Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Sc.(H) (BT/GE/MICRO/MOL)/SEM-3/CH-301/2011-12

2011

CHEMISTRY (PASS)

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) Which one is more acidic ?

a) CH_3COOH b) $ClCH_2COOH$

c) $Cl_2CHCOOH$ d) CH_3CHO.

ii) In HVZ reaction, the reagents are

a) Red P and Br_2 b) PBr_3

c) Al and I_2 d) Both (a) and (b).

iii) For cyclic reversible process, total entropy change will be

a) 0 b) 1

c) – 1 d) none of these.

iv) When for a series of reversible Carnot engine if initial and final temperature are same then efficiencies will be

a) same b) different

c) 0% d) 100%.

v) For a weak acid with α as its degree of dissociation, the value of dissociation constant is given by (C is concentration of acid in moles per litre)

a) $Ka = C\alpha$ b) $Ka = C\alpha^2$

c) $Ka = C^2\alpha$ d) $Ka = C^2\alpha^2$

vi) The compound that is not a Lewis acid is

a) BF_3 b) $AlCl_3$

c) $BeCl_2$ d) $BaCl_2$.

vii) Acetylene when passed into hot dilute sulphuric acid in presence of mercuric sulphate as catalyst, converted into

a) acetaldehyde b) acetone

c) acetophenon d) acyloin.

viii) In Rosenmund reduction catalyst used is

a) zinc chloride b) magnesium acetate

c) palladium d) Aluminium oxide.

ix) Amine compounds in presence of chloroform and ethanolic potassium hydroxide produce

a) Cyanide b) Isocyanide

c) Nitrosoalkane d) Ketoxime.

x) Grignard reagent can produce amine compounds by reaction with

a) Chloramine b) Chloroaniline

c) Chloroanisaldehyde d) Chlorosulphonic acid.

xi) α-halo acids may be prepared by

a) Ritter reaction b) Curtius reaction

c) HVZ reaction d) Schotten Baumann.

xii) Standard electrode potential is measured at

a) 234 K b) 256 K

c) 298 K d) 245 K.

GROUP – B

(Short Answer Type Questions)

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

2. What is the outcome of second law of thermodynamics ? Prove that $\left(\frac{\partial G}{\partial T} \right)_P = -S$. 2 + 3

3. What is ionic strength ? Calculate ionic strength of a solution containing 0·008 (m) $BaCl_2$ and 0·005 (m) KCl. 2 + 3

4. Give a comparative account of oxidation number and oxy acids of F,Cl and Br.

5. Write a short notes on any *two* of the following : $2\frac{1}{2} + 2\frac{1}{2}$

a) Reimer – Tiemann Reaction

b) Gattermann Reaction

c) Kolbe's Reaction.

6. How will you distinguish between primary, secondary and tertiary alcohols ?

GROUP – C

(Long Answer Type Questions)

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

7. Write different steps of Carnot cycle and determine efficiency for the cycle. Write the characteristics of Entropy. Prove that work function is measure of maximum work. Give example of extensive property. 2 + 5 + 3 + 4 + 1

8. Discuss about the electrophilic substitution reaction of phenol. Write a note on aldol condensation. How will you distinguish between aldehyde and ketone ? 6 + 5 + 4

9. a) State the relation between Kp, Kc and Kx.

   b) What is the application of Vant's haff equation ? 8 + 7

10. a) Write a brief account on the synthetic procedures of carboxylic acids.

    b) Describe the various mechanisms of esterification reactions with proper examples.

    c) Write an account on the synthetic procedures of acid halides. 5 + 6 + 4

11. Give an account for the hydrides, oxides and oxidation states of the group-VI elements. Why PCl_5 exists but NCl_5 does not ? Explain. What are diborene and borazole ? Show the bonding arrangements in diborene. 8 + 3 + 2 + 2