भारतीय अभियांत्रिकी एवं प्रबंधन संस्थान

Engineering and Management Institute of India

Syllabus For Diploma In Civil Engineering

(Effective from session 2020-21)

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27.	PROJECT	➢ Related your Branch

Civil Engineering Syllabus

Department of Civil Engineering

Vision:-

To strengthen the region through imparting superior quality technical education and research; which enables the fulfillment of industrial challenge and establish itself as a Centre of Excellence in the field of Civil Engineering.

Engineering Physics (1.1)

UNIT-I

Crystal Structures:- Lattice points, Space lattice, Basis, Bravais lattice, unit cell and lattice parameters, Seven Crystal Systems with 14 Bravais lattices , Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Miller Indices, Inter planer spacing of Cubic crystal system.

Defects in Crystals:- Classification of defects, Point Defects: Vacancies, Substitution, Interstitial, Concentration of Vacancies, Frenkel and Schottky Defects, Edge and Screw Dislocations .

Principles of Quantum Mechanics:- Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, Heisenberg's Uncertainty Principle.

UNIT –II

Electron Theory of Metals:- Classical free electron theory, Derivation of Ohm's law, Mean free path, Relaxation time and Drift velocity, Failures of Classical free electron theory, Quantum free electron theory, Fermi-Dirac distribution, Fermi energy, Failures of Quantum free electron theory.

Band Theory of Solids:- Electron in a periodic potential, Bloch Theorem, Kronig-Penny Model(Qualitative Treatment), origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semi Conductors & Insulators, Effective mass of an Electron.

Semiconductor Physics:- Intrinsic Semiconductors and Carrier Concentration, Extrinsic Semiconductors and Carrier Concentration, Hall Effect and Applications.

UNIT – III

Dielectric Properties & Magnetic Properties:- Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Types of polarization: Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities (Electronic & Ionic) -Internal Fields in Solids. Magnetic Permeability, Magnetic Field Intensity, Magnetic Field Induction, Intensity of Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magnetron, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Hysteresis Curve on the basis of Domain Theory of Ferro Magnetism, Soft and Hard Magnetic Materials, Ferrites and their Applications.

UNIT – IV

Lasers:- Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation,Meta-stable State, Population Inversion, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

Fibers optics:- Structure and Principle of Optical Fiber, Acceptance Angle, Numerical Aperture, Types of Optical Fibers (SMSI, MMSI, MMGI), Attenuation in Optical Fibers.

UNIT –V

Nanotechnology:- Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio,Bottom-up Fabrication: Sol-gel Process; Top-down Fabrication: Chemical Vapor Deposition, Physical, Chemical and Optical properties of Nano materials, Characterization (SEM, EDAX), Applications.

Reference Book :-

1. Applied physics By Dr. Manjeet singh & Anita Sangwan.

2. Basic physics By Karl F. Khan.

Engineering Mathematics (1.2)

UNIT-I

Algebra:-Determinants:- Definition and expansion of determinants of order 2 and Properties of determinants (not for examination). Solution of simultaneous equationsusing Cramer's rule(in 2 and 3 unknowns) - Simple Problems,

Matrices:- Definition –Singular Matrix Non-singular Matrix, Adjoint of a matrix and Inverse of a matrix up to 3 x 3 only. Simple Problems. Definition – Rank of a matrix. Finding rank of a matrix by determinant method (matrix of order 3 x 4) Simple Problems.

Binomial Theorem:- Definition of Factorial notation - Definition of Permutation and Combinations – values of n Pr. N Cr Binomial theorem for positive integral, binomial theorem.

UNIT –II

Complex Numbers:- Algebra of Complex Numbers:- Definition – Real and Imaginary parts, Conjugates, Modulus and amplitude form, Polar form of a complex number, multiplication and division of complex numbers (geometrical proof not needed)– Simple Problems .Argand Diagram – Collinear points, four points forming square, rectangle, rhombus and parallelogram only . Simple Problems.

UNIT – III

Trigonometry:- Properties of Trigonometric functions – Ratios of Compound angles, multiple angles, sub multiple angles – Transformations of Products into sum or difference and vice versa – Simple trigonometric equations – Properties of triangles Inverse Trigonometric functions.

UNIT – IV

Integration and Its Applications:- Indefinite Integral – Standard forms – Integration by decomposition of the integrand of trigonometric, algebraic, exponential, logarithmic and Hyperbolic functions – Integration by substitution – Integration of reducible and irreducible quadratic factors – Integration by parts – Definite Integrals and properties, Definite Integral as the limit of a sum – Application of Integration to find areas under plane curves and volumes of Solids of revolution – Mean and RMS value.

UNIT –V

Differential Equations:- Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solution of differential equation of the type first order, first degree, variable-separable, homogeneous equations, exact, linear differential equation of the form $dy/dx + Py = Q$, Bernoulli's equation, nth order linear differential equation with constant coefficients both homogeneous and non homogeneous and finding the Particular Integrals for the functions , , ,Sin ax, Cos ax.

Reference Book :-

1. Engineering mathematics- By A.B. Mathur.

2. Engineering mathematics- By J.P. Sharma.

Engineering Chemistry (1.3)

UNIT-I

ELECTROCHEMISTRY AND BATTERIES:- Basic concepts of electrochemistry, Conductance, Specific, equivalent and molar conductance and effect of dilution on conductance, Electrochemical cells, Galvanic cell (daniel cell), Electrode potential, Electrochemical series and its applications, Nernst equation, Types of electrodes, Calomel electrode, quinhydrone electrode.

Batteries:- Classification of batteries primary cells (dry cells) and secondary cells (lead-acid battery, Ni-Cd cell) applications of batteries, numerical problems.

