

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH/CHE (N)/SEM-3/CH (CHE)-302/2012-13**

**2012**

**CHEMISTRY-II**

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) The mean speed of a certain gas at  $27^{\circ}\text{C}$  is  $400 \text{ ms}^{-1}$ .  
The temperature at which the speed will be 800 is
  - a)  $54^{\circ}\text{C}$
  - b)  $108^{\circ}\text{C}$
  - c)  $216^{\circ}\text{C}$
  - d)  $927^{\circ}\text{C}$ .
- ii) The compressibility factor of a van der Waals gas at critical point is
  - a) 0.375
  - b) 0.505
  - c) 0.408
  - d) zero.

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iii) A real gas most closely approaches the behaviour of an ideal gas under the conditions of

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

iv) Which of the following are considered to be polymers of amino acids ?

- a) Nucleotides
- b) Carbohydrates
- c) Lipids
- d) Proteins.

v) Poise is the unit of measure of which of the following ?

- a) Pressure
- b) Viscosity
- c) Force
- d) Mass.

vi) Common table sugar is

- a) Glucose
- b) Sucrose
- c) Fructose
- d) Maltose.

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vii) The principal sugar in blood is

- a) Fructose
- b) Glucose
- c) Suscrose
- d) Galactose.

viii) Which of the following refers to the scattering of light by colloidal particles ?

- a) Rutherford effect
- b) Tyndall effect
- c) Thompson effect
- d) None of these.

ix) Which of the following is a basic amino acid ?

- a) Glycine
- b) Lysine
- c) Threonine
- d) Valine.

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x) Of the following pairs, each of 0.1 m solution, the isotonic solution at the same temperature will be

- a) glucose and KCl
- b)  $\text{MgCl}_2$  and NaCl
- c) Urea and  $\text{ZnSO}_4$
- d)  $\text{Na}_2\text{SO}_4$  and  $\text{Ca}(\text{NO}_3)_2$ .

xi) Organomagnesium halides are called

- a) Tollen's reagent
- b) Millon's reagent
- c) Grignard reagent
- d) none of those.

xii) Which of the following is disproportionation reaction ?

- a) Cannizzaro reaction
- b) Aldol reaction
- c) Perkin reaction
- d) Wittig reaction.

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**GROUP – B****( Short Answer Type Questions )**Answer any *three* of the following.  $3 \times 5 = 15$ 

2. What does it mean by surface tension ? What is surface energy and its unit ? “Water can wet glass surface but mercury does not.” Explain the statement.  $2 + 1 + 2$
3. What is meant by critical micelle concentration ? How is it determined experimentally ?  $3 + 2$
4. Dry air is slowly bubbled through a solution containing 38.0 gm of a solute per 100 gm of water and then through water. Loss in weight of water was noticed to be 0.055 gm and the total gain in weight of a tube containing  $P_2O_5$  through which the air was subsequently passed was found to be 2.212 gm. Calculate the molar mass of the dissolved substance.
5. Draw the structures of a purine base and pyrimidine base found in both DNA and RNA. Write about three types of RNA molecules found in a cell.  $2 + 3$
6. Explain the term tautomerism. How will you synthesis adipic acid ( hexanedioic acid ) from malonic ester ?  $2 + 3$

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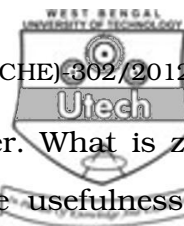
**GROUP – C****( Long Answer Type Questions )**Answer any *three* of the following.  $3 \times 15 = 45$ 

7. a) What is isoelectric point of an amino acid ? How is isoelectric point related to the dissociation constants of conjugate acid of an amino acid ? 2 + 3
- b) What points are to be taken into consideration during the formation of a peptide linkage between two different amino acids ? Mention a reaction by which proteins are detected ? 3 + 2
- c) Explain the reaction of glucose with excess of phenylhydrazine in presence of acetic acid with mechanism. Sucrose is non-reducing sugar but reduces Fehling's solution after hydrolysis with dilute acid. Offer an explanation. 3 + 2
8. a) Write notes on the following :
- i) Claisen condensation
  - ii) Friedel-Crafts acylation
  - iii) Cannizzaro reaction
  - iv) Sandmeyer reaction.
- b) What is Grignard reagent ? ( 4 × 3 ) + 3

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9. Write a short note on electrical double layer. What is zeta potential and its significance ? Discuss the usefulness of ultracentrifugation over sedimentation. Define viscosity coefficient. What is the unit of viscosity coefficient in CGS system and derive its dimension.  $3 + 3 + 4 + 2 + 1 + 2$
10. What is Freundlich isotherm ? What are the assumptions of Langmuir isotherm ? Deduce Langmuir adsorption isotherm. Discuss the application of adsorption.  $4 + 4 + 5 + 2$
11. Derive thermodynamically the expression for osmotic pressure of a solution and the relative lowering of vapour pressure of the solvent.  $7 + 8$
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