



SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST -II
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech. Chemical Engineering
Course Code and Course Name : BACHY104 - Engineering Chemistry
Faculty Name(s) : Dr. Ethiraj KR, Dr. Atanu Chakraborty
Class Number(s) : 6416, 6422
Date of Examination : 07/10/2025
Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcome:
 - CO-1: Explain the electronic effects and reactions of aromatic compounds with mechanisms

QN	Questions	M	CO	BL
1.	Write the increasing order of acidity of chloroacetic acid (ClCH_2COOH), acetic acid (CH_3COOH), and trifluoroacetic acid (CF_3COOH). Explain the role of electronic effects of the substituents.	10	1	BL2
2.	(a) Arrange the following alkenes in the increasing order of stability and give justification $\begin{array}{c} \text{H} & & \text{H} \\ & \backslash & / \\ & \text{C} = \text{C} \\ & / & \backslash \\ \text{H} & & \text{H} \end{array}$ (i) $\begin{array}{c} \text{H}_3\text{C} & & \text{CH}_3 \\ & \backslash & / \\ & \text{C} = \text{C} \\ & / & \backslash \\ \text{H}_3\text{C} & & \text{CH}_3 \end{array}$ (ii) $\begin{array}{c} \text{H} & & \text{CH}_3 \\ & \backslash & / \\ & \text{C} = \text{C} \\ & / & \backslash \\ \text{H} & & \text{H} \end{array}$ (iii) $\begin{array}{c} \text{H} & & \text{CH}_3 \\ & \backslash & / \\ & \text{C} = \text{C} \\ & / & \backslash \\ \text{H}_3\text{C} & & \text{CH}_2\text{CH}_3 \end{array}$ (iv) (b) Discuss the role of hybridisation in the acidity of hydrocarbons.	10 (5+5)	1	BL2
3.	The bond energy of a carbon-carbon triple bond ($\text{C}\equiv\text{C}$) is approximately 839 kJ/mol, while the bond energy of a carbon-carbon single bond ($\text{C}-\text{C}$) is roughly 347 kJ/mol. Explain this significant difference in bond energies, relating your explanation to the physical properties and orbital characteristics of these bonds.	10	1	BL3
4.	Complete the reaction and give the mechanism of the following: $\text{?} \xrightarrow{\text{?}} \text{C}_6\text{H}_5\text{C(CH}_3)_2\text{CH}_2\text{CH}_3$ $\text{C}_6\text{H}_4(\text{Br})(\text{CF}_3) \xrightarrow{\text{NaNH}_2/\text{NH}_3} \text{?} \xrightarrow{\text{NaNH}_2/\text{NH}_3} \text{?}$ Major product	10 (5+5)	1	BL1
5.	Explain the synthesis and chemical properties of azo dyes. Why are these dyes highly colored? Relate their structure to their colour.	10	1	BL2