

December - 2023 (B.Tech) Program: FE   SCHEME - II Examination: FY Semester: I Course Code: BSC103 Course Name: Engineering Chemistry Duration: 02 Hours Max. Marks: 45				
<b>Instructions:</b> (1) All questions are compulsory. (2) Draw neat diagrams wherever applicable. (3) Assume suitable data, if necessary. <b>Atomic weights ; C= 12, O=16, H=1, N=14, Ca=40, Na=23, Mg= 24, Cl=35.5, S=32, Fe=56, Al=27</b>				
		Max. Marks	CO	BT level
<b>Q 1</b>	Solve <b>any five</b> questions out of six	<b>15</b>		
i)	2.0 gm of coal sample was used for determination of nitrogen by Kjeldahl method. The NH <sub>3</sub> evolved was passed into excess of acid. The excess acid required 18 ml of N/10 KOH solution. A blank titration is also carried out .Its reading is 30 ml. Calculate % of nitrogen.	3M	3	3
ii)	What is power alcohol and what are the advantages of power alcohol?	3M	4	2
iii)	Calculate % atom economy of reactions with respect to product methyl iso-cyanate  $\text{CH}_3\text{NH}_2 + \text{COCl}_2 \longrightarrow \text{CH}_3\text{-N=C=O} + 2\text{HCl}$ <p style="text-align: center;">methyl iso-cyanate</p>	3M	5	3
iv)	Differentiate between anodic and cathodic coating.	3M	1	1
v)	What are the applications of molecular spectroscopy?	3M	6	1
vi)	A chemical analysis showed the presence of following salts (mg/L) in the hard water sample:  Ca (HCO <sub>3</sub> ) <sub>2</sub> = 146, Mg (HCO <sub>3</sub> ) <sub>2</sub> = 160, CaCl <sub>2</sub> = 121, Mg (NO <sub>3</sub> ) <sub>2</sub> = 130, NaCl = 10. Calculate temporary, permanent and total hardness of the given sample of hard water.	3M	2	3

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<b>Q.2</b>	Solve <b>any three</b> questions out of four.	<b>15</b>		
i)	How proper designing and selection of material protect the metals from corrosion? Explain with examples.	5M	1	1
ii)	What are selection rules? Explain them in details with the help of diagram.	5M	6	1
iii)	Compare conventional and green route of manufacturing Indigo Explain which principle of green chemistry does green route support?	5M	5	2
iv)	Draw a suitable diagram and explain pitting corrosion of the metallic objects.	5M	1	2
<b>Q.3</b>	Solve <b>any three</b> questions out of four.	<b>15</b>		
i)	50 ml of water sample consumes 7 ml of N/20 EDTA solution .After boiling and filtration same volume of water sample consumes 4ml of N/20 EDTA Calculate total, permanent and temporary hardness of water sample .	5M	2	3
ii)	Find the higher and lower calorific value of a coal sample which on ultimate analysis gave the following results C = 78 %, H = 9 %, O=8%, N = 3 %, S =2%. Assume latent heat of steam is 580 Kcal/Kg.	5M	3	3
iii)	What are the advantages and applications of hydrogen as a fuel?	5M	4	2
iv)	What is petrol knocking? Define Octane and Cetane number.	5M	3	1

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