AV–1815

B.Sc. (Part—III) Semester—VI Examination
6S : CHEMISTRY

Time : Three Hours]　　　　　　　　　　　　　　　　　　[Maximum Marks : 80

N.B. :— (1) All questions are compulsory.

(2) Question No. 1 carries 8 marks while each of remaining questions carries 12 marks.

(3) Draw diagrams and write equations wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :

(i) The geometry of $Fe(CN)_6$ is _____.

(ii) The central metal ion present in Hemoglobin is _____.

(iii) CH_3CH_2OH shows _____ nmr signals in nmr spectrum.

(iv) $- Log_{10}[H^+]$ is known as _____.　　　　　½×4=2

(B) Select the correct alternative :

(i) CH_4 molecule shows _____ electronic transition.

(a) $\sigma \rightarrow \sigma^*$ 　　　　　　　(b) $n \rightarrow \sigma^*$

(c) $\pi \rightarrow \pi^*$ 　　　　　　　(d) $n \rightarrow \pi^*$

(ii) Energy change associated with a nuclear reaction is defined as _____ value of that reaction.

(a) Q 　　　　　　　　　　(b) R

(c) Electronic 　　　　　　　(d) $\in$

(iii) The emission of Electron from metal surface when light of suitable wavelength falls on it is known as _____ effect.

(a) Photoelectric Effect 　　　　(b) Compton Effect

(c) Threshold Frequency 　　　　(d) None of the above

(iv) In muscles myoglobin has _____ oxygen storing capacity than hemoglobin.

(a) More 　　　　　　　　(b) Less

(c) Equal 　　　　　　　　(d) None of the above　　　½×4=2

(C) Answer in one sentence each :

(i) Define Fission yield.

(ii) Define chromatography.

(iii) Give the range of fingerprint region in IR Spectroscopy.

(iv) What is base peak ?　　　　　　　　　　　　　1×4=4

UNIT—I

2. (A) What are labile and inert complexes ? How does charge on metal ion affect the lability of complexes ?   2+2=4

    (B) Give the statement of Beer's Law. What are its limitations ?   1+3=4

    (C) Distinguish between ascending and descending paper chromatography.   4

OR

3. (P) Discuss S_N^2 mechanism in octahedral complexes.   4

    (Q) Explain the following terms :

        (i) λ_{max}

        (ii) Calibration curve.   2+2

    (R) Illustrate the principle of differential migration of ions in paper chromatography.   4

UNIT—II

4. (A) What are metal carbonyls ? Explain the V.B. structure of $Cr(CO)_6$.   4

    (B) Give the applications of silicone polymers.   4

    (C) Explain the role of Mg^{2+} ions in metabolic activity.   4

OR

5. (P) Give evidences in support of multiple nature of M–C bond in metal carbonyls.   4

    (Q) Explain the structure of $(PNCl_2)_3$.   4

    (R) What is the role of Hemoglobin in oxygen transport ? Explain.   4
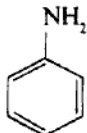
UNIT—III

6. (A) Explain hyperchromic and hypsochromic shifts with suitable example.   4

    (B) Describe types of vibrational modes in IR Spectroscopy.   4

    (C) What types of vibrational modes are expected in H_2O molecule ? Discuss its spectrum.   4

OR

7. (P) What type of electronic transitions are possible for the following :

        (i) CH_3CH_2Cl

        (ii) $CH_3\overset{O}{\overset{\|}{C}} - H$

        (iii) $CH_3 - CH_3$

        (iv) $CH_3 - NH_2$ 4

    (Q) Differentiate between following pairs on the basis of IR Spectroscopy :

        (i) CH_3CH_2Br and CH_3CH_2OH

        (ii) CH_3COCH_3 and CH_3CONH_2 4

    (R) Define :

        (i) Chromophore

        (ii) Bathochromic shift.   4

UNIT—IV

8. (A) Explain the terms :

    (i) Spin-Spin splitting

    (ii) Equivalent and nonequivalent protons.   4

  (B) Describe mass spectrum of neopentane.   4

  (C) How many signals are observed in NMR spectrum of the following molecules under low resolution :

    (i) $CH_3 - O - CH_2 - CH_3$

    (ii)

    4

OR

9. (P) Explain the terms :

    (i) Metastable peak

    (ii) Coupling constant (J-Value)   4

  (Q) Calculate m/e values for the following ions :

    (i) $[C_6H_5]^{\cdot}$

    (ii) $[CH_3COOH]^{\cdot}$ 4

  (R) Differentiate the following pairs on the basis of NMR :

    (i) CH_3CHO and CH_3CH_2COOH

    (ii) $CH_3CH_2NH_2$ and CH_3CONH_2 4

UNIT—V

10. (A) Define the following :

    (i) Atomic Orbital

    (ii) Threshold frequency. $2\times2=4$

  (B) State and explain compton effect.   4

  (C) Derive deBroglie's equation.   4

OR

11. (P) For one dimensional box derive the equation $En = \dfrac{n^2 - h^2}{8ma^2}$.   4

  (Q) Explain Planck's quantum theory.   4

  (R) A particle having wavelength 6.6×10^{-6} m is moving with velocity $10^4 ms^{-1}$. Find the mass of the particle. ($h = 6.626 \times 10^{-34} Js$)   4

UNIT—VI

12. (A) Explain how the pH is determined by using Quinhydrone electrode.   4

(B) Define :

    (i) Magic number

    (ii) Nuclear force.   2×2=4

(C) Explain fission yield and fission yield curve.   4

OR

13. (P) Give the application of radioactive isotopes in (i) Agriculture (ii) Medicine.   2×2=4

(Q) How pH of solution is determined by glass electrode ?   4

(R) Explain the Nuclear force on the basis of Mesons theory.   4