*Name : .....*

*Roll No. : .....*

*Invigilator's Signature : .....*

**CS/B.Sc (H)/BT/Genetics/Mol.Bio/MicroBio/SEM-4/CH-401/2011**

# 2011
# 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 order of the reaction $H_2 + I_2 = 2HI$ is

      a) 1 b) 2

      c) 3 d) 4.

   ii) Which of the following acts as a semi-permeable membrane ?

      a) $Al(OH)_3$

      b) $BaCO_3$

      c) $\left[Co(NH_3)_6\right] Cl_3$

      d) $Cu_2\left[Fe(CN)_6\right]$.

iii) For preparing 100 ml decinormal $H_2SO_4$ solution the amount of $H_2SO_4$ will be

a) 9·8 b) 4·9

c) 0·49 d) 0·98

iv) The hybridisation of central atom in $ICl_3$ is

a) $sp^3d^2$ b) $d^2sp^3$

c) $sp^3$ d) $sp^3d$.

v) Non-protein part of molecule is called

a) Haemoglobin b) Prosthetic group

c) Collagen d) Enzyme.

vi) A hypertonic solution is the one which has ..... osmotic pressure than the other.

a) lower b) equal

c) higher d) none of these.

vii) ( AgCN ) is an example of

a) halogen compound

b) interhalogen compound

c) pseudohalogen compound

d) none of these.

viii) Common table sugar is

a) Glucose b) Fructose

c) Sucrose d) Maltos.

ix) Schmidt rearrangement is an

a) intermolecular rearrangement

b) intramolecular rearrangement

c) intramolecular-intermolecular rearrangement

d) none of these.

x) *Salicylaldehyde* on treatment with alkaline $H_2O_2$ producess

a) Catechol

b) Phenol

c) Salol

d) None of these.

xi) The product of aldol condensation reaction is

a) only aldehyde

b) only ester

c) an aldehyde and an alcohol

d) only alcohol.

xii) The reagent used in Bayer-Villiger reaction is

a) concentrate acid

b) dilute acid

c) per-acid

d) none of these.

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following. 3 × 5 = 15

2. How does epimerization occur ? How do chain lengthening and shortening occur in aldoses.

3. Give example of catyalylzed reaction. Explain how promoter works ? Give difference of activity of inhibitor and catalyst poison. 2 + 1 + 2

4. Show that for a first order reaction the time required for 75% reaction in twice the time for 50% reaction. What is the unit of specific reaction rate in first order reaction ? 4 + 1

5. Give the structures and names of two α-amino acids. Show their zwitter ionic structures. What is a peptide bond ? 2 + 2 + 1

6. Write down the mechanistic steps for Pinacol-Pinacolone rearrangement.

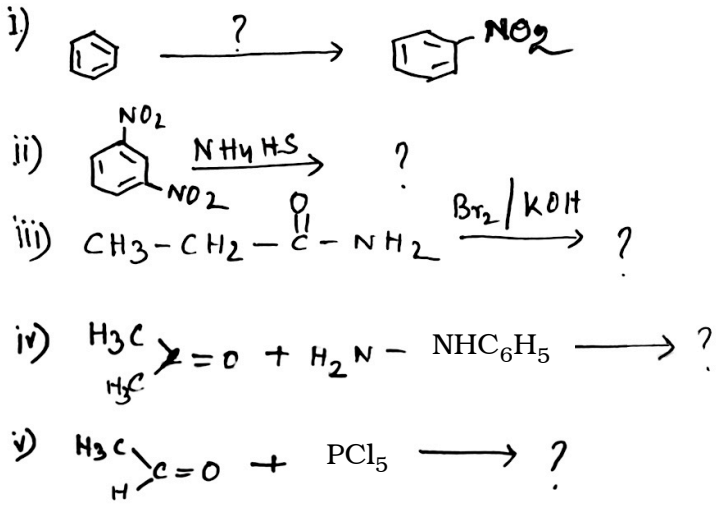
7. Define osmotic pressure. What do you mean by van't Hoff 'i' factor ? Show that dilute solution resembles an ideal gas. ( 1 + 1 ) + 2 + 1

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following. 3 × 15 = 45

8. a) Complete the following : 5 × 1




b) Discuss the acid catalysed rearrangement of 1, 2-diols to ketones. 5

c) Discuss on organozinc compound. 5

9. Derive kinetic equation of zero order reaction and hence prove that half-life of the zero order reaction is proportional to the initial concentration of reactant. Explain why molecularity is not fractional ? Discuss the Ostwald's isolation method for determination of order of reaction. The rate constant of the reaction is found to be doubled when temperature is raised from 30°C to 40°C. Calculate activation energy ? 3 + 2 + 2 + 4 + 4

10. Calculate half-life of second order reaction and hence draw a graph of square of concentration *vs* time. What is pseudo-unimolecular reaction ? Write significance of entropy. Draw an energy profile diagram and show activation energy and transition state. 5 + 2 + 2 + 2 + 2 + 2

11. Discuss the mechanism of Cannizzaro reaction. Explain why *p*-dimethylaminobenzaldehyde does not undergo Cannizzaro reaction. Write explanatory notes on Meerwein-Ponndorf-Verley reduction. Compare Friedel-Craft alkylation and acylation. 5 + 2 + 4 + 4

12. Write short notes on any *three* of the following : 3 × 5

    a) Aldol condensation

    b) Bayer-Villiger reaction

    c) Sodium borohybride

    d) Lithium aluminium hybride

    e) Fries rearrangement

    f) Beckmann rearrangement.

13. Name the compound formed during reaction between carbohydrate and phenyl hydrazine. Mention the carbon atom numbers of glucose and fructose where phenyl hydrazine reacts. Discuss the reaction with mechanism. How can *D*-fructose be converted to *D*-glucose ? Write the structure of *D*-glucose and *L*-glucose. 1 + 1 + 6 + 4 + 3

14. What are interhalogen compounds ? How are they classified ? How are interhalogen compounds prepared ? Discuss the structure of $IF_7$ and $ClF_3$. 3 + 3 + 3 + ( 2 × 3 )