

SECTION -A

[Answer separately]

QUESTION -1

a) Fill in the blanks:

[2.5]

(i) The splitting of spectral lines in the presence of magnetic field is called \_\_\_\_\_.

(ii) Paschen series occurs when electron jumps from higher energy level to \_\_\_\_\_ energy level.

(iii) The number of radial nodes in 3d orbital is \_\_\_\_\_.

(iv) The designation given to an orbital having  $n = 3$  and  $l = 1$  is \_\_\_\_\_.

(v) The orbitals of a subshell having same energy are called \_\_\_\_\_.

b) Choose the correct alternatives :

[2.5]

(i) The four quantum numbers of the valence electron of potassium are  
(a) 4, 0, 0, +1/2 (b) 4, 1, 0, +1/2 (c) 4, 1, 1, +1/2 (d) 4, 0, 1, +1/2

(ii) For a d electron the orbital angular momentum is

(a)  $\sqrt{6}h/2\pi$  (b)  $\sqrt{2}h/2\pi$  (c)  $h/2\pi$  (d)  $2h/2\pi$

(iii) The equivalent mass of  $\text{KMnO}_4$  in the reaction



[M= molecular mass]

(a)  $M/2$  (b)  $M/3$  (c)  $M/4$  (d)  $M/5$

(iv) Mole fraction of the solute in 1 molal aqueous solution is

(a) 0.1770 (b) 0.0177 (c) 0.0344 (d) 1.7700

(v) A 5 molar solution of sulphuric acid is diluted from 1 litre to 10 litres.

What is the normality of the diluted solution

(a) 0.25 N (b) 1 N (c) 2 N (d) 7 N

c) Answer the following:

[5]

- (i) Give two differences between orbit and orbital.
- (ii) State Hund's rule of maximum multiplicity.
- (iii) What is the radius of the third orbit in metres
- (iv) Which d orbital does not have four lobes? What is its shape called?
- (v) The chloride of an element is found to contain 52.8% of chlorine. What is the equivalent weight of the element

QUESTION-2

[2]

State and explain Pauli's exclusion principle with example.

QUESTION -3

[2]

Write the electronic configuration of

- (i) Cu [Z of Cu is 29] (ii)  $\text{Cr}^{3+}$  [Z of Cr is 24]

QUESTION- 4

[2]

A salt contains the % composition Na = 29.11, S = 40.51, O = 30.38. Calculate the empirical formula of the salt [Na = 23, S = 32, O = 16]

QUESTION – 5

[2]

Two particles A and B are in motion. If the wavelength associated with Particle A is  $5 \times 10^{-8} \text{ m}$ . Calculate the wavelength associated with particle B if its momentum is half of A.

QUESTION- 6

[2]

How many moles of methane are required to produce 22g of carbon dioxide after combustion

QUESTION – 7

[3]

Which quantum number determines the

- (a) Shape (b) orientation (c) size of orbital

QUESTION- 8

[3]

Calculate the uncertainty in the position of a particle of mass 1mg if the uncertainty in velocity is  $5.5 \times 10^{-20}$  m/s. Given  $h = 6.626 \times 10^{-34}$  Kg m<sup>2</sup>s<sup>-1</sup>.

State the principle behind this.

QUESTION -9

[3]

An aqueous solution of dibasic acid [ molecular mass =118] containing 35.4 of acid per litre of solution has density 1.0077 g/cm<sup>3</sup>. Express the concentration in terms of molarity, molality and normality.

QUESTION -10

[3]

3g of hydrogen react with 29 g of oxygen to form water

- Which is the limiting reagent?
- Calculate the amount of water formed.
- Calculate the amount of reactant left unreacted.

QUESTION- 11

[3]

- What are the postulates of Bohrs theory.
- Which one of the following has high energy and which has low energy?  
(i)  $n=4, l=2, m=0$  (ii)  $n=4, l=0, m=0$  (iii)  $n=2, l=1, m=0$   
(iv)  $n=3, l=1, m=0$

QUESTION -12

[5]

- Calculate the kinetic energy of ejected electron when yellow light of frequency  $5.2 \times 10^{14}$  sec<sup>-1</sup> falls on the surface of potassium metal. Threshold frequency of potassium is  $5 \times 10^{14}$  sec<sup>-1</sup>. State photoelectric effect.
- Out of Zn<sup>2+</sup> [ Z of Zn =30] and Fe<sup>2+</sup> [Z of Fe = 26] which has highest paramagnetism and why?