UNIT –II

Corrosion and its Control:- Introduction, causes and effects of corrosion; Theories of corrosion: Chemical and electrochemical corrosion with mechanism; Factors affecting the rate of corrosion: Nature of the metal and nature of the environment; Types of corrosion: Waterline and crevice corrosion; Corrosion control methods.

Cathodic protection:- Sacrificial anodic protection and impressed current cathodic protection; Surface coatings: Metallic coatings, methods of application of metallic coatings- hot dipping(galvanizing, tinning), electroplating(copper plating); Organic coatings: Paints.

UNIT – III

Materials chemistry: Polymers-classification with examples, polymerization-addition, condensation and co-polymerization; Plastics: Thermoplastics and thermosetting plastics; Compounding of plastics; Preparation, properties and applications of Polyvinylchloride, Teflon, Bakelite and Nylon-6,6;

Redox Reactions: Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

UNIT – IV

Nanotechnology: - Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Bottom-up Fabrication: Sol-gel Process; Top-down Fabrication: Chemical Vapor Deposition, Physical, Chemical and Optical properties of Nano materials, Characterization (SEM, EDAX), Applications.

Structure of Atom:- Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle,

Orbitals Theory:- concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule.

UNIT –V

Water: Sources and impurities of water, hardness of water, expression of hardness-units; Types of hardness: Temporary hardness, permanent hardness and numerical problems; Estimation of temporary and permanent hardness of water by EDTAmethod; Determination of dissolved oxygen by Winkler's method; Boiler troubles: Priming, foaming, scales, sludges and caustic embrittlement.

Treatment of water: Internal treatment of boiler feed water- carbonate, calgon and phosphate conditioning, softening of water by Zeolite process and Ion exchange process; Potable water-its specifications, steps involved in the treatment of potable water, Sterilization of potable water by chlorination and ozonization, purification of water by reverse osmosis process.

Reference Book :-

1. Applied chemistry-I. By Prof. Durga Nath Dhar.

Applied chemistry. By Dr. B. S. Chauhan

Communication skill (1.4)

UNIT-I

Communication Skills:- Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

Barriers to communication:- Physiological Barriers, Physical Barriers Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers.

Perspectives in Communication:- Introduction, Visual Perception, Language Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.

UNIT –II

Elements of Communication:- Introduction, Face to Face Communication – Toneof voice, Body Language (Non-Verbal Communication), Verbal Communication Physical Communication.

Communication Styles:- Introduction, The Communication styles Matrix with example for each Direct Communication style, Spirited Communication style, Systematic Communication style, Considerate Communication style.

UNIT – III

Basic Listening Skills:- Introduction, Self-Awareness, Active Listening, Becomingan Active Listener, Listening in Difficult Situations.

Effective Written Communication:- Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion‘ Required, Shades of Meaning, Formal Communication

Writing Effectively:- Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message.

UNIT – IV

Interview Skills:- Purpose of an interview, Do‘s and Dont‘s of an interview.

Giving Presentations:- Dealing with Fears, Planning your Presentation, StructuringYour Presentation, Delivering, Your Presentation, Techniques of Delivery.

UNIT –V

Group Discussion:- Introduction, Communication skills in group discussion, Do‘s and Don‘s of group discussion.

Reference Book :-

1. Communication skills for Engineer By Suneeta Mishra.

2. Advanced Communication skills By MTD Training.

Personality Development(1.5)

UNIT-I

MANAGERIAL PERSONALITY:- DEFINITION OF PERSONALITY – BASICS OF PERSONALITY – DETERMINANTS OF PERSONALITY – DEVELOPMENT OF PERSONALITY – THEORIES OF PERSONALITY.

UNIT –II

PERSONALITY TRAITS:- DEFINITION – NATURE AND IMPORTANCE OF PERCEPTION. FACTORS INFLUENCING THE PERCEPTION.

DECISION MAKING:- IMPORTANCE AND NECCESSITY OF DECISION MAKING, PROCESS AND PRACTICAL WAY OF DECISION MAKING. WEIGHINGPOSITIVES & NEGATIVES.

INTERPERSONAL SKILLS:- UNDESTANDING THE RELATIONSHIP BETWEEN LEADERSHIP NETWORKING & TEAM WORK.ASSESSING INTERPERSONAL SKILL SITUATIONDESCRIPTION OF INTERPERSONAL SKILL.

UNIT – III

SELF DEVELOPMENT:- SELF AWARENESS – SELF-CONFIDENCE – MNEMONICS – GOAL SETTING TIME MANAGEMENT AND EFFECTIVE PLANNING. HUMAN GROWTH AND BEHAVIOUR.

UNIT – IV

SELF MANAGEMENT:- STRESS MANAGEMENT – MEDITATION AND CONCENTRATION TECHNIQUES – SELF HYPNOTISM – SELF ACCEPTANCE AND GROWTH.

UNIT –V

TRANSACTIONAL ANALYSIS: - IDEGO – SUPER EGO – TRANSACTIONS – LIFE POSITION – WINNERS AND LOSERS – INTERPERSONAL RELATION.

SELF MANAGEMENT: - STRESS MANAGEMENT – MEDITATION AND CONCENTRATIONTECHNIQUES – SELF HYPNOTISM – SELF ACCEPTANCE AND GROWTH

Reference Book: -

1. Social and personality development By David R. Shaffer.

2. Personality development course By Arun Sagar Anand.

Engineering Drawing(2.1)

UNIT-I

Fundamental of Engineering Drawing, Scales and Curves :- Introduction to engineering drawing: Drawing instruments and accessories, types of line, lettering practice and rules of dimensioning , geometrical constructions, basic geometrical shapes; Scales: Types of scales, units of length and their conversion, construction of scales, plain scale, diagonal scale, vernier scale; Curves used in engineering practice and their constructions; Conic sections, construction of ellipse parabola and hyperbola, special curves, construction of cycloid, epicycloids, hypocycloid and involutes.

