



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech(New)/SEM-1/CH-101/2011-12**

**2011**

**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) For a reaction  $A \rightarrow B$ , both change in enthalpy (  $\Delta H$  ) and change in entropy (  $\Delta S$  ) are positive. The most favourable condition for the reaction is

- |                    |                      |
|--------------------|----------------------|
| a) low pressure    | b) high pressure     |
| c) low temperature | d) high temperature. |

ii) Schottky defect is found in

- |         |         |
|---------|---------|
| a) NaCl | b) ZnO  |
| c) AgCl | d) FeO. |



- iii) Tetrafluoroethylene is the monomer of
- a) Polyethylene                      b) Nylon 6
- c) Polyvinyl chloride              d) Teflon.
- iv) Normal hydrogen electrode has been assigned a potential of
- a) hundred volts                      b) zero volt
- c) one volt                              d) none of these.
- v) With the increase in temperature, conductivity of *p*-type semiconductor
- a) increases
- b) decreases
- c) is changed but the direction of change cannot be predicted
- d) does not change.
- vi) Which of the following is true for a galvanic cell ?
- a) The cell potential is always negative
- b) The products are less stable than the reactants
- c)  $\Delta G$  for the cell reaction is positive
- d) Chemical energy is converted to electrical energy.

a)  $\text{Ph}_3\text{C}^-$

b)  $(\text{C}_6\text{H}_{11})_3\text{C}^-$

c)  $(\text{C}_3\text{H}_5)_3\text{C}^-$

d)  $(\text{CH}_3)_3\text{C}^-$ .

a) zero                      b) first  
c) second                  d) third.

a) remains unchanged      b) increases  
c) decreases                      d) cannot be predicted.

$\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$  takes place is

b)  $\text{Cu} \mid \text{FeSO}_4 \parallel \text{CuSO}_4 \mid \text{Fe}$ c)  $\text{Cu} \mid \text{CuSO}_4 \parallel \text{FeSO}_4 \mid \text{Fe}$ 

d)  $\text{Fe} \mid \text{FeSO}_4 \parallel \text{CuSO}_4 \mid \text{Cu}$



xi) The minimum amount of energy possessed by the reacting molecules to produce effective collisions is called

- a) threshold energy                      b) internal energy
- c) activation energy                      d) kinetic energy.

xii) Proteins are biopolymers. The monomer units present in them are

- a) alkene                                      b) amino acid
- c) fatty acid                                      d) carbohydrate.

xiii) For the redox couples  $\text{Zn}^{2+} \mid \text{Zn (s)}$  and  $\text{Cu}^{2+} \mid \text{Cu (s)}$  the standard reduction potentials are  $-0.76 \text{ V}$  and  $+0.34 \text{ V}$  respectively. If the couples are combined then

- a)  $\text{Zn}^{2+}$  is reduced and Cu is oxidized
- b) Zn is oxidised and  $\text{Cu}^{2+}$  is reduced
- c) both Zn and Cu are oxidized
- d) both  $\text{Zn}^{2+}$  and  $\text{Cu}^{2+}$  are reduced.



**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.

3 × 5 = 15

2. Define an adiabatic process and show that for a reversible adiabatic process

$$(T)^{C_v/R} \cdot V = \text{constant}.$$

3. a) Write a short note on bio-diesel.  
b) Define number average molecular weight of a polymer.  
c) What is glass transition temperature of a polymer ?

3 + 1 + 1

4. a) What is the difference between *n*-type and *p*-type semiconductors ?  
b) What do you mean by pseudounimolecular reaction ?  
Give an example.

2 + 3

5. a) What is equivalent conductance and what is its unit ?  
b) What is the law of independent migration of ions ?

2 + 3

6. a) What is the calorific value of a fuel ?  
b) Distinguish between GCV and NCV.

2 + 3



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.

3 × 15 = 45

7. Write notes on any *three* of the following : 3 × 5
- a) Biodegradable polymer
  - b) Clausius–Clayperon equation
  - c) Vulcanization of rubber
  - d) Calomel electrode
  - e) Mesomeric effect
  - f) Homogenous catalyst.
8. 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 second law of thermodynamics.
- b) What is colour centre generator ? Explain with example.
- 12 + 3
9. a) Discuss the physicochemical principle involved in the measurement of pH of an aqueous solution by Hydrogen electrode method.
- b) Write about the synthesis and uses of the following :
- i) HDPE
  - ii) Buna-S-Rubber.
- c) Distinguish between Frenkel and Schottky defect.

6 + 6 + 3



10. a) Compose the C-Cl bond length in  $\text{CH}_2 - \text{CH}_2\text{Cl}$  and  $\text{CH}_3 - \text{CH}_2 - \text{Cl}$ .
- b) Arrange the following in increasing acidity :
- Phenol
  - 2, 6-dimethyl-4-nitrophenol
  - 3, 5 dimethyl-4-nitrophenol.
- c) Give an example of hyperconjugation with explanation.
- d) Distinguish between the following with example :
- Carbonium ion and carbanion
  - Addition reaction and substitution reaction.

3 + 3 + 5 + 4

11. a) What are water gas and semi-water gas ?
- b) How do gasoline and diesel differ in chemical composition ?
- c) Deduce the expression for the rate constant of a second order reaction where the initial concentrations of the two reactants are same.
- d) Discuss the role of solvents in  $\text{S}_\text{N}^1$  reaction.
- e) What is inversion temperature ?

3 + 3 + 5 + 2 + 2

