*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°C is 400 $ms^{-1}$. The temperature at which the speed will be 800 is

      a) 54°C b) 108°C

      c) 216°C d) 927°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.

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.

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.

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) $MgCl_2$ and NaCl

c) Urea and $ZnSO_4$

d) $Na_2SO_4$ and $Ca(NO_3)_2$.

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.

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following. 3 × 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

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following. 3 × 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) Sandmayer reaction.

   b) What is Grignard reagent ? ( 4 × 3 ) + 3

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