AR – 607

Sixth Semester B. Sc. (Part – III) Examination

(New)

6S CHEMISTRY

P. Pages : 8

Time : Three Hours] [Max. Marks : 80

Note : (1) All questions are compulsory.
(2) Question No. **1** carries **8** marks while each of the remaining questions carry **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 wavelength of which there is maximum absorption is denoted by ————.

(ii) In a typical mass spectrum, the highest peak is called as ————.

(iii) The principle of paper chromatography is based on ————.

(iv) Calomel electrode is an example of ————. 2

(B) Select the correct alternative :—

(i) An IR spectrum shows a strong absorption band at 1715 cm^{-1}, the functional group likely to be present is

(a) $-CH=CH-$

(b) $-\overset{\overset{O}{\|}}{C}-$

(c) $-NH_2$

(d) $-NO_2$

(ii) The following reaction is an example of

$${}^{''}_{5}Be + {}^{'}_{1}H \longrightarrow {}^{''}_{6}C + {}^{'}_{0}n$$

(a) (p, α) (b) (p, n)

(c) (p, γ) (d) (d, α).

(iii) The geometry of $Fe(CO)_5$ is

(a) linear (b) Tetrahedral

(c) Trigonal bipyramidal

(d) Octahedral

(iv) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ will show how many signals in NMR spectrum.

(a) Three (b) Two

(c) one (d) six 2

(C) Answer in **one** sentence :—

(i) What is meant by RF value ?

(ii) Define the term Fusion reaction.

(iii) What is meant by finger print region of IR ?

(iv) State Beer Lambert's Law. 4

UNIT I

2. (A) Discuss SN′ dissociative mechanism of ligand substitution in octahedral complexes. 4

(B) Explain how colorimeter differs from spectrophotometer. 4

(C) What is paper chromatography ? Explain its principle of differential migration of ions in paper chromatography. 4

OR

3. (P) Discuss the process of asending paper chromatography. 4

(Q) Discuss the mechanism of substitution reaction in square planer complexes. 4

(R) Draw the block diagram of colorimeter and explain its components in brief. 4

UNIT II

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

(B) Discuss the role of Hemoglobin and myoglobin in oxygen transport. 4

(C) Give any two methods of preparation of Iron pentacarbonyl. 4

OR

5. (P) What are Silicones ? Give the preparation of linear Silicone polymers. 4

(Q) What is the action of

(i) Heat

(ii) H_2SO_4 on Nickel tetra carbonyl ? 4

(R) Explain the role of k^+ ions in biological activities. 4

UNIT III

6. (A) What type of electronic transitions do you expect in each of following ?

(i) $CH_3CH_2CH_3$ (ii) CH_3Cl

(iii) $CH_3-\overset{\overset{O}{\|}}{C}-H$ (iv)  4

(B) Discuss the types of modes of vibrations in IR spectroscopy. 4

(C) Define the terms :—

(i) Bathochromic shift

(ii) Hypsochromic shift. 4

OR

7. (P) In which region of IR, absorption bands of stretching vibration occur for the following functional groups ?

(i) $\underline{C=O}$ (ii) $=\underline{C-H}$

(iii) $-\underline{N-H}$ (iv) $\underline{C\equiv C}$ 4

(Q) Discuss the types of electronic transitions that occur in U. V. region with suitable diagram. 4

(R) Define the terms with suitable example

(i) Chromophore (ii) Auxochrome 4

UNIT IV

8. (A) How will you distinguish following pairs by NMR spectroscopy

(i) $CH_3–O–CH_3$ and $CH_3–CH_2–OH$

(ii) $CH_3–CH_2–CH_2–Br$ and $CH_3–\underset{\underset{Br}{|}}{CH}–CH_3$ 4

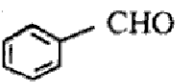
(B) Define the terms

(i) Base peak.

(ii) Molecular ion peak 4

(C) How many signals do you expect in each of following ?

(i) $CH_3-CH_2-\underset{\underset{Cl}{|}}{\overset{\overset{H}{|}}{C}}-CH_3$

(ii) 

4

OR

9. (P) Explain the following terms with an example :—

(i) Chemical shift.

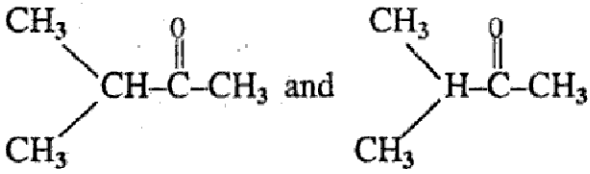
(ii) Spin Spin splitting. 4

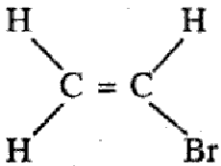
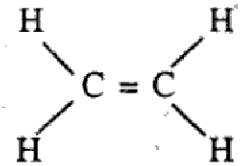
(Q) Calculate m/z value for each of the following molecular ions :—

(i) $[CH_3-CH_2-OH]^+$.

(ii) $[C_6H_5-CH_3]^+$. 4

(R) How will you distinguish the following pairs by NMR ?

(i)  and

(ii)  and 

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UNIT V

10. (A) Derive Schrodinger's wave equation in one dimensional box. 4

(B) Discuss the physical interpretation of wave function ψ and ψ^2 4

(C) State and explain de-Broglie's hypothesis. 4

OR

11. (P) Explain the postulates of Planck's quantum theory. 4

(Q) State and explain Heisenberg's uncertainty principle. 4

(R) Explain photoelectric effect. 4

UNIT VI

12. (A) Discuss the advantages and limitations of liquid drop model of nucleus. 4

(B) What are potentiometric titrations ? Discuss with an example. 4

(C) Calculate the Q value of the nuclear reaction

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

mass of Al = 26.981 amu.
mass of H = 1.0073 amu.
mass of He = 4.0026 amu. 4

OR

13. (P) Explain how pH is determined using quinhydrone electrode. 4

(Q) Discuss the nuclear fission reaction. 4

(R) Discuss the nuclear shell model. 4