Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Sc.(H)/ Micro.Bio./Mol.Bio./BT/GE /SEM-1/CH-101/2012-13

2012

CHEMISTRY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) The (*) C atom in the compound $CH_3C^*H(Cl)(Br)$ is

   a) Prochiral b) Achiral

   c) Stereogenic d) Chiral.

   ii) The right orders of S_N1 and S_N2 reactivity of carbons are

   a) 3 > 2 > 1 and 2 > 3 > 1

   b) 2 > 3 > 1 and 3 > 1 > 2

   c) 3 > 2 > 1 and 1 > 2 > 3

   d) 1 > 2 > 3 and 3 > 2 > 1.

   iii) Which one of the following is most odd ?

   a) CN^- b) NH_3

   c) CH_3OH d) SO_3.

iv) If a compound contains 4 chiral carbon atoms then it will have stereoisomer number

a) 16 b) 18

c) 20 d) 8.

v) Erythros are the diastereomer which are having

a) two like groups on the opposite side

b) two like groups on the same side

c) no like groups present

d) two unlike groups on the same side.

vi) At triple point degree of freedom is

a) 1 b) 0

c) –1 d) 2.

vii) Radiation which does no effect in electric field is

a) α b) β

c) γ d) Positron.

viii) Oxalic acid is a

a) primary standard b) secondary standard

c) both (a) and (b) d) none of these.

ix) In S_N2 reactions the reactivity order of alkyl halides is

a) 3° > 2° > 1° b) 3° < 2° > 1°

c) 3° < 2° < 1° d) none of these.

x) $-CH_3$ group shows

a) + *i* effect b) – *i* effect

c) both (a) and (b) d) none of these.

xi) According to phase rule

a) $F = C - P + 2$ b) $F = C - P + 1$

c) $F = C - P - 2$ d) $F = C - P - 1$.

xii) A meso compound has

a) plane of symmetry

b) more than one chiral centre

c) both (a) and (b)

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. Draw the structures as directed :

a) 2(S), 3(R), 4(R) 2, 3, 4, 5-tetra hydroxy pentan-1-al

b) Chair form of cyclohexane in Newmann projection

c) (Z)-2-bromo pent 2ene. 2 + 2 + 1

3. Explain why $K_2Cr_2O_7$ is primary standard but $KMnO_4$ is secondary. Give practical implication of common ion effect.

4. Distinguish between isotopes, isobars and isotones.

5. Define hybridization and explain the hybridization of RF_3.

6. What are elements of symmetry ? Explain with example the alternative axis of symmetry.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. Deduce an expression of energy of an electron in the *n* th Bohr orbit in hydrogen atom. Why is it negative ? Write electronic arrangement of Cr^{3+} and Fe^{2+}. Explain with example Pauli exclusion principle. Mention the values of four quantum numbers for the outermost electron in sodium atom. State the Aufbau principle and find out the maximum number of electrons that can be accommodated in *M*-shell of an atom. 4 + 1 + 2 + 3 + 2 + 2 + 1

8. In case of S_N2 reaction using polar and non-polar solvents which case will be favourable ? Explain. State the stereochemistry of S_N2 reaction. What is neighbouring group participation ? How does the effect of entering and leaving group influence the S_N1 and S_N2 reaction mechanism ?

4 + 3 + 3 + 5

9. Define equivalent conductance. Derive a relation between equivalent conductance and concentration. What is cell constant ? Write a relation between cell constant and specific conductance. Explain the different forces applied on a charged particle in a field. Write Kohlrausch law of independent migration of ions. 2 + 3 + 2 + 2 + 4 + 2

10. Write de Broglie's theory of matter waves. Calculate the wavelength associated if

    a) a bullet of 1·5 gm is shot out with a velocity of $3{\cdot}2 \times 10^4$ cm/sec

    b) an electron is accelerated through a potential difference of 100 volts.

    Derive the expression of radius of 1st Bohr orbit in case of a hydrogen atom. Point out the limitations of Bohr's theory.

2 + 5 + 4 + 4

11. Explain (i) Hybridization, (ii) Dipole moment of molecules, (iii) Inductive effect, (iv) Hydrogen bond, (v) Resonance.

3 + 3 + 3 + 3 + 3

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