

August 2023

(B.Tech) Program: FE

Examination: FY Semester: I (Scheme II) | Backlog

Course Code: BSC103 Course Name: Engineering Chemistry

Duration: 02 Hours

Max. Marks: 45

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.
- (4) Additional Data: Atomic weights: - H = 1, C = 12, N = 14, O = 16, Na = 23, Mg = 24, Cl = 35.5, K = 39, Ca = 40, S = 32.

		Max. Marks	CO	BT level
Q 1	Solve any five questions out of six	15		
i)	A sample of hard water was found to have following composition on chemical analysis:- $Mg(HCO_3)_2 = 7.3$ mg/L, $Ca(HCO_3)_2 = 16.2$ mg/L, $MgCl_2 = 9.5$ mg/L, $CaSO_4 = 13.6$ mg/L. Calculate temporary, permanent and total hardness of given sample of hard water.	3M	2	3
ii)	'Reduction of the waste is an important principle of Green Chemistry' — Justify.	3M	5	2
iii)	How is moisture determined in the coal sample?	3M	3	2
iv)	Explain the role of fillers and driers used while making of paint.	3M	1	2
v)	Explain only the working of reverse osmosis used in purification of water.	3M	2	2
vi)	The fuel sample has following composition: C = 80%, H = 6%, O = 8 %, S = 1.5%, N = 1%. Calculate GCV and NCV of the given sample of the fuel.	3M	3	3
Q.2	Solve any three questions out of four.	15		
i)	A sample of coal contains C = 65%, H = 15%, O = 10%, S = 4%, Ash = 4%, N = 2% by weight. Calculate the weight of air needed for complete combustion of 1Kg of this fuel.	5M	3	3

ii)	Explain Ion Exchange method of softening the hard water.	5M	2	2
iii)	Explain sacrificial anode method of preventing metallic corrosion.	5M	1	2
iv)	Explain conventional and green route of manufacturing indigo dye. Also justify why route is green?	5M	5	2
Q.3	Solve any three questions out of four.	15		
i)	20ml of standard hard water that contained 1.2 g CaCO ₃ per liter required 30 ml of EDTA. 50 ml of unknown hard water sample required 30 ml of same EDTA. This sample of hard water was boiled, cooled and filtered. 50ml of this filtered water required 20 ml of EDTA. Calculate hardness of all types.	5M	2	3
ii)	Explain how following factors affect the rate of metallic corrosion- (i) position of metal in an electrochemical series (ii) pH.	5M	1	2
iii)	Outline the representative reaction and explain method to prepare Biodiesel. Write its advantages.	5M	4	2
iv)	What is green chemistry? Calculate percentage atom economy for the following reaction with respect to acetanilide. $\text{C}_6\text{H}_5\text{NH}_2 + (\text{CH}_3\text{CO})_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{NH COCH}_3 + \text{CH}_3\text{COOH}$ <p style="text-align: center;">acetanilide</p>	5M	5	3
