TYBSC Sem-VI (CBSGS) 13/4/17
Organic Chemistry. 2016-2017

QP Code : 77212

(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 $C_4H_8O_2$. Determine the index of its hydrogen deficiency and deduce its structural formula from the following spectral data. Also write name of the compound. 5
IR (cm^{-1}) : 2850, 1740, 1200, 1175
PMR δ (ppm) : 1.15 (3H) triplet, 2.3 (2H) quartet, 3.7 (3H) singlet.

(B) An organic compound has molecular formula C_7H_6O. Determine the index of its hydrogen deficiency and deduce its structural formula from the following spectral data. Also write name of the compound. 5
IR(cm^{-1}) : 3065, 2820, 2735, 1703, 1200, 745, 690 .
PMR δ (ppm) : 7.4 - 7.9 (5H) multiplet, 10.0(1H) singlet.

(C) (a) Three samples are expected to be of 3-pentanol, 3 -pentanone and 1-ethoxypropane. Explain how you will choose the correct ones using their I.R. spectra. 3

(b) How will you distinguish between the following pairs of compounds on the basis of the λmax values in their u.v. spectra? 2
(i) Butanone and methylvinyl ketone.
(ii) 1,3-Hexadiene and 1,4 - hexadiene

(D) (a) Three samples having molecular formula $C_5H_{11}I$ are expected to be isomeric monoiodopentanes; viz. 1-iodopentane, 2-iodopentane and 3-iodopentane. How will you choose the correct ones using their PMR-spectra? 3

(b) Why is acetylenic proton more shielded than expected? 2

(E) What are finger-print region and group-frequency region? Explain their significance in I.R. Spectroscopy of organic compounds. 5

(F) (a) Give the mass-spectrometric fragmentation pattern of 3-methylpentane. 3

(b) Two nitrogenous organic compounds A & B form molecular ion peaks at m/e 87 and m/e 88 respectively. How will you distinguish between them in terms of the number of nitrogen atoms present on the basis of the nitrogen rule? 2

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

(A) (a) Explain fluorescence with the help of a neat and labelled Jablonski diagram. 3

(b) Explain the photochemical conversion of 1,4-dienes to vinylcyclopropanes with mechanism. 2

(B) What is Norrish type I cleavage? Explain the reactions with suitable examples at (i) 100°C (ii) room temperature. 5

(C) (a) Write the reactions for the preparation of following from their monomers and give their uses. 3

(i) Polyurethane (ii) Polypropylene 2

(b) Write brief account of recyclable polymers. 3

(D) (a) What is diene polymerisation? Explain stereochemistry of the polymer of a diene obtained by different methods of polymerisation. 2

(b) Draw the structures & give uses of following . 3

(i) PTFE (ii) PET

(E) (a) What are epoxyresins? Give the preparation of prepolymer of epoxyresin. What is the function of hardener in its preparation? 2

(b) Write any four biomedical uses of polymers. 3

(F) (a) Give the preparation, properties and uses of polystyrene. 2

(b) Explain the following terms with suitable examples.

(i) Stabilizer (ii) Elastomer

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

(A) (a) Explain Pinner's work in structural elucidation of nicotine. 3

(b) What are hormones? How are they classified? 2

(B) (a) Give the structure of : 3

(i) L-Ascorbic acid (ii) α- Terpineol (iii) Progesterone 2

(b) Explain ozonolysis of citral. 2

(C) (a) How is citral converted to ? 3

(i) ionones (ii) geraniol

(b) Explain (i) isoprene rule 2

(ii) special isoprene rule.

(D) (a) Give the total synthesis of nicotine from nicotinic acid. 3

(b) What are primary and secondary metabolites? 2

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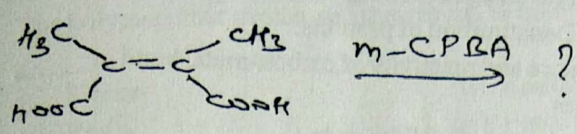
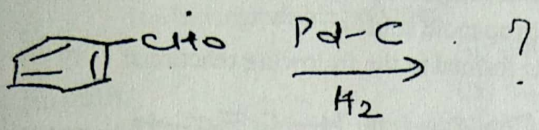
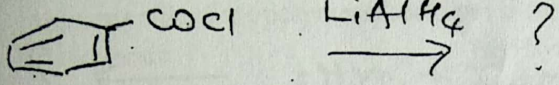
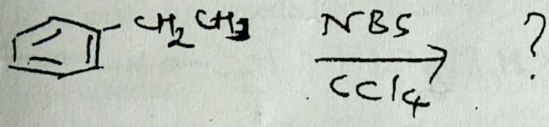
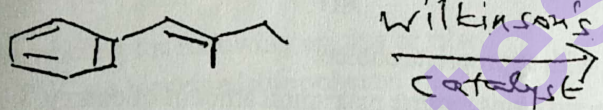
(E) Complete the following reactions: 5

(a) 

(b) 

(c) 

(d) 

(e) 

(F) (a) Give one application of each of the following reagents in organic synthesis. 3

(i) SeO_2 (ii) $NaBH_4$ (iii) B_2H_6

(b) What is Lindlar's catalyst? Explain its selectivity. 2

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

(A) Explain the terms (i) Isoelectric point (ii) Zwitterion, with reterence to α-aminoacids. How will you prepare? 5

(1) Alanine by Strecker synthesis

(2) Phenylalanine by Erlenmeyer azalactone synthesis.