UNIT –II

Orthographic Projection, Projection of Planes:- Orthographic projection: Principles of orthographic projections, conventions, first and third angle projections, projection of points, projection of lines, lines inclined to single plane, lines inclined to both the planes, true lengths and traces; Projection of planes: Projection of regular planes, planes inclined to one plane, planes inclined to both planes, projection of planes by auxiliary plane projection meth.

UNIT – III

Projection of SolidDC Machines:- Projection of solids: Projections of regular solid, prisms, cylinders, pyramids, cones. Solids inclined to one plane, solids inclined to both planes projection of solid by auxiliary plane projection method.

UNIT – IV

Development of Surfaces, ISOMetric Projections:- Development of surfaces: Development of lateral surface of right regular solids, prisms, cylinders, pyramids and cones; Isometric projections: Principle of isometric projection, isometric scale, isometric projections and isometric views isometric projections of planes prisms, cylinders, pyramids, and cones.

UNIT –V

Transformation of Projections:- Transformation of projections: Conversion of isometric views to orthographic views and conversion of orthographic views to isometric vie**.**

Reference Book :-

1. Engineering Drawing By Dhananjay. A. Johle.
2. Engineering Drawing By K. C. John.

Basic Management (2.1)

UNIT-I

Principle of Management:- Introduction, definition and importance of management. Functions of Management, Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling. Concept and Structure of an organization, Types of industrial organization (a) Line organization,(b) Functional organization, (c) Line andFunctional organization, Departmentalization, Introduction and its advantages. Hierarchical Management Structure Top, middle and lower level management.

UNIT –II

Work Culture:- Introduction and importance of Healthy Work Culture in organization; Components of Culture Importance of attitude, values and behaviour Behavioural Science
– Individual and group behaviour Professional ethics – Concept and need of Professional Ethics. Intellectual Property Rights (IPR) Introduction, definition and its importance, Infringements related to patents, copyright, trade mark.

UNIT – III

Management Scope in Different Areas:- Human Resource Development, Introduction and objective, Manpower Planning, recruitment and selection, Performance appraisal methods, Material and Store Management, Introduction, functions and objectives of material management, Purchasing: definition and procedure, Just in time (JIT), Marketing and Sales, Introduction, importance and its functions, Difference between marketing and selling, Advertisement- print media and electronic media, Market-Survey and Sales promotion. Financial Management – Introduction, Concept of NPV, IRR, Cost- benefit analysis, Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund, Maintenance Management, Concept and Preventive Maintenance.

UNIT – IV

Leadership and Motivation:- Leadership: Definition and Need of Leadership, Qualities of a good leader, Manager vs. leader, Motivation: Definition and characteristics of motivation, . Factors affecting motivation, Maslow's Need Hierarchy Theory of Motivation, Job Satisfaction.

UNIT –V

Legal Aspects of Business: Introduction and need Origin:- Labour Welfare Schemes, Wage payment : Definition and types Incentives: Definition, need and types, Factory Act 1948, Minimum Wages Act 1948, Customer Relationship Management (CRM), Definition and Need, Types of CRM, Customer satisfaction, Total Quality Management (TQM), Inspection and Quality Control, Concept of Quality Assurance, TQM.

Reference Book :-

1. Principles of management By Philip Kotler TEE Publication.

2. Principles of management By A. K. Sarathe.

Engineering Applied mechanics (2.3)

UNIT-I

Fundamentals:- Definitions of mechanics, statics, dynamics, Engineering Mechanics, body, rigid body, mass, weight, length, time, scalar and vector, fundamental units derived units, S.I. units.

Force:- Definition of a force, Newton, S.I. unit of a force, representation of a force by vector and by Bow's notation method. Characteristics of a force, effects of a force, principle of transmissibility.

Resolution of a force:- Definition, Method of a resolution, Types of component force,Perpendicular components and Non- perpendicular components.

Force system:- Definition, classification of force system according to plane and line of action Moments of a force.

UNIT –II

Equilibrium:- Definition, conditions of equilibrium, analytical and graphical condition of equilibrium for concurrent, non- concurrent and parallel force system.

Lami's theorem:- Statement and explanation, Application of Lami's theorem for solving various engineering problems.

Equilibrant:- Definition, relation between resultant and equilibrant, equilibrant of concurrent and non-concurrent force system.

Beams:- Definition, Types of beams (cantilever, simply supported, overhanging, fixed, continuous), Types of end supports (simple support, fixed, hinged , roller), classification of loads, point load, uniformly distributed load. Reaction's for a simply supported beam only .

UNIT – III

Centre of Gravity and Friction:-

Centroid:- Definition of centroid. Moment of an area about an axis. Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle.Centroid of composite figure.

Center of gravity:- Definition, centre of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids.

Friction:- Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction, angle of repose and coefficient of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages of friction.

Equilibrium of bodies on level plane:- external force applied horizontal and inclined up and down, Equilibrium of bodies on inclined plane, external forces is applied parallel to the plane, horizontal and incline to inclined plane.

UNIT – IV

Simple Liftind Machine:- Definitions of simple machine, compound machine , load , effort , mechanical advantage , velocity ratio , input on a machine ,output of a machine ,efficiency of a machine , expression for mechanical advantage , velocity ratio and efficiency of a machine. Ideal machine, ideal effort and ideal load, friction in machines, effort lost in friction and frictional load

Law of machine:- maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self locking machine.

