(Pages : 3) **W – 5310**

Reg. No. : .....

Name : .....

Third Semester M.Sc. Degree Examination, December 2025

Chemistry/Analytical Chemistry/Polymer Chemistry

CH 232/CL 232/PC 232 : ORGANIC CHEMISTRY III

(2020 Admission Onwards)

Time : 3 Hours Max. Marks : 75

SECTION – A

Answer **any two** sub-questions among (a), (b), or (c) from each question. Each question carries **2** mark.

1. (a) How do you study the keto-enol tautomerism using UV spectroscopy?

   (b) How do you check the intramolecular hydrogen bonding in IR spectroscopy?

   (c) How does a Time-of-Flight mass analyzer work?

2. (a) What is the applications of Nuclear Overhauser effect?

   (b) What are shift reagents in NMR spectroscopy?

   (c) A cyclic organic molecule absorbs in the UV at 312 nm. It has major IR bands at 2928, 2899, 2862, 1723 and 1438 cm^{-1}. The ^{1}H-NMR show peaks at 1.13 (d, 3H), 1.76 (d, 4H) and 1.81 (qp, 1H). Determine the structure.

3. (a) Discuss any one method for the preparation of organo lithium compounds

   (b) What is the application of Glaser coupling?

   (c) What is the use of Tebbe reagent?

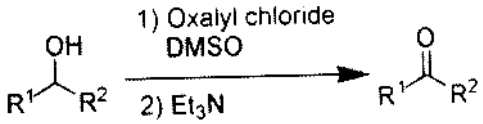
4. (a) What is the metathesis of an alkene?

   (b) What is Heck coupling?

   (c) What is combinatorial synthesis?

P.T.O.

5. (a) What is the mechanism of the of reaction?



(b) What is Wolf-Kishner reduction?

(c) What are the uses of $NaBH_4$?

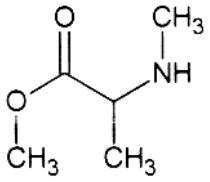
(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each question carries **5** marks.

6. (a) Mention the Woodward Fieser rules for the calculation of UV absorption values of dienes.

(b) Discuss the mass spectral fragmentation pattern of the following compound:



7. (a) What is HSQC? What is its advantage?

(b) A hydrocarbon with molecular formula $C_4H_8O_2$ has UV absorption at 307 nm. The IR transmittances are at 2931, 2862, 1732, 1421 and 1109 cm^{-1}. The ^1H-NMR (ppm) shows the following peaks: 1.16 (t. 3H), 1.19 (s. 3H) and 2.27 (q, 2H). Determine the structure of the compound.

8. (a) What are Li exchange reactions? What are its applications?

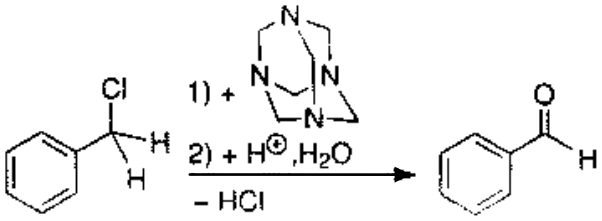
(b) Explain the applications of Grignard reagents in organic synthesis.

9. (a) Explain the applications of retro synthetic analysis.

(b) Discuss the mechanism of Sonogashira Coupling.

10. (a) Discuss the chemoselectivity in oxidation and reduction reactions.

(b) Discuss the mechanism of the following reaction



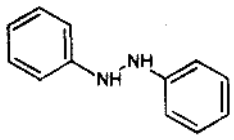
(5 × 5 = 25 Marks)

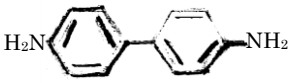
SECTION – C

Answer **any three** questions. Each question carries **10** marks.

11. (a) Discuss the principle and applications of MALDI technique.

(b) Distinguish between the following compounds by the InfraRed spectra:

(i) 

(ii) 

12. An aliphatic diester on reacting with a base produces a cyclic ester. The spectral details of the reactant are: IR: 2943, 2889, 1723, 1485, 1427 and 1103 cm^{-1}. ^1H-NMR :1.41 (s. 6H), 1.88 (t. 2H), 1.93 (p, 4H) and 2.32 (t, 2H) ppm. The spectral details of the product arc IR: 2933, 2889, 2824, 1729, 1475, 1425 and 1109 cm^{-1}. ^{1}H-NMR: 1.41 (tt. 4H), 2,48 (s, 3H) and 2.62 (t, 2H) ppm. Sketch the reaction.

13. Explain the synthesis and reactions of (Benzene) chromium tricarbonyl.

14. What is Castro-Stephens coupling? Discuss its mechanism and uses.

15. (a) What is DIBAL-H? Discuss its uses in organic synthesis.

(b) Discuss the mechanism of action and uses of SeO_2 as oxidizing agent.

(3 × 10 = 30 Marks)

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