

Organic Chemistry (S.M)

Q.P. Code : 14627

(2½ Hours)

[Total Marks : 75]

- N.B. : (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Use of log tables/ non - programmable calculator is permitted.

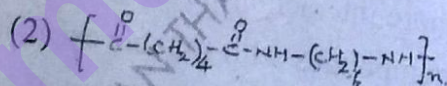
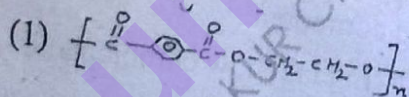
1. Answer any THREE of the following:-

- (a) An organic compound has molecular formula C_4H_8O . Determine its index of hydrogen deficiency and deduce its structural formula using the following spectral data. 5
IR (cm^{-1}) : 2985, 2725, 1735.
PMR δ (ppm) : 1.1 (6H) doublet, 2.3 (1H) multiplet, 9.4 (1H) singlet.
Also write the name of the compound.
- (b) An organic compound has molecular formula $C_4H_8O_2$. Determine its index of hydrogen deficiency and deduce its structural formula using the following spectral data. 5
IR (cm^{-1}) : 2980, 1750, 1065
PMR δ (ppm) : 1.17 (3H) triplet, 1.96 (3H) Singlet, 4.07 (2H) quartet.
Also write the name of the compound.
- (c) Define 'Bathochromic shift'. Explain how chromophore - chromophore and auxochrome - chromophore interactions bring about bathochromic shift in u.v. spectra of organic compounds with suitable example. 5
- (d) (i) Show the mass spectral fragmentation pattern of butane. 3
(ii) Explain in brief with a suitable example how IR spectroscopy is used in studying the course of a reaction. 2
- (e) (i) With the help of a neat diagram, explain anisotropic deshielding of the proton of -CHO group. 3
(ii) What are isotopic peaks? Why are they produced in mass-spectrum? 2
- (f) (i) Predict the number of PMR Signals and splitting pattern of the following :- 3
(1) 1 - chloropropane (2) 2, 3 - Dibromobutane. 2
(ii) What is meant by 'coupling constant'? What is its significance?

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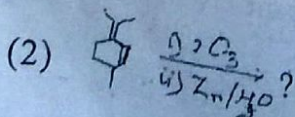
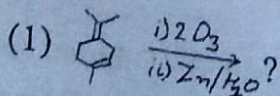
2. Answer **any three** of the following:-

- (a) Explain photochemical conversion of bezophenone to benzpinacol.
- (b) (i) Explain 'phosphorescence' with the help of Jablonski diagram.
(ii) Explain di- π -methane rearrangement of 1, 4-dienes.
- (c) (i) Give brief account of biodegradable polymers and their uses.
(ii) Write the structure and uses of
 - 1) Polystyrene
 - 2) Nylon - 6
- (d) (i) Write the reactions for preparation of following from their monomers and give its uses.
(1) Teflon
(2) Polystyrene
(ii) Explain the following terms with one example.
(1) Stabilizers
(2) Fillers
- (e) (i) What is meant by tacticity? Explain its types of stereoisomerism.
(ii) Give Biomedical uses of the synthetic polymers. (Any two)
- (f) (i) What is polymerisation? Explain cis and trans polymerisation of isoprene.
(ii) Identify the monomers in the following polymers.

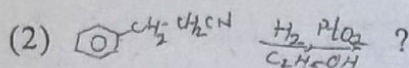
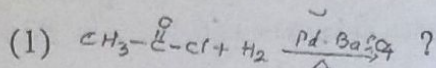


3. Answer **any three** of the following.

- (a) What are alkaloids? Give the analytical evidence with reactions for the following
 - (i) Nicotine contains pyridine nucleus.
 - (ii) Nicotine contains N-methyl group.
- (b) (i) Give the synthesis of α and β ionones from citral.
(ii) Complete the following reactions:-

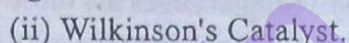
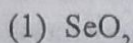


- (c) (i) Give the reaction for Hofmann exhaustive methylation and degradation of the pyrrolidene. 3
- (ii) Complete the following reactions :- 2

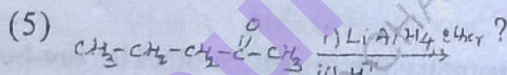
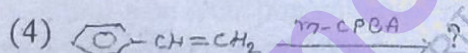
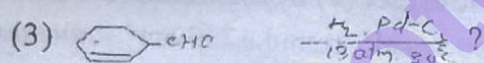
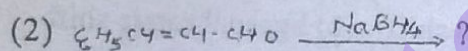
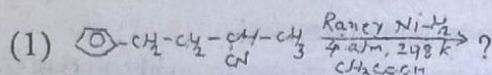


- (d) Give the synthesis of citral from 3-methylbutan-1-ol and give its commercial importance. 5

- (e) Explain the selectivity of the following with two suitable examples of each 5

