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

Subject Code: **BSC103**   Subject Name: **Engineering Chemistry**   Date: 11/08/23

August 2023 (B.Tech) Program: FE Examination: FY Semester: I (Scheme II) 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)	An 8 ml sample of waste water was refluxed with 40 ml of potassium dichromate solution and after refluxing the excess unreacted dichromate required 20 ml of 0.1 N FAS solution. A blank of distilled water on refluxing with 40 ml of dichromate solution required 35 ml of 0.1 N FAS solution. Calculate of COD of waste water.		3M	2	3
ii)	What is Supercritical carbon dioxide (SC CO_2) and what are its applications?		3M	5	2
iii)	What is the significance of determining percentage of ash in coal sample?		3M	3	2
iv)	What are the characteristics of a good paint?		3M	1	2
v)	Define hardness. How temporary hardness is removed from water?		3M	2	2
vi)	0.4 gm of a coal sample was burnt in bomb calorimeter. The ash formed was extracted with $BaCl_2$ solution to get $BaSO_4$ precipitate. The weight of dry precipitate was 0.038 gm. Calculate % of Sulphur.		3M	3	3

Q.2	Solve **any three** questions out of four.	**15**		
i)	Define GCV. Calculate GCV and NCV of the given sample of the fuel having following composition: C =78%, H= 16%, O = 4%, S = 1.5%, N= 0.5 %. Calculate GCV and NCV of the given sample of the fuel.	5M	3	3
ii)	What is the principle of electro dialysis method? Explain the process with the help of the diagram.	5M	2	2
iii)	Explain wet corrosion in acidic medium with schematic diagram and mechanism.	5M	1	2
iv)	What is green chemistry? List the 12 principles of green chemistry.	5M	4	2
Q.3	Solve **any three** questions out of four.	**15**		
i)	50ml of standard hard water (10 g $CaCO_3$/ lit) required 40 ml of EDTA. 50 ml of unknown hard water sample required 24 ml of same EDTA. This sample of hard water was boiled, cooled and filtered. 50ml of this filtered water required 15 ml of EDTA. Calculate hardness of all types.	5M	2	3
ii)	What are the advantages and applications of hydrogen as a fuel?	5M	5	2
iii)	What is cathodic protection? Explain impressed current cathodic protection of corrosion control with the help of diagram.	5M	1	2
iv)	What do you understand by atom economy? Calculate % atom economy of the following reactions with respect to the product maleic anhydride. 1) $C_6H_6 + 4.5O_2 \rightarrow C_4H_2O_3 + 2H_2O$ 　　　maleic anhydride 2) $C_4H_8 + 3O_2 \rightarrow C_4H_2O_3 + 3H_2O$ 　　　maleic anhydride	5M	4	3