

**THE KAVERY ENGINEERING COLLEGE***(An Autonomous Institution)***M.E DEGREE END SEMESTER THEORY EXAMINATIONS NOV/DEC 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)**

| <i>Q.No</i> | <i>Questions</i>                                                                                         | <i>BTL</i> | <i>CO</i> | <i>Marks</i> |
|-------------|----------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | Define the term Stoichiometry.                                                                           | L1         | 1         | 2            |
| 2.          | Predict any two environmental significance of the solubility product (K <sub>sp</sub> ).                 | L2         | 1         | 2            |
| 3.          | Differentiate between the processes of volatilization and partitioning in the fate of aquatic chemicals. | L1         | 2         | 2            |
| 4.          | Define Coagulation with a suitable example.                                                              | L2         | 2         | 2            |
| 5.          | Give the main chemical reaction involved in the formation of photochemical smog.                         | L1         | 3         | 2            |
| 6.          | Differentiate between Black Carbon and other particulates in terms of origin and composition.            | L2         | 3         | 2            |
| 7.          | Define Cation Exchange Capacity (CEC) of soil.                                                           | L1         | 4         | 2            |
| 8.          | Classify the main components that contribute to the nature and composition of soil.                      | L2         | 4         | 2            |
| 9.          | List any two examples of Endocrine Disturbing Chemicals (EDCs).                                          | L1         | 5         | 2            |
| 10.         | What is meant by 'chemical speciation' of heavy metals?                                                  | L2         | 5         | 2            |

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

| <i>Q.No</i> | <i>Questions</i>                                                                                                                  | <i>BLT</i> | <i>CO</i> | <i>Marks</i> |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11.         | a i Describe the concept of mass balance with a suitable environmental example.                                                   | L2         | 1         | 8            |
|             | ii Explain the CO <sub>2</sub> solubility in water and describe the distribution of its species as a function of p <sup>H</sup> . | L2         | 1         | 8            |
|             | Or                                                                                                                                |            |           |              |
|             | b i Define chemical kinetics and explain the first-order reaction kinetics in detail.                                             | L2         | 1         | 8            |
|             | ii Discuss the 12 Principles of Green Chemistry.                                                                                  | L2         | 1         | 8            |

|     |   |    |                                                                                                                                                                     |    |   |    |
|-----|---|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|
| 12. | a | i  | Explain the concept of partitioning ( $K_{ow}$ ) to predict the potential for volatilization of a non-polar organic chemical from an aquatic system.                | L2 | 2 | 8  |
|     |   | ii | Summarize the various types of photochemical transformations that synthetic chemicals undergo in the aquatic environment.                                           | L2 | 2 | 8  |
|     |   |    | Or                                                                                                                                                                  |    |   |    |
|     | b | i  | Illustrate the construction and environmental significance of pE-pH diagrams in determining the fate of metals.                                                     | L2 | 2 | 8  |
|     |   | ii | Explain the formation and stability of colloids using the double layer theory.                                                                                      | L2 | 2 | 8  |
| 13. | a | i  | Find the causes and effects of stratospheric ozone layer depletion.                                                                                                 | L2 | 3 | 8  |
|     |   | ii | What are greenhouse gasses? Why are they considered significant in global warming?                                                                                  | L2 | 3 | 8  |
|     |   |    | Or                                                                                                                                                                  |    |   |    |
|     | b | i  | Summarize the effectiveness of current CO <sub>2</sub> capture and sequestration technologies in mitigating global warming.                                         | L2 | 3 | 8  |
|     |   | ii | Illustrate the causes, effects and control measures of acid rain.                                                                                                   | L2 | 3 | 8  |
| 14. | a | i  | Apply the knowledge of Cation Exchange Capacity (CEC) to predict the mobility order of common cations ( $Na^+$ , $Ca^{2+}$ , $Al^{3+}$ ) in a typical clay soil.    | L3 | 4 | 8  |
|     |   | ii | Choose an appropriate chemical amendment to promote ion-exchange reactions for neutralizing acidic soil, justifying your choice based on soil chemistry principles. | L3 | 4 | 8  |
|     |   |    | Or                                                                                                                                                                  |    |   |    |
|     | b | i  | Explain the mechanism and principle of electrokinetic remediation for the removal of heavy metals from contaminated soil.                                           | L3 | 4 | 8  |
|     |   | ii | Discuss the principles and process of reclamation of salt-contaminated land by leaching.                                                                            | L3 | 4 | 8  |
| 15. | a |    | Predict the toxicity and environmental impact of Polychlorinated Biphenyls (PCBs) and Polycyclic Aromatic Hydrocarbons (PAHs).                                      | L3 | 5 | 16 |
|     |   |    | Or                                                                                                                                                                  |    |   |    |
|     | b | i  | What are nanomaterials? List different forms and their environmental applications.                                                                                  | L3 | 5 | 8  |
|     |   | ii | Show the sources and effects of Dioxins and Furans, and Pesticides as endocrine disturbing emerging pollutants.                                                     | L3 | 5 | 8  |