Study of simple machines:- Simple axle and wheel, differential axle and wheel, single purchase crab, doublepurchase crab, simple screw jack, pulleys : First, second and third system of pulleys

UNIT –V

Effect of Force System, Work Power:-

Motion of particle:- Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration .
Definition of speed, velocity, acceleration, uniform velocity, uniformacceleration and variable acceleration.
Simple axle and wheel, differential axle and wheel, single purchase crab, double purchasecrab, simple screw jack, pulleys : First, second and third system of pulleys.

Reference Book :-

1. Applied mechanics By I.B. Prasad, Khanna.

2. Applied mechanics By R.S. Jog, Anand Publishers, Gwalior.

Information Technology (2.4)

UNIT-I

T Software Concepts:-

Software:- Types of Software - its Nature and Qualities.

Operating Systems:- Features of Microsoft Windows and Linux - Timportance in Current Scenario.

UNIT –II

MS Office- Applications:-

MS Word in Business Correspondence:- Letters - Tables - Mail Merge - Labels

Applications of MS Excel:- Graphs and Charts - Basic Calculations of variousfunctions inExcel.

UNIT – III

MS Power Point:-

Introduction to MS Power Point:- Toolbar - Icons and Commands - Navigating in Power Point- Creation of Slides - Animation - Templates - Designing Presentations - Slide Show Controls - Making Notes on Pages and Handouts - Printing Presentations - Customizing Presentations - Types of Templates.

UNIT – IV

Computer Networks:-

Overview of Network:- Communication Processors - Communication Media - Types of Network - Network Topologies - Network Protocols - Network Architecture - Recent Developments -Basic Cloud Computing Service Models.

UNIT –V

Smart Tools & Apps:-

Tools & Apps:- Smart Cards - Paytm - On-line payment Apps - Knowledge and Information Sharing Apps - Digitisation - IOT - Hot Spot - Features of Artificial Intelligence.

Reference Book :-

1. Introduction to information technology By Rajaraman V.

2. Information technology By Stuart Gray.

Strength of Material (CE-3.1)

UNIT-I

Simple Stresses & Strains :- Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT –II

Shear Force and Bending Moment Diagrams: - Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure.

UNIT – III

Flexural Stresses: - Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, sections. Shear Stresses: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T sections.

UNIT – IV

Deflection of Beams:- Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads,- U.D.L uniformly varying load.

UNIT –V

Torsion of Circular Shafts: - Theory of pure torsion, Derivation of torsion equations: $T/J=q/r=N\ \theta/L$ Assumptions made in theory of pure torsion-Torsional moment of resistance – Polar section modulus – Power transmitted by shafts. Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in dia, and volume of thin cylinders.

Reference Book: -

1. Strength of Materials by (R.K. Bansal ,Laxmi Publications 2010).

2. Strength of materials by (Sadhu Singh.Khanna Publications).

3. Strength of Materials by (S.Timshenko)

Fluid Mechanics (CE-3.2)

UNIT-I

Fluid statics: - Dimensions and units: physical properties of fluids-specific gravity, viscosity and its significance, surface tension, capillarity, vapor pressure. Atmospheric gauge and vacuum pressure –measurement of pressure. Manometers- Piezometer, U-tube, inverted and differential manometers. Pascal's law, hydrostatic law. Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of metacenter height. Stability analysis and applications.

UNIT –II

Fluid kinematics: - Introduction, flow types. Equation of continuity for one dimensional flow, circulation and vorticity, Stream line, path line and streak lines and stream tube. Stream function and velocity potential function,differences and relation between them. Condition for irrotational flow, flow net, source and sink, doublet and vortex flow.

Fluid dynamics: - surface and body forces –Euler's and Bernoulli's equations for flow along a stream line,momentum equation and its applications, force on pipe bend.

Closed conduit flow: - Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.

UNIT – III

Boundary Layer Theory:- Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

Dimensional Analysis:- Similitude and modelling – Dimensionless numbers.

Performance of hydraulic turbines: - Geometric similarity, Unit and specific quantities, characteristic curves,governing of turbines, selection of type of turbine,

cavitation, surge tank, water hammer. Hydraulic systemshydraulicram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors and oscillators. Advantages,limitations and applications.

UNIT – IV

Basics of turbo machinery:- hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

of turbo machinery:- hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radialvanes.

UNIT –V

Centrifugal pumps:- classification, working, work done – manometric head- losses and efficiencies- specificspeed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH.

Hydraulic Turbines:- classification of turbines, impulse and reaction turbines, Pelton wheel, Francisturbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube- theoryfunctions and efficiency.

Reference Book: -

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.

2. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

Building Construction (CE-3.3)

UNIT-I

STONES, BRICKS AND AGGREGATES:- Properties of building stones, relation to their structural requirements. Classification of stones, stone quarrying, precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacture of bricks, Comparison between clamp burning and kiln burning; Fine aggregate: Natural and manufactured: Sieve analysis, zoning, specify gravity, bulking, moisture content, deleterious materials; Coarse aggregate: Natural and manufactured: Importance of size, shape and texture.

UNIT –II

CEMENT AND ADMIXTURES:- Various types of cement and their properties; Various field and laboratory tests for cement; Various ingredients of cement concrete and their importance, various tests for concrete; Field and tests admixtures, mineral and chemical admixture.

Masonry Construction:- Stone masonry: Technical terms, joints, Classification of Stone masonry. Brick masonry: Technical terms, bonds in brick work. Other Masonry: Composite masonry, Hollow blocks masonry, Partition Wall, Cavity walls Lintels & arches: Lintels – types, construction. Arches – technical terms, types, construction. Wall Finishes: Plastering, pointing and painting.

