Gondwana University, Maharashtra B.E./B.Tech CSE Sem 2 syllabus

Applied Chemistry

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UNIT-I Water Conditioning
Industrial: Types units of hardness; Softening; (principle, reactions, advantage, limitation Comparison of) Lime-Soda (no methods), Zeolite, de-mineralization process; Numericals on lime-soda and Zeolite process; Boiler Troubles(causes, Effect on boiler operation & methods of prevention) Carry over-priming foaming; Scale sludge, caustic embrittlement, Boiler corrosion; Internal conditioning-(phosphate, carbonate, calgon).
Domestic: coagulation & sterilization using UV, ozone, chlorine, Break point chlorination.

UNIT-II Corrosion and Battery Science
Introduction, Cause and Consequences of corrosion, Factors influencing corrosion Chemical & electrochemical corrosion. Mechanisms of electrochemical corrosion; Pilling-Bedworth rule; Differential aeration theory of corrosion.
Types of corrosion and Preventive Methods: Pitting; Inter granular, Stress, Waterline Corrosion; Corrosion prevention a) Design & material selection, b) Cathodic & anodic protection, c) protective surface coating- (only principle Methods not required)-tinning, galvanizing & powder coating, metal cladding and electroplating.
Battery: Secondary - Nickel-cadmium. Fuel cell applications, advantages and limitations eg Alkaline Fuel Cell.

UNIT-III Materials and Green Chemistry
Cement: Portland cement: Raw material, manufacture, process parameters, role of microscopic constituents, Properties:-Setting & hardening; heat of hydration, soundness; Types (characteristics, application) High alumina, White, Rapid hardening, Ready Mix

Concrete, flyash (properties, advantage, limitation, application) as cementing material.
Green Chemistry: Introduction, principles, concept of carbon credits.

UNIT-IV Fuels and Energy
Fuels: Introduction: Calorific value, HCV & LCV; Determination of CV by Bomb & Boy‟s calorimeter; numericals; Solid fuels:- significance of proximate and Ultimate analysis; numericals (Dulongs formula).
Liquid and Gaseous fuels:- bubble tower fractional distillation of crude oil (boiling point wise separation only); Knocking in IC & Compression engine; Octane & Cetane number, Doping agents (Antiknocking, Anti oxidants, antiicing) Fisher-tropsch process of manufacture of synthetic gasoline; catalytic cracking (Only Principal, Definition, reactions and catalysts used, Advantage, Method of fixed bed & fluid bed not required) Bio-diesel, CNG (Composition, properties, advantages, limitations, applications, method of preparation not needed).

UNIT-V Lubrication and Combustion Calculations
Lubricants: Introduction, mechanism; Hydrodynamic, boundary & extreme pressure lubrication; Classification-solid, semisolid & liquid lubricants; Biodegradable lubricants (properties, application, advantage limitation); Properties of greases:- Drop test & consistency test; Properties of liquid lubricants (definition, significance) flash & fire point, viscosity & viscosity index, Cloud & Pour Point: Criteria for selection of lubricant- IC engine, refrigeration, gear, transformer, steam turbine, delicate mechanical system.
Numericals on Combustion estimations.

Applied Physics

Applied Physics

UNIT - I Quantum Physics
Dual nature of matter, De-Broglies concept of matter waves , Davisson and Germer‟s experiment, Compton scattering (qualitative approach), Heisenberg‟s uncertainty principle and its experimental illustrations, wave packet concept, wave function interpretation, Schrodinger‟s wave equations, applications : Particle in infinite potential well, qualitative approach for finite potential well, tunneling.

UNIT -II Semiconductor Physics
Formation of energy bands in solids, Classification of solids based on band theory, Energy band diagram of germanium & silicon, Probability distribution function Fermi energy-its dependence on temp and doping concentration, conductivity of solids. p-n junction diode, junction voltage equation, Hall effect-its derivation and application, transistors.

UNIT -III Solid state physics
Introduction, Lattice, basis, space lattice, Unit cell, Bravais lattices, crystal system- SC, BCC & FCC, octahedral and tetrahedral voids. Crystal structure, Miller indices, Braggs law.

UNIT -IV Wave optics & Electron ballistics
Interference due to thin films of uniform and non uniform thickness, Newton‟s ring, Antireflection coating applications, Motion of electron in uniform electric and magnetic fields, Concept of crossed fields. Electron refraction electric and magnetic focusing devices-CRT, CRO and its applications, Bainbridge Mass spectrograph.

UNIT -V Lasers and fibre optics
Introduction, Principle of laser, laser characteristics, Spatial and temporal coherence of light waves,types of laser, and its application. Introduction to optical fibre structure, principle, modes of propogation, acceptance angle, Numerical aperture, fractional refractive index, types and classifications of optical fibre, V – number, attenuation & its different mechanisms, distortion, applications as sensors and detectors advantages of optical fibre in communication.

