

K. J. Somaiya Institute of Technology, Sion, Mumbai-22  
(Autonomous College Affiliated to University of Mumbai)

Nov-Dec 2024

B. Tech Program Scheme- III

Regular Examination: FY Semester: I

Course Code: BSC103 and Course Name: Engineering Chemistry

Date of Exam: 15/01/25

Duration: 02 Hours

Max. Marks: 45

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

Additional Data Atomic weights: C = 12, H = 1, N = 14, O = 16, Cl = 35.5, Na = 23, Mg = 24, Ca = 40  
S = 32, Cl = 35.5

		Max. Marks	CO	BT level
<b>Q 1</b>	Solve <b>any five</b> questions out of six.	<b>15</b>		
i)	After treating 15000 liters of water by ion exchanger, the cationic resins required 250 liters of 0.5 N HCl and anionic resins required 250 liters of 0.5 N NaOH solutions. Calculate the hardness of water.		2	2
ii)	Calculate % atom economy of reactions with respect to product cinnamaldehyde  $C_6H_5CHO + CH_3CHO \rightarrow C_6H_5CH=CHCHO + H_2O$		5	2
iii)	Write the difference between galvanizing and tinning.		1	2
iv)	What is the principle of solar power plant?		4	1
v)	What are the applications of flame photometry?		6	1
vi)	1.1 gm of coal sample was used for determination of nitrogen by Kjeldahl method. The NH <sub>3</sub> evolved was passed into 30ml of N/10 H <sub>2</sub> SO <sub>4</sub> . The excess acid required 13ml of N/10 NaOH for neutralization. Calculate % of nitrogen.		3	2
<b>Q.2</b>	Solve <b>any three</b> questions out of four.	<b>15</b>		

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i)	What is corrosion? Explain stress corrosion with the help of examples.		1	2
ii)	A sample of hard water on analysis was found to have following salts: $\text{Ca}(\text{HCO}_3)_2 = 150 \text{ mg/L}$ , $\text{CaCl}_2 = 160 \text{ mg/L}$ , $\text{MgSO}_4 = 147 \text{ mg/L}$ , $\text{Mg}(\text{HCO}_3)_2 = 198 \text{ mg/L}$ , $\text{KNO}_3 = 120 \text{ mg/L}$ . Calculate temporary, permanent and total hardness of the given sample of hard water.		2	3
iii)	What are selection rules? Explain them in details with the help of diagram.		6	2
iv)	Explain the refining of Crude petroleum with a neat diagram.		3	2
<b>Q.3</b>	Solve <b>any three</b> questions out of four.	15		
i)	Explain conventional and green route of manufacturing indigo. Also justify why route is green?		4	3
ii)	50 ml of standard hard water (1m $\text{CaCO}_3/\text{ml}$ ) requires 22 ml of EDTA solution .50 ml of water sample required 11ml of EDTA solution .The same sample after boiling required 7 ml of EDTA solution .Calculate temporary hardness of water sample .		2	3
iii)	What is paint? Write any four constituents of paint with functions and examples.		1	2
iv)	A sample of coal contains C = 85%, H = 3%, O = 5%, S =3.5%, N = 3.5% Calculate Gross and Net Calorific value of the fuel.		3	3

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