UNIT – III

WOOD, ALUMINUM AND GLASS:- Structure, properties, seasoning of timber; Classification of various types of woods used in buildings, defects in timber; Alternative materials for wood, galvanized iron, fibre-reinforced plastics, steel, aluminium; Types of masonry, English and Flemish bonds, rubble and ashlars masonry, cavity and partition walls.

UNIT – IV

BUILDING COMPONENTS AND FOUNDATIONS:- Lintels, arches, different types of floors-concrete, mosaic, terrazzo floors, pitched, flat and curved roofs, lean-toroof, coupled roofs, trussed roofs, king and queen post trusses; RCC roofs, madras terrace/shell roofs. Foundations: Shallow foundations, spread, combined, strap and mat footings.

UNIT –V

STAIRS AND BUILDING PLANNING:- Stairs: Definitions, technical terms and types of stairs, requirements of good stairs; Geometrical design of RCC doglegged and open-well stairs; Principles of building planning, classification building and planning and building by laws.

Reference Book :-

1. Building Construction by Bhavikatti S.S.

2. Building Construction byB.C punmia, Ashok Kr. jain.

Surveying (CE-3.4)

UNIT-I

Chain surveying: - Principle, purpose and suitability of chain surveying, equipments used in chain surveying. Different types of chains, tapes, ranging rods, arrows, pegs mallet, crossstaffs, Indian optical square, and line ranger- their construction and use, Direct and indirect ranging, chaining on flat and sloping ground. Reconnaissance survey, selection of stations. Conducting chain survey over an area, recording the field data, plotting the chain survey, conventional signs. Obstacles in chain surveying erroneous length of chain, correction for measurements by erroneous length of chain, simple problems. Errors in chain surveying, permissible errors in chaining.

UNIT –II

Compass Surveying: - Purpose, principle and suitability of compass surveying instruments used in compass surveying construction and working of prismatic and surveyors compass, temporary adjustment or use of prismatic compass setting and taking observations. Concept of bearing, systems of bearings, magnetic meridian, true meridian and arbitrary meridian, magnetic bearing, true bearing, arbitrary bearing whole circle and reduced bearing, fore and back bearing. Magnetic dip and declination. Local attractions, causes of local attraction, detection of local attraction, errors and corrections, problems on local attraction, calculation of included angles, calculation of bearing in a compass traverse. Concept of traverse; open and closed traverse, traversing with a compass. Check for open and closed traverse plotting traverse, graphical adjustment of closing errors, errors in compass surveying.

UNIT – III

Simple Levelling:- Propose of levelling, concept and explanation of all terms connected with levelling work instruments used in levelling, principle and construction of Dumpy, IOP (Tilting) and automatic levels, types of levelling instruments, types of levelling staffs, Concept of line of collimation, axis of telescope, axis of bubble tube and vertical axis. Temporary adjustment of dumpy level, IOP level and automatic level. Methods of levelling. Concept of station, back sight, intermediate sight, foresight, height of instrument, reduced level, parallax, change point. Reduction of levels and maintenance of level field book, height of instruments method and rise and fall method with arithmetic checks, numerical problems.

UNIT – IV

Precise levelling: - Propose of precise levelling problems on missing entries, longitudinal or profile levelling (LSection), Cross- Section levelling (X-Section), reciprocal levelling, balancing of back sight and fore sight, Difficulties in levelling : Levelling across hill or hollow, levelling on steep slope (Up hill or down hill), staff very near the instrument, continuation of levelling across a tall wall, levelling across a pond or a lake too wide and levelling across a river. Effect of earth's curvature and refraction. Error in levelling and precautious to minimize them. Permanent adjustment of dumpy level. Permissible error in levelling. Sensitivity of bubble tube.

UNIT –V

Constructional details and method of using of Abney level, Ceylon's Ghat tracer, Box Sextant, Tangent Clinometers or Indian pattern clinometers, digital planimeter. Calculation of areas by graphical method : Dividing the plan into triangles, graphical paper method and application of formula. Trapezoidal and Simpson's formula with numerical problems.

Reference Book : -

1. Surveying and Levelling Vol. I by B.C. Punmia.
2. Surveying and Levelling Vol. I by T.P Kanetkar and Kulkarney
3. Surveying and Levelling Vol. I by Amarjeet Singh Aggarwal

Building Drawing (CE-3.5)

UNIT-I

Roofs: -

Coupled roof ii) Couple closed roof iii) Single collar roof iv) Double collar roof.

Doors and Windows: -

i) Fully Panelled Door ii) Fully Glazed Window iii) Half glazed and Panelled door.

UNIT –II

Planning of building as per NBC & KBR:-

Plan residential and public building for the given plinth area and requirements by applying the rules. Viz – Two & Three bedded residence, an office building, A primary school building and a public health center.

Development of Building drawings:-

Draw the detailed plan, section and elevation of buildings- given the line diagram.

UNIT – III

Building with flat roof: -

Prepare the plan, section and elevation of an office building with two rooms and a verandah with, R.C.C. flat roof. Prepare the plan and elevation of a residence with two bed rooms, one hall, kitchen, store, a common bath and a sit out with R.C.C. flat roof.

Buildings with tiled roof: -

Draw the elevation, section and plan showing roof line of a hall with hip roof. Draw the elevation, section and plan showing the roof lines of a hall with gabled roof.

Building with sloped and flat roofs: -

To draw the elevation, section and plan of a two storied building with two rooms and a verandah and stair on the ground floor with flat roof and another two rooms and verandah on the Ist floor with sloping roof.

