MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : CH(CHE)-302

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) Surface tension of a liquid is

a) extensive property

b) intensive property

c) bulk property

d) none of these.

ii) Viscosity of the liquid can be determined by

a) barometer

b) stalagmometer

c) Ostwald viscometer

d) calorimeter.

iii) A non-reducing sugar is

a) sucrose b) glucose

c) mannose d) cellobiose.

iv) Which compound will not take part in aldol condensation reaction ?

a) Acetone b) Ethanol

c) Acetaldehyde d) Benzaldehyde.

v) Solutions *A* and *B* contains 0·18 G glucose per litre and 0·06 G urea per litre respectively. The osmotic pressures *A* and *B* will be in the ratio

a) 3 : 1 b) 1 : 3

c) 3 : 2 d) 1 : 1.

vi) Butter is

a) an emulsion of oil in water

b) an emulsion of water in oil

c) macromolecular colloid

d) multimolecular colloid.

vii) Which of the following pairs of solution will be isotonic at the same temperature ?

a) 0·1 M glucose and 0·1 M KCl

b) 0·1 M urea and 0·1 M $MgCl_2$

c) 0·1 M NaCl and 0·1 M K_2SO_4

d) 0·1 M K_2SO_4 and 0·1 M $MgCl_2$.

viii) The colour of a colloidal suspension occurs due to

a) electrokinetic effect

b) electrophoresis

c) electro-osmosis

d) Tyndal effect.

ix) Which is false ?

a) Glucose is a disaccharide

b) Starch is polysaccharide

c) Glucose and fructose are not anomers

d) Invert sugar consists of glucose and fructose.

x) Which is not a transport phenomenon ?

a) Diffusion b) Electrical current

c) Surface tension d) Viscosity.

xi) Dimension of η is

a) M^2LT^{-2} b) ML^2T^{-2}

c) $ML^{-1}T^{-1}$ d) ML^2T^{-1}.

xii) Viscosity of pure water at 20°C is

a) 1 millipoise b) 10 millipoise

c) 100 millipoise d) 0·1 millipoise.

GROUP – B

(Short Answer Type Questions)

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

2. a) What will be the product when ethyl acetate is treated with methyl magnesium bromide ?

b) How will you synthesize acetophenone from benzene ? 3 + 2

3. a) Write the differences between physisorption and chemisorption.

b) What is gold number ? Explain with an example. 2 + 3

4. a) Derive thermodynamically that decrease of surface area of a liquid system is always spontaneous at constant pressure and temperature.

b) Draw the normal and zwitterionic structures of an amino acid. 3 + 2

5. Write down Maxwell's expression for distribution of molecular speed and explain its feature graphically. Determine the most probable speed from this expression.

6. Evaluate the commutator $[P_x, X]$ and comment on the significance of the result.

GROUP – C

(Long Answer Type Questions)

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

7. What do you mean by compressibility factor of a gas ? Derive expressions for the critical constants and hence, obtain the value of the compressibility factor of a Van der Waals gas.

8. a) Draw the structure of a non-reducing disaccharide.
   b) Explain the mutarotation of D-glucose.
   c) Why D-glucose and D-mannose will give same osazone ?
   d) Write a short note on Killani-Fischer synthesis.
   e) Explain the fact that anomers are special case of epimers. 2 + 4 + 3 + 4 + 2

9. a) Describe the basic theory of determination of surface tension by drop-weight method.
   b) Explain the effect of temperature on viscosity coefficient of a liquid. Show the graphical representation also.
   c) Rault's law can be used to determine the molar mass of a solute from a very dilute solution. Explain.
   d) Explain electrical double layer and zeta potential qualitatively.
   e) Write a short note on Tyndal effect. 3 + 3 + 2 + 4 + 3

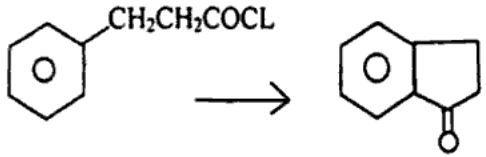
10. What is 'isoelectric point' of an amino acid ? Derive the relation of isoelectric point to the dissociation constants of conjugated acid of an amino acid. Discuss Ninhydrin Test of α-amino acids. Why it is necessary to protect the $-NH_2$ group of one amino acid and –COOH group of the other during synthesis of a peptide linkage from two amino acid molecules ? What are nucleosides and nucleotides ? Write structures of one nucleoside and one nucleotide where sugar parts are different. 2 + 3 + 2 + 3 + 2 + 3

11. Carry out the following conversion :

a) D-Glucose → D-Fructose

b) Diethylmalonate → succinic acid

c)



d) Convert benzaldehyde to cinamic acid. What is Bayer-Villiger reaction ?

e) Write the normalized wave function of a particle in one-dimensional box. What is the energy of the particle ? 3 + 3 + 3 + 4 + 2