Curriculum Plan (Odd Semester 2025-26)

Teacher Name: **Dr. Geeta Devi Yadav**

Course: B.Sc. (H) Chemistry, NEP-UGCF, Semester I

Paper Name: Gaseous and Liquid (DSC) (2 periods per week)

UPC:

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| **S. No.** | **Contents** | **Allocation**  **of Lectures Total 30** | **Month wise**  **schedule to be followed** | **Assignments/ Presentations etc** |
| 1. | **Liquid state** Liquid state Nature of liquid state, qualitative treatment of the structure of the liquid state. Physical properties of liquids-vapour pressure, its origin and definition, Vapour pressure of liquids and intermolecular forces, and boiling point Surface tension, its origin and definition, Capillary action in relation to cohesive and adhesive forces, determination of surface tension by (i) using stalagmometer (drop number and drop mass method both) and (ii) capillary rise method, Effects of addition of sodium chloride, ethanol and detergent on the surface tension of water and its interpretation in terms of molecular interactions, Role of surface tension in the cleansing action of detergents. | **8** | **First week of August – Fourth week of August** | **Syllabus overview**  **Reference books suggestions**  **Question-Solving Doubt Session** |
| 2. | **Liquid State**  Coefficient of viscosity and its origin in liquids, Interpretation of viscosity data of pure liquids (water, ethanol, ether and glycerol) in the light of molecular interactions, Effects of addition of sodium chloride, ethanol and polymer on the viscosity of water, relative viscosity, specific viscosity and reduced viscosity of a solution, comparison of the origin of viscosity of liquids and gases, effect of temperature on the viscosity of a liquid and its comparison with that of a gas.  **Gaseous State**  Kinetic theory of gases- postulates and derivation of kinetic gas equation, Maxwell distribution of molecular velocities and its use in evaluating average, root mean square and most probable velocities and average kinetic energy. Definition, expression, applications and temperature and pressure dependence of each one of the following properties of ideal gases: Collision frequency, Collision diameter, Mean free path. | **8** | **First week of September – Fourth week of September** | **Question-Solving Doubt Session University Papers Discussion**  **Class Test** |

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| 3. | Coefficient of viscosity, definition, units and origin of viscosity of gases, relation between mean free path and coefficient of viscosity, temperature and pressure dependence of viscosity of a gas, calculation of molecular diameter from viscosity Barometric distribution law, its derivation and applications, alternative forms of barometric distribution law in terms of density and number of molecules per unit volume, effect of height, temperature and molecular mass of the gas on barometric distribution. | **6** | **First and second week of October-fourth week of October** |  |
| 3. | Behaviour of real gases- Compressibility factor, Z, Variation of compressibility factor with pressure at constant temperature (plot of Z vs P) for different gases ( H2, CO2, CH4 and NH3), Cause of deviations from ideal gas behaviour and explanation of the observed behaviour of real gases in the light of molecular interactions van der Waals (vdW) equation of state, Limitations of ideal gas equation of state and its modifications in the form of derivation of van der Waal equation, Physical significance of van der Waals constants, application of van der Waal equation to explain the observed behaviour of real gases. Isotherms of real gases- Critical state, relation between critical constants and van der Waals constants, correlation of critical temperature of gases with intermolecular forces of attraction, Continuity of states, Limitations of van der Waals equation, Reduced equation of state and law of corresponding states (statement only). Virial equation of state-Physical significance of second and third virial coefficients, van der Waals equation expressed in virial form, Relations between virial coefficients and van der Waals constants. | **6** | **First week of November – Fourth week of November** | **Question-Solving Doubt Session**  **University Papers Discussion**  **Assignment Distribution** |

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