UNIT – IV

Prepare the service plan showing:-

(1) the layout of existing and proposed water supply electricity drainage and sewerage main lines from or to which connections are proposed to be given with dimensions and specifications.

(2) The layout of existing and proposed water supply drainage and sewerage lines within the plot with dimensions specifications and description of installation.

(3) The north direction. Plan longitudinal section and elevation of a slab culvert with return wing wall.. Plan longitudinal section and elevation of a slab culvert with splayed wing wall.

UNIT –V

Projection of points:-

Introduction. Position of a point, projections of ponits in the First Quadarnt, Projections of ponit in the first Quadrant, projections of point in the second Quadrant, projections of thierd points in the quadrant, projections of ponits in the fourth quadrant, position and projections of the points Lyingin he Different Octains.

Reference Book: -

1. Building Drawing by Roop Lal.

2. Building Drawing by S.S Bhavikatti.

Concrete Technology (CE-4.1)

UNIT-I

Basics:-

Historical background, composition of concrete, general note on strength mechanism, recent practice and future trends.

Constituent of Concrete: -

Cement –Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard.

Aggregates -Utility in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards.

Water -General Requirements & limiting values of impurities.

Admixtures -Additives and admixtures, types, necessity and benefit Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage.

UNIT –II

Hardened concrete:-

Compressive and tensile strength and their relationship, various tests as per IS and ASTM. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and nondestructive tests with their limitations, test methods as per IS and ASTM.

UNIT – III

Fresh concrete: -

Methods of mixing, transporting and placing of concrete. Workability – Definition and requirement, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, micro-cracking.

Durability and permeability of concrete:-

Definitions, causes, carbonation, cracking.

UNIT – IV

Concrete in aggressive environment:-

Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids.

Special Concrete:-

Review of behavior and characteristics of high strength concrete, high performance concrete, fiber reinforced concrete, mass concrete, light weight and heavy weight concrete, Precast concrete.

UNIT –V

Special concreting techniques:-

Pumped concrete, concrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete.

Reference Book :-

1. Surveying and Levelling Vol. I by B.C. Punmia.
2. Surveying and Levelling Vol. I by T.P Kanetkar and Kulkarney

Environmental Engineering (CE-4.2)

UNIT-I

Introduction:-

Man and Environment:- : Overview (socio-economic structure & occupational exposures) – Scope of Environmental Engineering – pollution problems due to urbanization & industrialization.

AIR POLLUTION :-

Causes of air pollution –types & sources of air pollutants- Climatic & Meteorological effect on air pollution concentration- formation of smog and fumigation.

Analysis of Air Pollutants- Collection of Gaseous Air Pollutants- Collection of Particulate Pollutants – Analysis of Air Pollutants like : Sulphur dioxide – Nitrogen oxide – Carbon monoxide – Oxidants &Ozone – Hydrocarbons – Particulate Matter.

UNIT –II

Air Pollution Control Measures & Equipment:-

Control of Particulate Emission – Control of Gaseous Emission – Flue Gas Treatment Methods : Stacks Gravitational and Inertial Separation, Settling Chambers, Dynamic Separators, Cyclones, Filtration, Liquid Scrubbing, Spray Chambers, Packed Towers, Orifice and Ventury Scrubbers, Electrostatic Precipitators, Gas/solid Adsoruption, Thermal Decomposition.

Methods &Approach of Air Pollution Control:-

Controlling smoke nuisance – Develop air quality criteria and practical emission standards Creating zones suitable for industry based on micrometeorology of air area Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere.

UNIT – III

WATER & ENVIRONMENT:-

Water Sources -Origin of waste water – Types of water pollutants and their effects.

DIFFERENT SOURCES OF WATER POLLUTION- Biological Pollution (point & non-point sources) – Chemical Pollutants: Toxic Organic & Inorganic Chemicals Oxygen demanding substances – Physical Pollutants: Thermal Waste – Radioactive waste Physiological Pollutants: Taste affecting substances – other forming substances.

WATER POLLUTION & ITS CONTROL-Adverse effects on: Human Health & Environment, Aquatic life, Animal life, Plant life — Water Pollution Measurement Techniques – Water Pollution Control Equipments & Instruments – Indian Standards for Water Pollution Control.

UNIT – IV

SOIL & ENVIRONMENT-

SOIL POLLUTING AGENCIES & EFFECT OF SOLUTION-Liquid & Solid Wastes – Domestic & Industrial Wastes – Pesticides – Toxic: Inorganic & Organic Pollutants – Soil Deterioration – Poor Fertility, Septicity, Ground Water Pollution, Concentration of Infecting Agents in Soil.

SOLID WASTE DISPOSAL-Dumping domestic & Industrial Solid Wastes: Advantages & Disadvantages – Incineration: Advantages & Disadvantages – Sanitary Land Field: Advantages & Disadvantages – Management of Careful & Sanitary Disposal of Solid Wastes.

UNIT –V

NOISE POLLUTION & CONTROL-Noise Pollution: Intensity, Duration – Types of Industrial Noise – Ill effects of Noise – Noise Measuring & Control – Permissible Noise Limits.

Reference Book: -

1. Environmental Engineering by (GilbertM.Massters)
2. Environmental Engineering by (R.K. Lad)

Steel Structure Design (CE-4.3)

UNIT-I

Materials –

Making of iron and steel - Types of structural steel - Mechanical properties of steel - Concepts of plasticity - Yield strength. Loads - Combined loads - Wind loads on roof trusses, Behavior of steel, local buckling. Concept of limit state design - Different limits states as per IS 800-2007- Design strengths - Deflection limits - Serviceability - Bolted connections - Welded connections - Design Strengths - Efficiency of joint - Prying action - Types of welded joints - Design of Tension members - Design strength of members.

