| Reg.No.: | | | | | | | | |
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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 4003**

B.E./B.Tech. DEGREE END-SEMESTER EXAMINATIONS – March/April 2023

First Semester

Electrical and Electronics Engineering

**U19CH105 – ENGINEERING CHEMISTRY**

(Regulation 2019)

(Common to Electronics and Communication Engineering and Biomedical Engineering)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

| Knowledge Levels (KL) | K1 – Remembering | K3 – Applying | K5 - Evaluating |
|---|---|---|---|
| | K2 – Understanding | K4 – Analyzing | K6 - Creating |

PART – A

(10 x 2 = 20 Marks)

| Q.No. | Questions | Marks | KL | CO |
|---|---|---|---|---|
| 1. | Is calcium carbonate soluble in water and why is it used as a unit to measure the hardness of water? | 2 | K2 | CO1 |
| 2. | State the difference between soft water and demineralized water. | 2 | K5 | CO1 |
| 3. | Define Tacticity with suitable example. | 2 | K1 | CO2 |
| 4. | Define functionality. | 2 | K1 | CO2 |
| 5. | List any two difference between nanoparticles and bulk particles. | 2 | K1 | CO3 |
| 6. | Give two examples each for top-down and bottom-up approaches in synthesizing nanoparticles. | 2 | K1 | CO3 |
| 7. | Mention disadvantages and uses of $H_2$-$O_2$ fuel cell. | 2 | K1 | CO4 |
| 8. | Define photovoltaic cell. | 2 | K1 | CO4 |
| 9. | State pilling bedworths rule. | 2 | K3 | CO5 |
| 10. | What are the functions of the vehicle in paint? | 2 | K2 | CO5 |

## PART – B

(5 x 16 = 80 Marks)

| Q.No. | | | Questions | Marks | KL | CO |
|---|---|---|---|---|---|---|
| 11. | a) | i. | Explain the procedure in detail to determine hardness of water using EDTA method with all relevant chemical reactions and steps involved. | 8 | K1 | CO1 |
| | | ii. | Identify the troubles occurs when using raw water in to the boiler. | 8 | K5 | |
| | | | (OR) | | | |
| | b) | i. | Explain the process of softening the hard water using ion-exchange method with all relevant chemical reactions, along with merits and demerits. | 8 | K1 | CO1 |
| | | ii. | Explain the water purification process by Reverse Osmosis technique with neat diagram. | 8 | K2 | |
| 12. | a) | i. | Explain the steps involved in the free radical polymerization mechanism. | 8 | K3 | CO2 |
| | | ii. | Explain the preparation, properties and uses of PMMA and Bakelite. | 8 | K2 | |
| | | | (OR) | | | |
| | b) | i. | Explain the addition and condensation polymerization with suitable examples. | 8 | K2 | CO2 |
| | | ii. | Explain the preparation, properties and uses of nylon 6,6 and Polystyrene. | 8 | K2 | |
| 13. | a) | i. | Describe the preparations of nanoparticles using sol-gel and hydrothermal method with neat diagram. | 10 | K1 | CO3 |
| | | ii. | Explain the application of nanoparticles in medical field. | 6 | K2 | |
| | | | (OR) | | | |
| | b) | i. | Describe the preparation methodology of nanoparticles using solvothermal method and chemical vapor deposition. | 10 | K1 | CO3 |
| | | ii. | Discuss the various types of nanoparticles used in electronic devices. | 6 | K2 | |
| 14. | a) | | Describe the components and working principle of alkaline battery and hydrogen - oxygen fuel cells. | 16 | K1 | CO4 |
| | | | (OR) | | | |
| | b) | i. | Describe the components and working principle of wind power plants. | 8 | K1 | CO4 |
| | | ii. | Describe the working construction and cell reaction of Ni-Cd batteries. | 8 | K2 | |
| 15. | a) | | Discuss the types of electrochemical corrosion with the corresponding chemical reactions and examples. | 16 | K1 | CO5 |
| | | | (OR) | | | |
| | b) | i. | Explain the factors influencing the rate of corrosion. | 10 | K1 | CO5 |
| | | ii. | Describe the process of nickel electro-less plating in detail. | 6 | K2 | |