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| **Semester: October 2022 – January 2023**  **Maximum Marks: 100 Examination: ESE Examination Duration:3 Hrs.** | | | | |
| **Programme code: 01**  **Programme: B.Tech** | | | **Class: F.Y.B.Tech** | **Semester: I (SVU 2020)** |
| **Name of the Constituent College:**  **K. J. Somaiya College of Engineering** | | **Name of the department: All Branches** | | |
| **Course Code:** **116U06C103** | **Name of the Course: Engineering Chemistry** | | | |
| **Instructions: 1)Draw neat diagrams 2) All questions are compulsory**  **3) Assume suitable data wherever necessary 4 ) Atomic mass of Ca=40, Mg=24, C=12, O=16, N=14, S=32,** | | | | |

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| **Que. No.** | **Question** | **Max. Marks** |
| Q1 | Solve any **Four** | **20** |
| i) | Explaining Prevention of waste with respect to principle of green Chemistry  Justifying its importance with suitable example. | 2 M  3M |
| ii) | Writing the reactions during softening  and regeneration in zeolite method.  two advantages of zeolite method. | 2 M  1 M  2 M |
| iii) | Writing classification pf Nano materials  Explaining each class using suitable examples. | 2.5 M  2.5 M |
| iv) | Distinguish between addition and condensation polymerization  5 Points | 1m x 5 |
| v) | Draw the neat labelled diagram for solar water heater  and give three limitations of solar energy. | 2 M  1M x 3 |
| vi) | absorbance a = 0.2218  & Molar absorptivity = 985.77 lit mol-1 cm-1 | 2.5 M  2.5 M |

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| Q2 A | Solve the following | **10** |
| i) | Give functions and examples of any two ingredients used in molding of plastics. | 2.5 M x 2 |
| ii) | Discuss any five characteristics of thermosetting polymers. | 1 M x 5 |
|  | OR |  |
| Q2 A | Find number average, weight average and PDi of the polymer.  If a poly disperse mixture of polymer contains 150 molecules of molecular weight 2500, 250 molecules of molecular weight 3000 and 300 molecules of molecular weight 500.  Mn=1821.42  Mw=2558.82  PDI=1.40  Give four applications of biodegradable polymers. | 2 M  2 M  2 M  1 M x 4 |
| Q 2 B | Solve any **One** | **10** |
| i) | Explain with the help of diagram  and reactions during temporary hardness & permanent hardness of hard water by hot lime soda process.  Give two advantages and limitations of lime soda process over zeolite process. | 2 M  4 M  2 M x 2 |
| ii) | Define BOD and COD.  Explain method to determine COD of effluent water using K2Cr2O7 titration. What is unit for its measurement and  Writing the any three advantages of COD over BOD. | 2 M  4 M  1 M  1M x 3 |

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| Q3 | Solve any **Two** | **20** |
| i) | What is proximate analysis of coal?  Determination of percentage volatile matter with formula and condition  Determination of percentage moisture present in coal with formula and condition  Discuss significance of determination % moisture and volatile matter (two points). | 1M  3 M  3 M  1M x 2 |
| ii) | Explain cracking of oils with suitable example.  Schematic diagram for moving bed catalytic cracking.  Explaining the moving bed catalytic cracking with condition and regeneration  Write two advantages of moving bed catalytic cracking. | 2 M  2 M  4 M  2M |
| iii) | Define calorific value.  What is difference between GCV and NCV of coal sample?  Calculate, GCV and of coal if it contains: C = 85 %, H = 6 %, O = 2 %, S = 2 %, N = 1 %. Ash= remaining. NCV  GCV=8896. Kcal/Kg, NCV= 8571 Kcal/kg | 1 M  3 M  3 M  3 M |

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| Q4 | Solve any **Two** | **20** |
| i) | What is principle of conductometric titration?  With the help of representative titration curve and  reaction during the neutralization  Explaining the increase and decrease of conductivity of solution during neutralization of strong acid and weak base using conductometric titrations | 3 M  2 M  2 M  3 M |
| ii) | Writing formula for Beer- Lamberts law and explaining each term  What is unit for molar extinction coefficient?  Explain with labelled diagram  working of double beam spectrophotometer with each component with their significance | 2M  1 M  2M  5M |
| iii) | Writing the formula for linear molecule  total number of fundamental modes of vibrations for CO2 = 4  & acetylene (C2H2) molecule. =7  Give IR frequencies for following functional group.   1. O-H (hydrogen bonded) c) Alkyl C-H stretching 2. Ether C-O-C d) Alkyl C-H bending | 2 M  2 M  2 M  1 M x 4 |

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| Q5 | Solve or write a short note on any **Four** | **20** |
| i) | Explaining Caustic embrittlement with reaction  and disadvantage | 5 M |
| ii) | Any 5 applications of Nano materials in medicine | 5 |
| iii) | Kevlar Polymer properties synthesis and uses | 5 |
| iv) | Solar photovoltaic cell diagram and working and advantage | 5 |
| v) | Atom Economy formula and significance and example | 5 |
| vi) | Any 5 Objectives of Green Chemistry | 5 |