Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(NEW)/SEM-2/CH-201/2013

2013

CHEMISTRY - I

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 the following : $10 \times 1 = 10$

   i) For an endothermic reaction

      a) ΔH is positive

      b) ΔH is negative

      c) $\Delta H = 0$

      d) ΔU is negative.

   ii) Which one of the following has the least bond angle ?

      a) NH_3

      b) BeF_2

      c) H_2O

      d) CH_4 .

iii) A metal deficient ionic compound acts as

a) *n*-type semiconductor

b) *p*-type semiconductor

c) intrinsic semiconductor

d) none of these.

iv) The ion conductance of an ion depends on its

a) charge only

b) speed only

c) charge and speed

d) charge, speed and hydration.

v) The hybridization of Xe in XeF_2 is

a) sp

b) $sp^3 d^2$

c) sp^3

d) $sp^3 d$.

vi) The calorific value is highest for

a) water gas

b) LPG

c) producer gas

d) carburated water gas.

vii) If a system interacts with the surrounding by exchanging energy only, then it is called as

a) open system

b) closed system

c) isolated system

d) none of these.

viii) Hydrolysis of ethyl acetate in presence of excess water follows

a) 2nd order kinetics

b) 1st order kinetics

c) zero order kinetics

d) pseudo-1st order kinetics.

ix) The unit of specific conductance is

a) ohm–cm

b) ohm/cm

c) mho

d) mho/cm.

x) Bakelite is an example of

a) metal

b) thermoplastic

c) rubber

d) thermoset.

GROUP – B

(Short Answer Type Questions)

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

2. Draw the conductometric titration curve of strong acid *vs* weak base and explain the salient features of the curve. 1 + 4

3. Write a technical note on octane number and name the unleaded additive that improves octane value. 4 + 1

4. Predict the hybridization and shape of PCl_5, NH_3, BCl_3, CO_2 and SF_6. 5 × 1

5. a) What is calorific value of a fuel ?

   b) Distinguish between Higher or Gross Calorific Value (HCV) and Lower or Net Calorific Value (LCV). 2 + 3

6. State and explain Arrhenius equation. What is the significance of activation energy ? How can it be determined ? 2 + 2 + 1

GROUP – C

(Long Answer Type Questions)

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

7. a) Discuss the defect encountered in ZnO.

   b) What are the basic postulates of transition state theory ?

   c) Prove that for criteria of spontanicity of ΔG should be negative.

   d) State and explain Kohlrausch's law of indipendant migration of ions. With the help of this determine the equivalent conductance of acetic acid.

   3 + 3 + 3 + 3 + 3

8. a) Prove that Joule-Thomson expansion of gas is isoenthalpic.

   b) Define Joule-Thomson coefficient and inversion temperature. Discuss their significances.

   c) Why is first order reaction never complete ?

   d) What is CNG ? What are the advantages of CNG ? Mention two uses of CNG. 4 + 5 + 2 + 4

9. a) What is enthalpy ? Derive Kirchhoff's equation.

   b) What is plastic ? Distinguish between thermoplastics and thermosetting polymer.

   c) State Markonikov's rule. Explain Markonikov and anti-Markonikov addition of the HBr to propane. 5 + 5 + 5

10. a) What is a Carnot cycle ? Obtain the expression for the efficiency of a reversible Carnot engine and starting from this expression state an appropriate statement of the scond law of Thermodynamics.

    b) Why does NaCl when heated in presence of Na vapour turn yellow ? 12 + 3

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

a) Inductive effect

b) Carbocation

c) Homogeneous catalysis

d) Schottky and Frenkel defects

e) Conducting polymer.