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

Subject Code: **BSC103** Subject Name: **Engineering Chemistry** Date: 26/6/23

May - June 2023
(B.Tech) Program: ~~BE~~ FY
Examination: FY Semester: I Scheme II
Course Code: **BSC103** Course Name: **Engineering Chemistry (KT)**
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) 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) | Write the difference between temporary and permanent hardness. | 3M | 2 | 2 |
| ii) | Explain "design for degradation" principle of green chemistry with the help of suitable example. | 3M | 5 | 2 |
| iii) | What is petrol knocking? Which antinocking agents are used in petrol? | 3M | 3 | 2 |
| iv) | Differentiate between galvanizing and tinning. | 3M | 1 | 2 |
| v) | What is hardness of water? Write the reaction of hard water with soap. | 3M | 2 | 2 |
| vi) | Calculate the percentage of carbon and hydrogen when 0.6 gm of coal was burnt in a combustion apparatus and the gaseous products of combustion were absorbed in KOH bulb and $CaCl_2$ tube which were previously weighed. Increase in weight of KOH bulb and $CaCl_2$ tube found to be 0.86 gm and 0.34 gm respectively. | 3M | 3 | 3 |
| **Q.2** | Solve **any three** questions out of four. | **15** | | |
| i) | What is anodic protection? Explain with the help of diagram. | 5M | 1 | 2 |
| ii) | How is the ultrafiltration process used for the separation of macromolecules? Write the industrial applications of | 5M | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| | ultrafiltration. | | | |
| iii) | A sample of coal was found to contain the following constituents C=73%, O=10%, S=3%, H=5%, N=1%, ash=1% and remaining is moisture. Calculate the minimum weight and volume of oxygen required for the complete combustion of two kg of coal. | 5M | 3 | 3 |
| iv) | With a suitable diagram and electrode reactions, explain electrochemical mechanism of rusting of iron in neutral and aqueous medium. | 5M | 1 | 2 |
| **Q.3** | Solve **any three** questions out of four. | **15** | | |
| i) | What is green chemistry? Calculate percentage atom economy for the following reaction with respect to chloro benzene.<br>$C_6H_6+Cl_2 \longrightarrow C_6H_5Cl + HCl$<br>Chloro benzene | 5M | 5 | 3 |
| ii) | How the bio gas is produced from animal dung? Why it is preferred over conventional fuel? | 5M | 4 | 2 |
| iii) | Explain conventional and green route of manufacturing adipic acid. Also justify why route is green? | 5M | 5 | 3 |
| iv) | 100 ml of standard hard water (1200mg CaCO3 /lit) requires 45 ml of EDTA solution. 100ml of water sample consumes 20 ml of same EDTA solution. 100 ml of boiled and filtered same water sample consumes 12 ml of this EDTA solution using EBT indicator at pH 10. Calculate all the types of hardness in this water sample. | 5M | 2 | 3 |

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