

**THE KAVERY ENGINEERING COLLEGE***(An Autonomous Institution)***M.E DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2025***First Semester**Environmental Engineering***PEVT2401 - Environmental Chemistry***Regulations - 2024***Duration: 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                               | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|--------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | Define solubility product ( $K_{sp}$ ) and write its general expression for a salt                                             | L1         | 1         | 2            |
| 2.          | In a first-order reaction, Identify the reason for the rate of reaction change as the concentration of the reactant decreases. | L3         | 1         | 2            |
| 3.          | List four drinking water quality parameters.                                                                                   | L1         | 2         | 2            |
| 4.          | Interpret the effect of thickness of the double layer on the sorption of contaminants onto colloids.                           | L2         | 2         | 2            |
| 5.          | Differentiate chemical and photochemical reaction with one example each.                                                       | L3         | 3         | 2            |
| 6.          | What are the primary sources of black carbon emissions?                                                                        | L1         | 3         | 2            |
| 7.          | Classify soil based on its composition.                                                                                        | L2         | 4         | 2            |
| 8.          | Name two agricultural chemicals used in India that contaminate soil.                                                           | L1         | 4         | 2            |
| 9.          | Select two endocrine-disrupting chemicals from the list (Citric acid, Vitamin E, Bisphenol A, Phthalate) .                     | L3         | 5         | 2            |
| 10.         | Infer two benefits of composites when used for environmental remediation.                                                      | L3         | 5         | 2            |

**PART – B (ANSWER ALL QUESTIONS) (Marks 5\*16 = 80)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                                                                                                                    | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11. a       | Analyze the acid-base reactions, $\text{CO}_2$ solubility in water and species distribution in water.                                                                                                               | L3         | 1         | 16           |
|             | <b>Or</b>                                                                                                                                                                                                           |            |           |              |
| b           | Ocean acidification is increasing due to rising atmospheric $\text{CO}_2$ levels. Analyze the chemical equilibria involved in this process, include heavy metal precipitation, and amphoteric hydroxides formation. | L3         | 1         | 16           |
| 12. a       | Analyze the combined effects of volatilization, partitioning and photochemical transformation on the fate of a volatile organic compound in a freshwater ecosystem. Write relevant equations to support it.         | L2         | 2         | 16           |

**Or**

|     |     |                                                                                                                                                                                        |    |   |    |
|-----|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|
|     | b   | Explain the significance of pE–pH diagrams in understanding the environmental behavior of synthetic chemicals.                                                                         | L2 | 2 | 16 |
| 13. | a   | Identify and explain the major greenhouse gases contributing to global warming.                                                                                                        | L2 | 3 | 16 |
|     |     | <b>Or</b>                                                                                                                                                                              |    |   |    |
|     | b i | Summarize the origin, particulate composition and environmental impacts of acid rain.                                                                                                  | L2 | 3 | 8  |
|     | ii  | Assess the methods used for determining key air quality parameters and their significance in environmental monitoring.                                                                 | L2 | 3 | 8  |
| 14. | a   | Outline the role of clays in soil composition and their impact on cation exchange capacity.                                                                                            | L2 | 4 | 16 |
|     |     | <b>Or</b>                                                                                                                                                                              |    |   |    |
|     | b   | Outline the impacts of agricultural chemicals on soil, method for reclaiming contaminated land through leaching for salts, and the use of electrokinetic remediation for heavy metals. | L2 | 4 | 16 |
| 15. | a i | Compare chemical speciation of the heavy metal mercury and arsenic. Discuss the importance of understanding heavy metal toxicity on human health.                                      | L3 | 5 | 8  |
|     | ii  | Choose and tabulate the toxicity effects on environment and human health of dioxins, Furan, PAHs and fluoro compounds.                                                                 | L3 | 5 | 8  |
|     |     | <b>Or</b>                                                                                                                                                                              |    |   |    |
|     | b   | Identify eight applications of nanomaterials in heavy metal pollutant remediation.                                                                                                     | L3 | 5 | 16 |