}_6\text{H}_5-\text{OH}$. 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) $\text{CH}_3-\text{CH}_2-\text{CH}_3$. 4