UNIT –II

Design of compression members -

Buckling class- Slenderness ratio - Strength design Laced and Battened columns - Column spice - Column base - Slab base.

UNIT – III

Design of Beams –

Plastic moment - Bending and shear strength laterally / supported beams design - Built-up sections - large plates Web buckling Crippling and Deflection of beams - Design of Purlin.

Torsion design- Beams, columns Combined axial, flexural and torsion: columns.

UNIT – IV

Design of eccentric connections with brackets –

End beam connections - Web angle Unstiffened and stiffened seated connections (bolted and welded types) Design of truss joints.

Plastic Design:-

Design of continuous beams and portal frame using plastic design approach.

UNIT –V

Design of welded plate Girders - Optimum depth - Design of main section - Design of end bearing, stiffness bearing and intermediate stiffness. Connection between web and flange - Design of flange splice and web splices.

Axial force design:-

Tension member, compression member.

Reference Book :-

Steel Structure Design By (S.S.Bhavikatti)

Steel Structure Design By (S.K.Duggal)

R.C.C. Design (CE-4.4)

UNIT-I

Reinforcement Materials: - Various types of reinforcing materials. Suitability of steel as reinforcing material. Properties of different types of steel (mild steel, medium tensile steel, and deformed bars).

Bond in RCC beams: - Concept of bond. Permissible bond stresses for plain and deformed bars as per BIS code of practice, minimum length, standard hook.

UNIT –II

Theory of R.C.C. Beams: - Assumption in the theory of simple bending for RCC beam. Flextural strength of a singly reinforced RCC beam Position of the Neutral axis, concept of balanced, under reinforced and over reinforced sections moment of the section. Shear strength of singly reinforced RCC beam, Assumptions made, permissible shear stresses as per IS code of practice, actual average shear stresses in singly reinforced concrete beam, concept of diagonal stirrups and inclined bars, shear strength of RCC beam section.

Bond in RCC beams: - Concept of bond. Permissible bond stresses for plain and deformed bars as per BIS code of practice, minimum length, standard hook.

UNIT – III

Singly Reinforced Concrete Beam: - Loads and loading standards as per IS:875. Design of singly reinforced concrete beam as per BIS-456 code of practice from the given data such as span, load and properties of materials used. Design of lintel with and without chajja. Design of a main/secondary beam for RCC roof and floor. Design of a cantilever beam/slab.

Doubly Reinforced Concrete Beams: - Doubly reinforced concrete beam and its necessity. Design of a doubly reinforced concrete beam.

RCC Stairs: - Generator principles for design of RCC stairs. Design of horizontally spanning stairs. Design of dog legged RCC stairs.

UNIT – IV

Columns and Isolated Footings: - Concept of long and short columns. IS specifications for main and lateral reinforcement including spiral reinforcement. Behaviour of RCC columns under axial load. Design of Axially loaded short and long columns with different end condition. Design of isolated footings to determine depth and width of foundation.

Basic concept of limit state design method and prestressed concrete – introduction to pre and post tensioning methods

UNIT –V

T-Beams:- Structural behaviour of beam and slab floor laid monolithically. Rules for the design of T-beams. Economical depth of T-beams. Design of simply supported T-beams using IS code of practice.

RCC Slabs: - Structural behaviour of slabs under UDL. Type of Boundary conditions. Design of one way slab. Design of two way slab with the help of tables of IS:456.

Reference Book: -

1. R.C.C. Design Engineering by (B.C.Pumia)
2. R.C.C. Design Engineering by (N. Krishna Raju)

Water Supply And Waste Management Engineering (CE-4.5)

UNIT-I

Estimation of surface and subsurface water resources – Predicting demand for water- Impurities of water and their significance Physical, chemical and bacteriological analysis -Waterborne diseases Standards for potable water. Intake of water: Pumping and gravity schemes.

UNIT –II

Objectives – Unit operations and processes Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation Clarifloccuator Plate and tube settlers Pulsator clarifier sand filters Disinfection softening, removal of iron and manganese. Defluoridation Softening Desalination process Residue Management Construction, Operation and Maintenance aspects.

UNIT – III

Storage and balancing reservoirs – types, location and capacity. Distribution system: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations – House service connections.

UNIT – IV

Characteristics and composition of sewage –Population equivalent – Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – Sewer appurtenances – Corrosion in sewers – Prevention and control –Sewage pumping-drainage in buildings – Plumbing systems for drainage.

UNIT –V

Objectives – Selection of Treatment Methods –Principles, Functions, – Activated Sludge Process and Extended aeration systems – Trickling filters – Sequencing Batch Reactor(SBR) – UASB –Waste Stabilization Ponds – Other treatment methods – Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects. – Discharge standards-sludge treatment Disposal of sludge.

Reference Book :-

1. Soil & Foundation by K.R. Arora.

2. Soil and Foundation by Dr. P.N Modi.

SOIL And Foundation Engineering (CE-5.1)

UNIT-I

SOIL EXPLORATION:-

Need and methods of soil exploration, boring and sampling methods, pits and trenches, drifts and shafts, methods of boring, auger borings, wash borings, rotary drilling, percussion drilling, core drilling, types of soil samples, disturbed samples, undisturbed samples, design features affecting the sample disturbance, split spoon samplers, scraper bucket samplers, shell by tubes and thin walled samplers, piston samplers, preservation and handling of samples. penetration tests, monotonic and cyclic, field permeability tests, in-situ tests using pressure meter, observation of ground water table, instrumentation in soil engineering, strain gauges, resistance and inductance type plate load test, pressure meter, geophysical methods, planning of programme and preparation of soil investigation report.