Basic Electrical Engineering

Basic Electrical Engineering

UNIT-I DC and AC Circuits
Concept of Electrical Circuit, Active & Passive elements, Voltage & Current Sources, Concept of Linearity & Linear network, Unilateral & Bilateral Elements, R,L and C as Linear Elements, Source Transformation, Kirchoff‟s Law, Superposition Theorem, Star- Delta Transformation.
AC Fundamentals, Sinusoidal & square waveforms , their average & effective values, Concept of Phasor, Phasor Diagram of RLC combinational Circuits with sinusoidal supply, Apparent, Active &

Reactive Powers, Electrical Energy, Power Factor, Causes & disadvantages of Low power factor, Power factor improvement using capacitor.

UNIT-II Magnetic Circuit & Single Phase Transformer

Concept of Magnetic Circuit, Analogy between Electric & magnetic Circuit, magnetic circuits with DC and Ac excitations, magnetic Leakage & Fringing, B-H Curve, Hysteresis & Eddy current losses, Series & Parallel Magnetic circuits, Mutual coupling, Laws of Electromagnetism.

Principle of operation & construction of Transformer, EMF Equation, Phasor Diagram under no load & loaded conditions, Equivalent Circuit, O.C. & S.C. Tests, Power Losses, Efficiency & Regulation, Introduction to Auto Transformer.

UNIT-III Electrical Machines

Principles of Electromechanical energy conversion, Fleming‟s Right & Left Hand rule

DC Generator‟: Construction, working , types and applications

DC Motor‟: Construction, working , types and applications

EMF Equation, Methods of Excitation, Back EMF, Condition for maximum efficiency,

Torque equation of motor, Characteristics, Speed control of DC shunt Motor, Applications of DC motor

Types of Three Phase Induction Motors, Principle of Operation, Slip-Torque Characteristic, Applications

Construction, Principle of operation & working of Single phase Induction Motor, Methods of Starting , Applications

UNIT-IV Measuring Instruments, Electrical safety & Introduction to Power System

Types of Instruments, Construction & working Principle of PMMC & moving iron type Voltmeters & Ammeters, Single phase dynamometer wattmeter, Induction type Energy meter, Use of Shunts & multipliers.

Overloads, short circuits & earth leakage, HRC Fuse, MCB, ELCB, Earth & Neutral wire, Factors influencing earth resistance, Pipe & plate earthing.

Three phase system : its necessity & advantages, Generation of three phase voltages, Phase sequence, Star & Delta Connections, Balance supply & balance load, Line & phase voltage/ current relations, Three phase power, General Lay out & single line diagram of Electrical Power System & functions of elements therein.

UNIT-V Basic Electronics

Semiconductor Devices, PN Junction Diode, Half Wave & full wave Rectifiers, Filters, Zener Diode, Introduction to BJT & its CE characteristic, BJT as an amplifier & switch.
Introduction to number systems & Logic Gates, Boolean Algebra & its applications (POS and SOP form), K-maps.

Engineering Mechanics

Engineering Mechanics

UNIT- I Basic Concepts: System of forces, Moment of forces and its Application, Couples and Resultant of Force System

Equivalent Force System: Resultant of a 2 dimensional distributed loads and three- dimensional general force system

Equations of Equilibrium: Free body diagrams, Types of Supports, Equations of equilibrium, coplanar concurrent and non-concurrent systems, general spatial force system, Support reactions for determinate beams with different types of load – concentrated, uniformly distributed and uniformly varying load.

UNIT- II Analysis of perfect Frames: Analysis of pin jointed simple and cantilever frames by method of joints and method of section.
Friction Forces: Law of Coulomb friction, problem involving Dry Friction, simple application like wedges, belt friction and band brakes.
Simple Machine – Differential wheel and axle, single and double purchase Crab, Velocity Ratio, Mechanical advantage, efficiency etc.

UNIT-III Centroids and Moments of Inertia: Centroid location by first principle, centroid of composite areas, Second Moment and products of inertia of plane areas, Transfer theorems for moment of inertia and Product of inertia.
Introduction of Virtual work theorem: Principle of Virtual work applied to equilibrium of Mechanisms, simple beam, Pin jointed frames.

UNIT-IV Kinematics & Kinetics of Particles: Rectilinear motion of a particle with variable acceleration, Motion curves, Projectile motion, normal and tangential components of acceleration, kinetics of particle and several interconnected particles.

UNIT-V Collision of elastic bodies: Principle of conservation of momentum, Impulse momentum equation, work energy equation, coefficient of restitution, impact of elastic bodies.
D'Alemberts Principles, problems on connected system of particles.