

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (NEW)/SEM-1/CH-101/2012-13

2012

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 any *ten* of the following :

10 × 1 = 10

- i) The sum of internal energy and pressure volume product is called
- a) entropy b) enthalpy
- c) heat supplied d) none of these.
- ii) Example of thermosetting plastic is
- a) PVC b) Nylon
- c) Polythene d) Bakelite.
- iii) A conductive polymer is
- a) Polyethylene b) Polypropene
- c) Polyaniline d) Bakelite.



- iv) Germanium is an example of
- a) intrinsic semiconductor
 - b) n-type semiconductor
 - c) p-type semiconductor
 - d) insulator.
- v) Galvanic cell does not have
- a) an anode
 - b) a cathode
 - c) a porous barriers
 - d) ions.
- vi) Entropy of the universe is
- a) decreasing
 - b) increasing
 - c) remaining constant
 - d) dependent on conditions.
- vii) The compound with antiknock value of zero is
- a) n-pentane
 - b) n-butane
 - c) n-hexane
 - d) n-heptane.
- viii) Which of the following is a macromolecule ?
- a) Nylon-66
 - b) Bakelite
 - c) Polyester
 - d) Chlorophyll.
- ix) Schottky defect is due to
- a) missing of anion from a lattice
 - b) missing of cation from a lattice
 - c) missing of cation and anion both from a lattice
 - d) none of these.

- ### GROUP – B

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

- [Turn over



4. Write down the electrode reactions and over all reaction of the following cells :

- i) $\text{Zn (s)} \mid \text{Zn}^{2+} \text{ (aq)} \parallel \text{Cu}^{2+} \text{ (aq)} \mid \text{Cu (s)}$
- ii) $\text{Pt(s)} \mid \text{H}_2 \text{ (g)} \mid \text{H}^+ \text{ (aq)} \parallel \text{Ag}^+ \text{ (aq)} \mid \text{Ag (s)}$

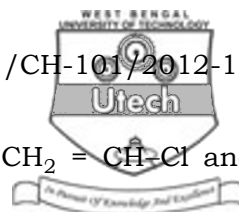
5. a) What is CNG and write its advantage over other fuels ?
 b) What is octane number of a fuel ? How can the octane number be improved ? 3 + 2
6. Explain the number average and weight molecular mass of polymer. Which one is greater and why ? 3 + 2

GROUP – C

(Long Answer Type Questions)

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

7. a) What is meant by transport number of an ion ? How is it related with ionic conductance ?
 b) “ H^+ and OH^- ions show very high ionic mobility in aqueous medium.”– explain with mechanism.
 c) What is calomel electrode ? How can we measure the pH of a solution using calomel electrode ?
 d) Discuss the difference among isotactic, syndiotactic and atactic polymers. 3 + 3 + 6 + 3



8. a) Compare the C-Cl bond lengths in $\text{CH}_2 = \text{CH}-\text{Cl}$ and $\text{CH}_3-\text{CH}_2-\text{Cl}$.

- b) Arrange the molecules in their increasing acidity order :

Phenol, 2,6-dimethyl-4-nitrophenol, 3,5-dimethyl-4-nitrophenol

- c) Predict all possible products of neopentyl bromide that undergo solvolysis in aqueous alkali medium.

- d) Distinguish with example :

- i) Carbonium ion and carbenium ion
- ii) Addition reaction and substitution reaction.

$$3 + 3 + 4 + 5$$

9. a) Show that the magnitude of the reversible work done is greater than the magnitude of the irreversible work done during isothermal expansion of an ideal gas.

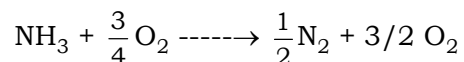
- b) Calculate the work done when one mole of a real gas at 0°C expands adiabatically and reversibly from 1 Lit to 10 Lit. (Given $\gamma = 5/3$)

- c) State and explain Hess's law.



- d) Calculate the heat of formation of ammonia.

Given :



$$\Delta H_c = -90.6 \text{ kcal mole}^{-1}$$



$$4 + 3 + 3 + 5$$

10. a) What do you mean by the activation energy of a reaction? How does the rate constant of a chemical reaction depend on the temperature?
- b) Calculate the activation energy of a reaction whose rate constant is doubled when temperature is increased from 200 K to 300 K.
- c) Show the influence of a positive catalyst on the activation energy of a reaction in the energy profile diagram.
- d) Distinguish between *p*-type and *n*-type semiconductors. Give two important kinds of example of semiconductors.

$$3 + 4 + 3 + 5$$



11. Write notes on any *three* of the following :

- a) Conducting polymer.
- b) Joule-Thomson expansion and inversion Temperature.
- c) Gibbs free energy and its use in denoting the spontaneity of a chemical reaction
- d) Anti-Markownikov's rule
- e) Schottky defect and Frenkel defect
- f) Order and Molecularity of the reaction.

=====