



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Sc. (H), BT/Genetics/MolBio/MicroBio/SEM-2/CH-201/2011**

**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 × 1 = 10

i) What is the oxidation state of iron in  $K_3[Fe(CN)_6]$  ?

a) + 2

b) + 3

c) + 4

d) - 4.

ii) An octahedral complex is formed when hybrid orbital of  
following type is involved

a)  $sp^3$

b)  $dsp^2$

c)  $sp^3d^2$

d)  $sp^3d$ .



- iii) The compressibility factor  $Z$  is given by
- a)  $Z = PV/RT^2$                       b)  $Z = PV/2RT$
- c)  $Z = PV/RT$                       d)  $Z = 2PV/RT$ .
- iv) The real gases show nearly ideal behaviour at
- a) low pressure and low temperature
- b) high pressure and low temperature
- c) high pressure and high temperature
- d) low pressure and high temperature.
- v) Coefficient of viscosity is expressed in
- a) dynes                                  b) dynes sq
- c) dynes per sq. cm                  d) none of these.
- vi) Which of the following compounds will show geometrical isomerism ?
- a) Propene                                b) 2-Butene
- c) Propyne                                d) 2-Butyne.
- vii) Markowinkoff's addition of HBr is not applicable in
- a) Propene                                b) 1-Butene
- c) 1-Pentene                              d) 2-Butene.





**GROUP – B**  
**( Short Answer Type Questions )**

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

2. State VSEPR theory and in the light of the theory compare the bond angles in  $\text{NH}_3$  and  $\text{H}_2\text{O}$ . 3 + 2
  
3. Define and explain common ion effect. Using this effect how can NaCl be prepared from sea-water ? 3 + 2
  
4. What is enthalpy ? How is it represented ? What are the adiabatic and isothermal processes ?  $1 + 1 + \left(1\frac{1}{2} \times 2\right)$
  
5. Write the Newmann projection of the following compounds having the specified conformation noted against each compound.
  - a)  $\text{CHCl}_2 \text{ CHCl}_2 (+ac)$
  
  - b)  $\text{CH}_3 \text{ CH NO}_2 \text{ CH Cl NO}_2 (+sp)$
  
  - c)  $\text{CH Cl Br CH (OH) NH}_2 (+sc)$

What are conformers ? 3 + 2

6. Discuss Stoke's law with equation. 5
  
7. Discuss the structures of  $\text{XeF}_2$  and  $\text{XeOF}_4$ .  $2\frac{1}{2} \times 2$



**GROUP – C**

**( Long Answer Type Questions )**

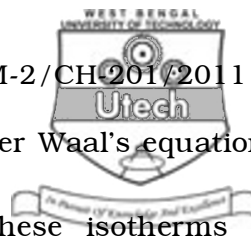
Answer any *three* of the following.  $3 \times 15 = 45$

8. a) What is Friedel – Crafts alkylation reaction ? Explain the mechanism.
- b) Write down the anti-Markownikoff's rule and explain it.
- c) Illustrate polymerization with example.

$( 2 + 3 ) + ( 3 + 3 ) + 4$

9. Write short notes on any *three* of the following :  $3 \times 5$
- a) Dipole-dipole interaction
- b) Hydrogen bonding
- c) Hybridisation
- d)  $C_p - C_v = R$ .

10. Define lattice energy and explain. Establish Barn-Haber cycle for the formation of sodium chloride crystal starting from metallic sodium and gaseous chlorine. What is radius ratio rule ? What are its limitations ?  $( 2 + 2 ) + 7 + 2 + 2$



11. Draw Amagat's isotherms. How can van der Waal's equation be applied to explain the nature of these isotherms ?

Establish the relation between critical constants and van der Waal's constants of a gas. Derive the equation of corresponding state. 3 + 3 + 6 + 3

12. Chelate effect is an entropy effect – explain with example.

Draw the structure and write hybridization state of the central atom in each of the following compounds :

i) Ni (CO)

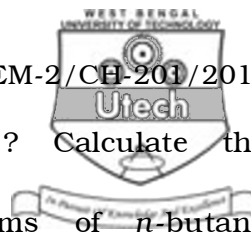
ii)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$ .

Write the IUPAC names of the following compounds :

i)  $[\text{Co Cl}(\text{NO}_2)(\text{NH}_3)_4]\text{Cl}$

ii)  $[\text{Fe}(\text{CO})_5]$ .

What are stepwise and overall stability constants of equilibrium concept ?  $5 + 3 + \left(1\frac{1}{2} + 1\frac{1}{2}\right) + 4$



13. What is 'butane-gauche' interaction ? Calculate the percentage of anti and gauche forms of *n*-butane at 298° K ( $\Delta H^\circ = -0.8 \text{ kcal mol}^{-1}$  for anti-gauche equilibrium).

Write down the preferred conformation for the following compounds :

- i)  $\text{CH}_3 \text{ CH}_2 \text{ CH}_2 \text{ Cl}$
- ii)  $\text{CH}_3 \text{ CH}_2 \text{ CH} = \text{O}$ .

Write down the 'chair' and 'boat' conformations of cyclohexane and discuss their relative stability.

$$3 + 4 + \left(1\frac{1}{2} + 1\frac{1}{2}\right) + (2 + 3)$$

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