



RAN-2203080201040002

M.Sc. Chemistry (Sem. - I) Examination November - 2025

Analytical Chemistry Paper - 4 (Elective Paper-A)

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
- (2) Sketch a neat and labelled diagram wherever necessary
- (3) Figures to the right indicate the full marks of the questions.
- (4) All questions are compulsory.

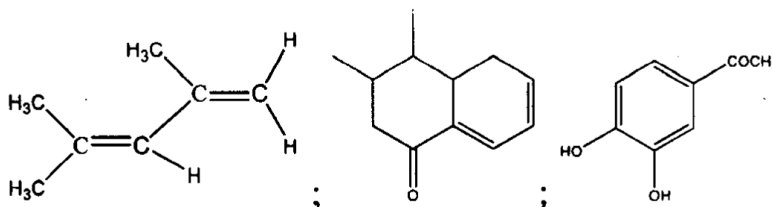
Seat No.:

Student's Signature

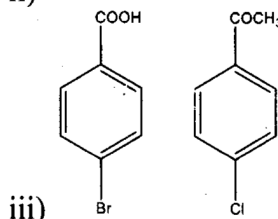
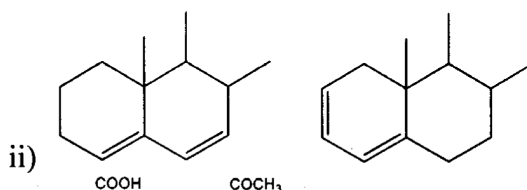
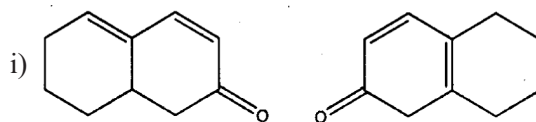
Q. 1 Answer any THREE of the following

18

- a) Explain allowed and forbidden transitions in UV-Visible Spectroscopy with examples. Explain auxochrome with examples.
- b) Explain bathochromic and hypsochromic shift in UV-Visible Spectroscopy. Explain the steric effect and the hydrogen bonding factor affecting $\lambda_{\max}$.
- c) i) Explain the application of UV-Visible in Structure elucidation, Compound identification and detecting impurities.
ii) Calculate the $\lambda_{\max}$ of the following compounds.



- d) Which of the compounds from the following pair is absorbed at a higher wavelength? Why?



- Q. 2** **Answer any THREE of the following.** **18**
- What is the principle of separation in TLC? Explain the applications of TLC.
 - Give the names of different stationary phases used in GSC. Explain the porous polymer stationary phase in GSC.
 - Discuss the different columns in GC. Give the advantages of a capillary column over a packed column.
 - Name the different detectors used in GC. Discuss the principles and operation of TCD.
- Q. 3** **Answer any THREE of the following** **18**
- Discuss the least squares method in detail.
 - Explain the physical significance of average deviation and standard deviation with examples.
 - Explain basic statistics, including mean, median, average deviation, standard deviation, variance, and coefficient of variation.
 - Write a note on the Q-test.
 - In the analysis of phosphorus content, the following values were reported: 0.45, 0.46, 0.47, and 0.50. Find whether the value of 0.50 can be retained based on the Q-test. (Q-value for four measurements at 90% confidence level is 0.76)
- Q. 4** **Answer any THREE of the following** **16**
- Explain Molarity, %V/V, ppm, formality, ppt with examples.
 - How is the equivalence point determined in non-aqueous titration?
 - What is a protogenic and protophilic solvent? Explain the auto-protolysis constant in non-aqueous titration,
 - What is the acid value?
 - In a 250 ml aqueous solution, 0.63g $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ dissolved. Calculate its Normality. (M.W. of $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O} = 126 \text{ g/mol}$)
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