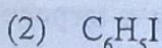
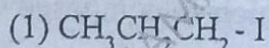


- (f) Complete the following reactions :- 5

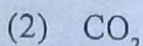
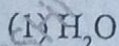


4. Answer any three of the following:-

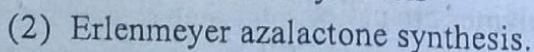
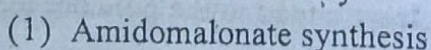
- (a) What is Lithium dialkyl cuprate? Give the preparation of Lithium dimethyl cuprate. What is action of the following on it? 5



- (b) What are Grignard reagents? Give the preparation of ethyl magnesium bromide. What is the action of the following on it? 5



- (c) Explain the term zwitter ion with respect to α - amino acids. Give the preparation of α -amino acid by - 5



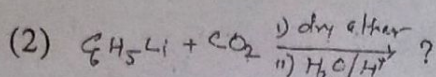
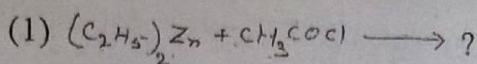
- (d) (i) What are nucleoproteins and nucleic acids? Draw the double Helix structure of DNA. 3

- (ii) What are nucleotides? Write structure of any one nucleotide. 2

- (e) Explain Merrifield's solid phase peptide synthesis. What are its advantages? 5

(f) (i) Explain pleated sheet structure of protein. Write any two functions of proteins. 3

(ii) Complete the following reactions. 2



5. Answer any five of the following :-

(a) State whether the following statements are true or false. 3

(i) Singlet states are more stable than corresponding triplet states.

(ii) Region between $3700-1400\text{ cm}^{-1}$ is called fingerprint region.

(iii) $n \rightarrow \pi^*$ transitions produce intense absorption bands.

(b) Fill in the blanks with appropriate option. 3

(i) Decrease in the wave length of maximum absorption is called

(1) bathochromic shift (2) hypsochromic shift

(3) hyperchromic effect (4) hypochromic effect

(ii) Intense absorption peak around 1700 cm^{-1} indicates presence of group.

(1) - OH

(2) $>C=O$

(3) - CN

(4) -SH

(iii) In mass spectrometry the organic molecules are bombarded with high energy

(1) γ -radiations

(2) Proton beam

(3) electron beam

(4) u. v. radiations.

(c) State whether the following sentences are true or false. 3

(i) Natural rubber is a terpene which is composed of repeated isoprene units.

(ii) Nylon - 66 is a polymer obtained by polymerisation of ϵ - Caprolactum.

(iii) PVC is thermoplastic polymer.

(d) Fill in the blanks with appropriate options :- 3

(i) Inert substances which are added to the polymer to increase the bulk of the polymer are called

(1) stabilizer

(2) filler

(3) plasticiser

(4) plastic

(ii) By condensation of monomer monoethylene glycol and Dimethyl terephthalate polymer obtained is

- | | |
|------------------|-------------------|
| (1) PET | (2) Nylon 66 |
| (3) polyurethane | (4) Epoxy - resin |

(iii) Zigeler - Natta Catalyst is used for the polymerisation of

- | | |
|-------------|------------|
| (1) alkane | (2) alkene |
| (3) alcohol | (4) acid |

(e) Fill in the blanks with appropriate option.

(i) Nicotine is isolated from

- | | |
|-----------------|----------------------|
| (1) Rose oil | (2) Belladonna plant |
| (3) Lemon grass | (4) Tobacco leaves |

(ii) Isoprene unit contains carbon atoms.

- | | |
|-------|-------|
| (1) 3 | (2) 4 |
| (3) 5 | (4) 6 |

(iii) Citral on heating with KHSO_4 gives

- | | |
|--------------|---------------|
| (1) Neroline | (2) Nerol |
| (3) Geraniol | (4) p-cymene. |

(f) State whether the following statements are true or false.

- (i) Citral-a on reduction with $\text{Na-Hg}/\text{H}_2\text{O}$ gives Geraniol.
- (ii) α - Terpineol is obtained from cardamom oil.
- (iii) Adrenaline is a steroid compound.

(g) Fill in the blanks with appropriate option:-

(i) Conjugated protein caesin is found in

- | | |
|--------------|-----------------|
| (1) milk | (2) blood |
| (3) egg yolk | (4) yeast cells |

(ii) The transmission of potential characteristics from parent to descendants is called

- | | |
|--------------|---------------|
| (1) Codon | (2) anticodon |
| (3) heredity | (4) Ribosome. |

(iii) RNA on hydrolysis gives sugar.

- | | |
|-----------------|-------------|
| (1) Ribulose | (2) Ribose |
| (3) Deoxyribose | (4) Glucose |

(h) State whether the following statements are true or false.

- (i) Nucleotide is phosphoric ester of Nucleoside.
- (ii) Isoelectric point (pI) of all amino acids is same.
- (iii) The pH of the blood and other body fluids is maintained by the buffering action of proteins.