

- Instructions:** 1) Answers to the two sections should be written on separate books.  
 2) All questions are compulsory  
 3) Figures to the right indicate full marks  
 4) Use of scientific calculator is permitted  
 5) For questions 2,3,5,6, there is choice for question A

## SECTION A (Physical Chemistry)

**Q1. Answer any FIVE of the following:** (2x5=10)

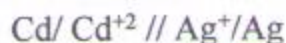
- Define CST? Give examples
- Draw the phase diagram for the carbon dioxide system and name the curves and areas
- What is the effect of dilution on conductance and equivalent conductance.
- How is a salt bridge prepared?
- What are azeotropes? Give examples
- Distinguish between phase rule and reduced phase rule
- Write the equation and electrode representation of the oxygen gas electrode.

- Q2.A) i)** State Raoult's Law. Draw a vapour pressure -composition diagram showing deviations from Raoult's Law with examples. 4
- ii)** Describe the water system with a diagram. 3

OR

- A) iii)** Explain Distillation of non-ideal liquid mixtures using temperature- composition curves. 4
- iv)** State the following 3
- Eutectic point in Pb-Ag System
  - Polymorphs of Sulphur
  - Lowest temperature in NaCl -Water system

- B) i)** Derive an equation for emf of the following cell 4
- $$\text{Ag} / \text{AgCl (s)}, \text{Cl}^- (\text{a}_1) // \text{Cl}^- (\text{a}_2), \text{AgCl (s)} / \text{Ag}$$
- ii)** Calculate the Std EMF of the following cell: 4



Given std reduction potential of the following electrodes:

$$E^0_{\text{Cd}^{+2}/\text{Cd}} = -0.40\text{V},$$

$$E^0_{\text{Ag}^+/\text{Ag}} = 0.80\text{V}$$

- Q3. A) i)** Describe the moving boundary method to determine the transport number. 4
- ii)** Given std reduction potential of the following electrodes

$$E^{\circ}_{\text{Cu}^{+2}/\text{Cu}} = 0.337\text{V}$$

$$E^{\circ}_{\text{Ni}^{+2}/\text{Ni}} = -0.25\text{V}$$

Can we store 1M  $\text{CuNO}_3$  solution in a nickel vessel? Why?

3

OR

A) iii) Write a note on conductometric titrations.

4

ii) Derive an equation for liquid junction potential.

3

B) i) Describe the Lead - Silver system with a diagram

4

ii) The vapour pressure of water at 293K is 18 mm, lowering of vapour pressure of glucose solution is 0.0810 mm.

Calculate

4

a) Relative Lowering of Vapour Pressure

b) Vapour pressure of the solution

c) Mole Fraction of Water

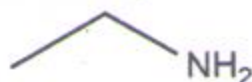
### SECTION B (Organic Chemistry)

Q.4. Answer any FIVE of the following:

(2 X 5=10)

i) How will you prepare 2,2-dibromobutanoic acid?

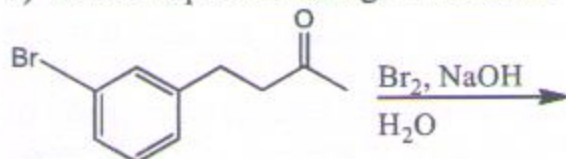
ii) How can you prepare the following amine using Gabriel phthalimide synthesis?



iii) How are amino acids classified based on chemical reactivity. Give one example of each class?

iv) Draw open chain structure of D-glucose.

v) Write the product and give its name.



vi) Give any two limitations of Beer- Lambert's Law.

vii) Draw the structure of  $\alpha$  -D-ribofuranose in Haworth projection.

Q.5.A. i) Explain the following terms used in U.V spectra with an example.

4

a) Chromophore

b) Bathochromic shift

ii) How will you prepare acetamide from ethylacetate?

3



iii) Explain the phenomena of mutarotation with an example.

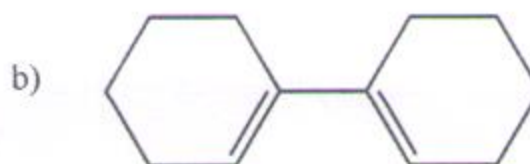
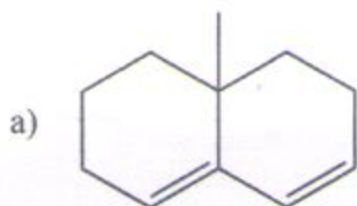
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iv) How will you prepare valine using Gabriel phthalimide synthesis?

3

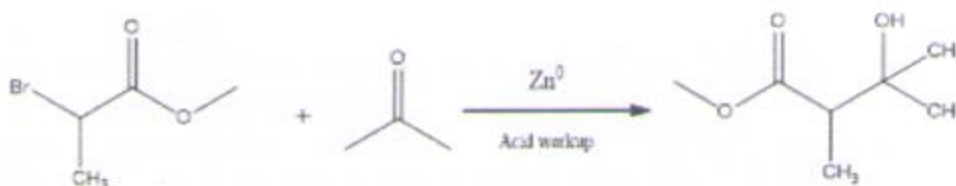
**Q.5.B.i)** Apply Woodward-Fieser rules and calculate absorption maxima of the following compounds.

4



ii) With a suitable mechanism explain the formation of the product in the following reaction:

4



**Q.6.A. i)** How will you prepare Gly-Val peptide?

4

ii) When a UV light is passed through the given solution, the radiant power is reduced to 50%, calculate the absorbance.

3

**OR**

iii) How is Hinsberg test useful in identifying primary and secondary amine?

4

iv) Using an example explain zwitter ion.

3

**Q.6.B i)** Design a method to synthesize monosubstituted bromoaniline from aniline.

4

ii) When p-nitrophenol is dissolved in water, the color is yellow, but when NaOH is added, the color deepens in intensity and move to longer wavelength. Justify.

4

\*\*\*\*\*END\*\*\*\*\*

**Woodward Fieser rules**

**I] Conjugated diene**

1). Base value for homoannular diene = 253nm

\*\*\*\*\*END\*\*\*\*\*

## Woodward Fieser rules

### I] Conjugated diene

- |                                       |         |
|---------------------------------------|---------|
| 1) Base value for homoannular diene   | = 253nm |
| 2) Base value for heteroannular diene | = 215nm |
| 3) Alkyl substituent or ring residue  | = 5nm   |
| 4) Double bond extending conjugation  | = 30 nm |
| 5) Exocyclic double bond              | = 5 nm  |