

**RAN-1903080203020003****M. Sc. (Sem. - III) Examination October - 2025****Organic Chemistry - Selected Topics in Organic Chemistry - I****Time: 3 Hours ]****[ Total Marks: 70****સૂચના : / Instructions**

(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.

Fill up strictly the above details on your answer book.

Seat No.:

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

Student's Signature

**Q. 1. Answer any three of the following :****(18)**

- Why TMS is used as reference in NMR ? Describe difference unit used for chemical shift.
- Explain with examples of coupled and decoupled protons in  $^{13}\text{C}$ -NMR.
  - Calculate the  $^{13}\text{C}$  chemical shift in pentanol.
- A colorless liquid (M.F. =  $\text{C}_9\text{H}_{10}\text{O}_2$ ) gives following spectral data:  
 IR( $\text{cm}^{-1}$ ): 1720, 1602, 1581, 1270, 1150  
 $^1\text{H}$ -NMR ( $\delta$  ppm): (1.29, t, 3H, J = 8Hz)  
 (4.35, q, 2H, J = 8Hz)  
 (7.40, m, 3H) and (8.81, m, 2H)  
 Determine the structure of the compound.
- Predict the splitting patterns and number of signals in the following compounds in  $^1\text{H}$ -NMR.
  - $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_3$
  - $\text{ClCH}_2\text{CH}_2\text{CH}_2\text{Cl}$
  - $\text{CH}_3\text{OC}_2\text{H}_5$

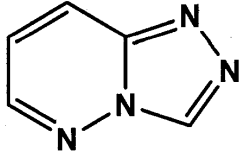
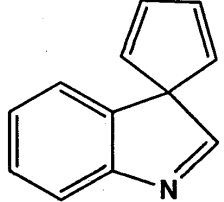
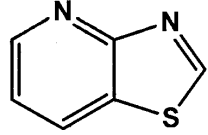
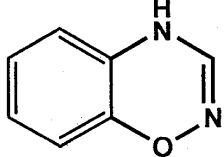
**Q. 2. Answer any three of the following :****(18)**

- Give schematic diagram of the methods used in industries for the removal of gaseous pollutants to control the air pollution.
- What is eutrophication? Discuss the effects of organic pollutants on water bodies.
- Describe the working of distillery industry. Which processes generated the wastage in distilleries ? Discuss treatment given to wastewater from distilleries.
- Discuss different methods for monitoring  $\text{CO}_x$  in air.

**Q. 3. Answer any three of the following :****(18)**

- How is thiazole prepared ? Mention its important reactions.
- Give an account of the synthesis routes and characteristic reactions of pyrazine.
- Give the structural formula of any three of the following compounds.
  - 3, 9-diazabicyclo[3.3.1] nonane
  - $^1\text{H}$ -pyrrolo[2,1-c][1,4]thiazine
  - 5H-Thiazolo[3,2-a]pyridine
  - Furo[3,4-c] pyridine

d. Using systematic nomenclature rules, give the name of any three of the following.

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

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

**(16)**

- Give the preparation of n - butyl lithium. Give applications of n - butyl lithium.
- Give the method of preparation of LTA. Discuss the synthetic applications of LTA in the oxidation of hydroquinone and monohydric alcohols.
- Give the preparation of NBS and it's use for a - bromination of carbonyl compounds and benzylic bromination.
- Describe the method of preparation of  $K_3Fe(CN)_6$  and state its uses.

\_\_\_\_\_