राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर
NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
(Institute of National Importance)
G.E. Road, Raipur – 492010 (CG)
Phone: (0771) 225 42 00
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DEPARTMENT OF CHEMISTRY

SYLLABUS – Applied Chemistry

Name of Subject	Applied Chemistry	Subject Code	0020112(CH)
Semester	1st and 2nd	Board of Studies	Chemistry
Maximum Marks	**70**	Minimum Marks	**25**
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/week	Credits
3	1	-	4

First Sem.: Electronics, Electrical, Bio-Technology/Bio-Medical, Chemical, Information Technology
Second Sem.: Mechanical, Metallurgy, Civil, Mining, Computer Science

UNIT I - Technology of water

Standards for drinking water, Methods of Treatment of water for domestic and industrial purposes: Sedimentation, Coagulation, Filtration, Sterilization, Break point chlorination. Determination of alkalinity of water, Hardness of water: Units, determination. Demineralization of water.
Softening of water: Lime-soda Process, Ion exchange process, Zeolite process. Boiler Troubles: Carry Over, Priming, Foaming, Scale, Sludge, Corrosion, Caustic Embrittlement. Internal treatment of water: Carbonate conditioning, Phosphate conditioning, Colloidal conditioning, Calgon conditioning. Calculations on water softening by Lime-soda process, Zeolite process, determination of alkalinity and hardness of water.

UNIT II - Petroleum, Fuels & Combustion

Petroleum: Petroleum, cracking, Synthetic petrol, Refining of gasoline, Reforming, Chemical structure of fuel and knocking. Octane Rating of fuels, Cetane Rating, Diesel engine fuel, Kerosene, LPG as a fuel.

Fuels & Combustion: Classification, Calorific value, Types, Determination by Bomb calorimeter, Dulong's Formula, Analysis of Coal, Proximate and Ultimate analysis, Flue gas analysis, Significance, Numericals, Carbonization of Coal, Manufacture of metallurgical coke by Otto Hoffman's byproduct oven, Combustion calculations.

UNIT III - Corrosion and Protective Coatings

Corrosion and its Control: Nernst Theory, Standard Electrode Potential, Galvanic Series, Concentration cell, Types of corrosion: Uniform and Galvanic, Erosion, Crevice, Pitting, Exfoliation and Selective leaching, Inter-angular Stress, Waterline, Soil, Microbiological. Theories of corrosion: Acid, Direct Chemical attack, Electrochemical, Corrosion reactions,

Factors affecting corrosion, Protective measures against corrosion, Sacrificial anode, Impressed current cathode protection.

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Protective Coatings: Paints: Constituents, functions & mechanism of drying. Varnishes and Lacquers; surface preparation for metallic coatings, electroplating (gold) and electrodeless plating (Nickel), anodizing, phosphate coating, powder coating & antifouling coating.

UNIT IV - Lubricants & Polymers

Lubricants: Functions of' lubricant, Mechanism of lubrication, Fluid or Hydrodynamic Lubrication, Thin film or Boundary lubrication & Extreme pressure lubrication. Lubricants for Extreme ambient conditions and for special applications. Properties of lubricants and tests.

Polymers: Types of Polymerization. Thermoplastics & thermosetting polymers. Preparation, properties and applications of the Polyethylene, Teflon, PVC, Nylon, Phenol formaldehyde & Urea Formaldehyde, Elastomers: Natural rubber, Vulcanization of rubber & Synthetic rubber.

UNIT V - Phase Rule, Portland Cement & Refractories

Phase Rule: Phase Rule, Explanation of terms, Advantages & Limitations of Phase rule, application of Phase rule to one component system; Water system.

Portland Cement: Manufacture of cement, Dry and Wet process, Important process parameters for manufacturing a good cement clinker. Characteristics of the constitutional compounds of cement. Additives for cement, Properties, General composition, Testing of cement, Chemical & physical requirement.

Refractories: Definition, Classification with Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material.

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Text Books

1. A text book of Engineering Chemistry by S. S. Dara, S. Chand & Co. New Delhi.
2. Engineering Chemistry by M. M. Uppal & S.C. Bhatia, Khanna Publishers. New Delhi.

Reference Books

1. Chemistry of Engineering Materials by C.P. Murthy, C. V. Agarwal and A. Naidu B. S. Publication Hyderabad
2. Engineering Chemistry by J. C. Kuriacose and J. Rajaram, Tata McGraw-Hill Co. New-Delhi.