SECTION - B  
[Answer separately]

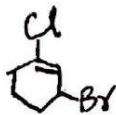
QUESTION -1

1. Fill in the blanks:

- (i) The yellow precipitate obtained in the detection of phosphorus is \_\_\_\_\_ [4]  
(ii) The IUPAC name of  $(\text{CH}_3\text{CO})_2\text{O}$  is \_\_\_\_\_.  
(iii) The plane polarized light is obtained by passing ordinary light through \_\_\_\_\_.  
(iv) The optical activity is measured by \_\_\_\_\_.

2. Choose the correct alternative:

- (i) The IUPAC name of the compound shown below is [4]



- (a) 2-bromo-6-chlorocyclohex-1-ene  
(b) 6-bromo-2-chlorocyclohexene  
(c) 3-bromo-1-chlorocyclohexene  
(d) 1-bromo-3-chlorocyclohexene
- (ii) Which of the following compound will show geometrical isomerism?  
(a) But-2-ene (b) propene (c) ethene (d) but-1-ene
- (iii) Identify the compound that exhibit tautomerism  
(a) 2-butene (b) lactic acid (c) 2-pentanone (d) phenol
- (iv) In sodium fusion the nitrogen of the organic compound is converted to  
(a) Sodamide (b) Sodium cyanide (c) Sodium nitrite  
(e) Sodium nitrate

3. Differentiate between:

- (i) Enantiomer and diastereoisomer  
(ii) Meso compound and racemic mixture

QUESTION -2

Draw the structures of the following compounds:

- (i) 3-methyl-2-oxobutanoic acid  
(ii) 3-chloro-4-methylhexan-1,6-dinitrile

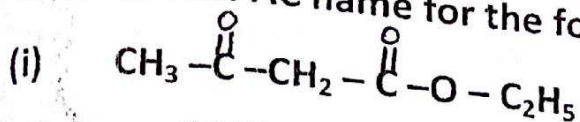
QUESTION -3

Represent pent- 2-ene by different formulae.

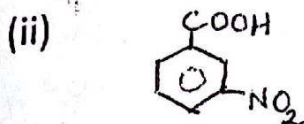
QUESTION -4

[2]

Write the IUPAC name for the following compounds:



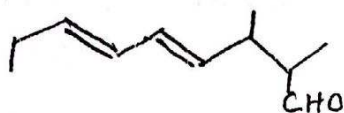
[2]



QUESTION -5

[2]

Write the IUPAC name for the following:



QUESTION - 6

What type of isomerism is shown by the following pairs of compounds ? [2]

- (i) Butan- 1-ol and butan -2-ol
- (ii) But-1-yne and buta-1,3- diene

QUESTION- 7

[3]

Write all the possible isomers which can be obtained from molecular formula  $\text{C}_4\text{H}_{10}\text{O}$ . Also mention the type of isomerism.

QUESTION -8

[3]

What is the cause of geometrical isomerism? What are the conditions required for a compound exhibiting geometrical isomerism? Draw the geometrical isomers for but- 2- en-1,4- dioic acid.

QUESTION- 9

[3]

- (a) Define (i) Chirality (ii) Specific rotation
- (b) What are the conditions required for object to be optically active.

**QUESTION -10**

[3]

What is Lassaigne's solution? How is it prepared? How will you detect phosphorus in an organic compound?

**QUESTION -11**

[3]

(a) Write the principle involved in Kjeldahl's method.

(b) 0.45g of an organic compound was Kjeldahlised and the ammonia evolved was absorbed in 60 cm<sup>3</sup> of N/5 H<sub>2</sub>SO<sub>4</sub>. The excess of acid required 20 cm<sup>3</sup> of N/4 NaOH. Calculate the percentage of nitrogen in the given compound.

**QUESTION – 12**

[5]

(a) Write the principle involved in Carius method of estimation of sulphur in organic compound.

(b) In a Carius determination, 0.534 g of an organic compound gave 0.834 g of Barium sulphate. Calculate the % of sulphur in the given compound [atwt of Ba =137, S = 32 , O = 16]

(c) 0.29g of an organic compound were analysed by Liebig's method. The weight of water and carbon dioxide produced be 0.255g and 0.66g respectively . Calculate the % of carbon and hydrogen in it.