(B) What is secondary structure of proteins? Explain pleated sheet structure of proteins. Discuss the functions of proteins. 5

(C) Explain the term nucleotides. Write the structures of any two nucleotides. Discuss the importance of DNA in self duplication. 5

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(D) (a) What are polypeptides? Write general structure of a dipeptide. 2

(b) Explain (1) Advantages of Merrifield solid phase synthesis. 3

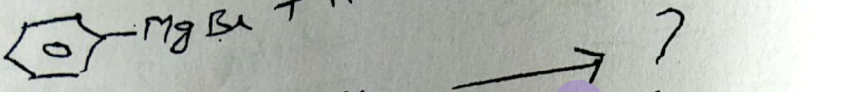
(2) Denaturation of proteins. 3

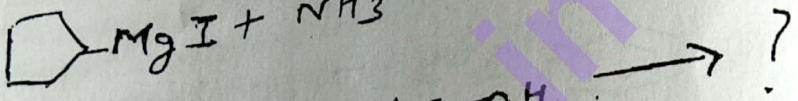
(E) (a) Explain the nature and reactivity of carbon-metal bond in organometallics. 2

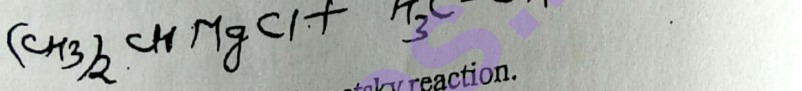
(b) How will you convert ethyl lithium to : 3

(1) propane (ii) propanoic acid

(F) (a) Write the products formed in the following reactions:

(i) 

(ii) 

(iii) 

(b) Give any one application of Reformatsky reaction. 2

4

5. (A) Fill in the blanks with appropriate choice.

(a) _____ transitions require maximum amount of energy.

($\sigma \rightarrow \sigma^*$ / $n \rightarrow \sigma^*$ / $\pi \rightarrow \pi^*$ / $n \rightarrow \pi^*$)

(b) Vibrations which bring about change in _____ of a molecule cause I.R. absorption.

(density / refractive index / polarizability / dipole moment)

(c) Spacing between peaks of a multiplet is called _____ constant.

(universal / coupling / gravitational / Planck's)

(d) Magnetic anisotropy brings about _____ of aldehydic proton.

(addition / elimination / shielding / deshielding)

OR

(A) State **true or false.** 4

(p) If a compound is transparent in the range 250-400 nm, it does not contain any unsaturated group.

(q) Nujol is used as a mulling agent in I.R. spectroscopy.

(r) PMR-signal of -OH proton normally appears as a doublet.

(s) Molecular ion is always more stable than fragement ions.

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(B) Fill the blanks with appropreat option :- 4

(a) The polymers that stretch and then revert to their original shape are _____

(i) Fibres (ii) Elastomers
(iii) Resin (iv) Plastic

(b) _____ is a biodegradable polymer.

(i) PP (ii) PS
(iii) PHA (iv) LDPE

(c) The stereoisomer of polymer in which all side chains are arranged on the same side of the polymeric backbone is called _____ polymer.

(i) Isotactic (ii) Syndiotactic
(iii) Atactie (iv) Cistactic

(d) Condensation polymerization of hexamethylene diammonium adipate gives _____

(i) Polyester (ii) Nylon-6
(iii) Nylon - 66 (iv) Polycarbonates

OR

(B) State whether the following are true or false. 4

(p) PVC is a biodegradable polymer.

(q) Polyethylene prepared by co-ordination polymerzation in presence of Ziegler Natta catalysts is HDPE.

(r) The inert substances added to polymers to increase the bulk of polymer are called stabilizers.

(s) The monomers having only two functional groups on condensation polymerisation give linear polymers.

(C) Fill in the blanks of choosing the right answer. 4

(a) Ceric ammonium nitrate is used as _____ agent.

(i) nitrating (ii) oxidizing
(iii) reducing

(b) Vitamin A is a _____ alcohol.

(i) primary (ii) secondary
(iii) tertiary

(c) Steroids on heating with Selenium at 360°C give _____.

(i) Cholesterol (ii) Ergocalciferol
(iii) Diel's hydrocarbon

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(d) Citral is the main constituent of _____.
(i) Citrous fruits (ii) Lemon Grass oil
(iii) Cinnamon oil 4

OR

(C) Fill in the blanks by choosing the right answer.
(p) Rosenmund reduction of acid chloride gives _____
(i) primary alcohol (ii) aldehyde
(iii) alkane.
(q) _____ is a water soluble vitamin.
(i) Vitamin E (ii) Vitamin B complex
(iii) Vitamin A
(r) Nicotine belongs to _____ group of alkaloids.
(i) Pyrrole - pyridine (ii) Pyrrole-piperidine
(iii) Pyridine -pyrrolidine
(s) _____ is a non-steroidal hormone.
(i) Progesterone (ii) Adrenaline
(iii) Testosterone 3

(D) Match the following

Column I	Column II
(a) Caesin	Rice
(b) Keratin	Wheat
(c) Albumin	Hair
	Milk
	Egg-White

OR

(D) State true or false. 3
(p) Organolithium compounds are more reactive than Grignard reagents.
(q) Histidine is neutral amino acid.
(r) Nucleotides are phosphate esters of nucleosides.