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# Syllabus

**Rajiv Gandhi Proudhogiki Vishwavidyalaya, Bhopal**

Bachelor of Engineering–BE (Common to all disciplines)

## **UNIT I**

### **Water and its Industrial Applications**

Sources, impurities, hardness and its units, industrial water characteristics, softening of water by various methods (external and internal treatment), boiler trouble causes, effect and remedies, characteristics of municipal water and its treatment, numerical problems based on softening methods.

## **UNIT II**

### **Fuels and Combustion**

Fossil fuels and classification, calorific value, determination of calorific value by Bomb calorimeter, proximate and ultimate analysis of coal and their significance, calorific value, computation based on ultimate analysis data, carbonization, manufacturing of coke and recovery of by-products. Knocking, relationship between knocking and structure of hydrocarbon, improvement of anti-knocking characteristics of IC engine fuels, diesel engine fuels, cetane number, combustion and its related numerical problems.

## **UNIT III**

### **A. Lubricants**

Introduction, mechanism of lubrication, classification of lubricants, properties and testing of lubricating oils, numerical problems based on testing methods.

### **B. Cement and Refractories**

Manufacture, IS-code, setting and hardening of cement, refractory—introduction, classification and properties of refractories.

## **UNIT IV**

### **High-Polymer**

Introduction, types and classification of polymerization, reaction. Mechanism, natural and synthetic rubber; vulcanization of rubber, preparation, properties and uses of—polythene, PVC, PMMA, teflon, poly-acrylonitrile, PVA, nylon 6, nylon 6,6, terylene, phenol (formaldehyde), urea (formaldehyde) resin, glyptal, silicone resin, poly-urethanes; butyl rubber, neoprene, buna N, buna S.

**UNIT V****A. Instrumental Techniques in Chemical Analysis**

Introduction, principle, instrumentation and applications of IR, NMR, UV, visible, gas chromatography, Lambert's and Beer's law

**B. Water Analysis Techniques**

Alkalinity, hardness (complexo-metric), chloride, free chlorine, DO, BOD and COD, numerical problems based on above techniques.