- **Curriculum (with CO & PO mapping):**

BTBS 102/202/ 107L /207L

ENGINEERING CHEMISTRY

Unit 1: Water Treatment (6L) Introduction, hard and soft water, softening of water – Zeolite process, Ion exchange process, Hot Lime –Soda process, water characteristics- Hardness and its determination by EDTA method, Dissolve oxygen (DO) and its determination by Winkler's method.

Unit 2: Phase Rule (7L) Phase Rule, statement, Explaination of the terms – Phase, Components, Degrees of freedom. One component system – Water and Sulphur. Reduced phase rule equation, Two components alloy system- Phase diagram of Silver- Lead alloy system.

Unit 3: Metallurgy (6L) Introduction, Occurrence of metals, types of ores, concentration of ores by physical methodsCrushing and Sizing, Froth- Flotation, Magnetic Separation, Gravity separation method. Chemical methods- Calcination, Roasting, Reduction of Ore- by Pyrolysis, Chemical reductions, Electrolytic Refining of Metals.

Unit 4: Fuels and Lubricants (7L) Fuels: Introduction, classification of fuel, Calorific value of a fuel, characteristics of a good fuel, solid fuel- Coal , Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, liquid fuel- Refining of Petroleum Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants , properties of lubricants ,Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.

Unit 5: Electrochemistry (6L) Introduction - Basic concepts: Definition and units of Ohm's law, Specific resistance, Specific Conductance, Equivalent conductance, Molecular conductance, Method of conductance measurement by Wheatstone bridge method, Cell constant. Debye-Huckel theory of strong electrolyte, Conductometric titrations, Ostwald's theory of acidbase indicator, Quinonoid theory, Glass electrode.

Text books:

1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992
2. Bhal & Tuli, Text book of Physical Chemistry (1995), S. Chand & Company, New Delhi.
3. O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
4. S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi.

Reference books:

1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.

2. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015. 3. WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.

4. Atkins, Physical chemistry.

ENGINEERING CHEMISTRY

Lab List of Experiments: (Perform any 10 Experiments)

1. Determination of Hardness of water sample by EDTA method.

2. Determination of Chloride content in water sample by precipitation titration method.

3. Determination of Dissolve Oxygen in water by Iodometric method.

4. Determination of percent purity of Bleaching Powder.

5. pH – metric Titration (Acid Base titration)

6. Conducto-metric Titration (Acid Base titration)

7. Surface tension

8. Viscosity

9. To determine acidity water sample.

10. To determine calorific value of a fuel.

11. Determination of Acid value of an oil sample.

12. Determination of Saponification value of an oil sample.

13. Experiment on water treatment by using Ion exchange resins.

14. To find out P-T curve diagram of steam.

15. To determine alkalinity water sample.

Reference Books:

1. Systematic experiments in Chemistry, A. Sethi, New Age International Publication, New Delhi.

2. Practical Inorganic Chemistry, A. I. Vogel, ELBS Pub.

3. Practical in Engineering Chemistry, S. S. Dara.

Course Objectives:
Students will appreciate role of Science in Engineering.
Will be able to appreciate fundamental concepts in chemistry as applied to various engineering materials and systems. Will understand phenomenon of corrosion, principles of metallurgical extractions, phase rule as applied to single and multicomponent systems, electrochemistry and advance instrumentation.