UNIT –II

SLOPE STABILITY:-

Infinite and finite earth slopes, types of failures, factor of safety of infinites lopes, stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method, Taylor's Stability number, and stability f slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES AND RETAINING WALLS: -

Rankine's theory of earth pressure, earth pressures in layered soils, Coulomb's earth pressure theory, and Culmann's graphical method. Types of retaining walls, stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill.

UNIT – IV

SHALLOW AND DEEP FOUNDATIONS:-

Types, choice of foundation, location of depth, safe bearing capacity, Terzaghi, Meyerhof, Skempton and IS Methods. Safe bearing pressure based on N value, allowable bearing pressure, safe bearing capacity, plate load test, allowable settlements of structures, Analysis of foundation, individual, strip, combined footings and mat foundations conventional, elastic approach, soil structure interaction principles. Types of piles, load carrying capacity of piles based on static pile formulae in dynamic pile formulae, pile load tests, load carrying capacity of pile groups in sands and clays, settlement of pile groups. Introduction to foundations on expansive soils and marine foundations.

UNIT –V

WELL FOUNDATIONS :-

Different shapes of wells, components of well, sinking of well, tilts and shifts, principles of analysis and design, seismic influences, IRC guidelines.

Reference Book :-

1. Soil & Foundation by K.R. Arora.

2. Soil and Foundation by Dr. P.N Modi.

Railway, Bridges And Tunnels Construction (CE-5.2)

UNIT-I

Introduction:-History, Indian Railways, recent developments, Importance of railways, Functions, requirement, types of rails, Standard rail sections, Causes of creep, Effects of creep, Measures to reduce creep, bulking, kinks, failure, wear.

Railway Track Gauge:- Different gauges on Indian Railways, affecting factors, Uniformity of gauge loading gauge, construction gauge, Problems caused by change of gauge. Track and Track stresses , Components, requirements, Cross section of permanent way, Track modulas Forces acting on Track, coning of wheels.

UNIT –II

Railway Stations and yards:- Purpose, selection of site, Facilities, Classification of station, Requirement and types of yard, Ash pit, Water Column, Turn table, Signaling and interlocking , Objectives ,Classification, Interlocking**.**

Geometric design of Track:- Necessity for geometric design, Details of geometric design of track, Track, Gradients, Grade compensation on curves. Curves and Super elevation, Track fittings, Fittings and fastening,

UNIT – III

Points and crossings:- Functions, Turnout, points or switches, Crossings, Gauntleted track, triangle, double junctions, Single slip, double slip, Resistance to Traction, Resistance to-friction, wave action, speed, track irregularity, wind, gradient, curvature, Ballast: Function, requirement, specifications of track ballast.

Alignment of Railway lines:- Importance, Basic requirements of an ideal alignment, selection of a good alignment ,Rack railway, Survey for track alignment, Sleeper, Functions, requirements, types of sleepers, sleeper density and spacing of sleepers.

UNIT – IV

Bridge Engineering: - General:- Selection of site, Data collection, Stages of investigation, waterway calculations, scours depth, afflux, Free board, Vertical clearance and economic span. Classification, Classification of superstructures with respect to structural behavior and material used, types of substructures, flooring joints, bridge bearings, movable bridges, temporary bridges.

Construction methods: - Methods of erection of various types of bridges, Superstructures and Substructures. Maintenance, Testing and strengthening of bridges**.**

UNIT –V

Tunnel Engineering: - General:- Necessity/Advantage of a tunnel, Classification of Tunnels, Size and shape of a tunnel, Alignment of a Tunnel, Portals and Shafts, Problems in Tunneling. Tunneling in Hard Rock, Sequence of operation ,Faces of attack, Methods of tunneling in hard rock.

Tunneling in Soft Ground:- Types and factors affecting the choice of method to sort ground, Methods of tunneling in soft rocks, Lighting, Ventilation and Dust control, Tunnel Lighting ,Ventilation of Tunnel, Methods of Ventilation, Dust contro, Drainage and safety, Drainage of tunnel, Drainage system, Safety.

Reference Book: -

1. Railway Engineering, by Satish Chandra and M.M. Agrawal.

2. Essential of Bridge Engineering, by D.J. Victor.

Estimating And Costing Construction (CE-5.3)

UNIT-I

ESTIMATE OF BUILDINGS:- Introduction to estimation- Necessity of Estimation- Units and Measurents-Types of Estimates- Methods of Estimation-Load bearing and framed structures Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.- Estimation of Steel for RCC works.

UNIT –II

ESTIMATE OF OTHER STRUCTURES:- Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well Estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall.

REPORT PREPARATION:- Principles for report preparation – report on estimate of Official building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.

UNIT – III

SPECIFICATION AND TENDERS:- Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications for buidings, Roads Tenders – Contracts – Types of contracts, BOT – Arbitration and legal requirements.

VALUATION:- Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Calculation of Standard rent – Mortgage – Lease-Valuation of Building- Loss assessment.

UNIT – IV

Fundamentals of Estimating and Costing:- Estimating and Costing, Meaning, purpose, Administrative Approval, Technical Sanction and Budget provision. Types of Estimate – Approximate estimate and detailed estimate. Detailed Estimate- of New work. Types and use of Estimate: Revised Estimate, supplementary Estimate, revised and supplementary estimate, renovation Estimate. Roles and responsibility of Estimator, Checklist of items of work in load bearing and framed structure as per Execution, Modes of measurement and Described accuracy in measurements of different items of work as per IS:1200, Rules for deduction in masonry work, Plastering and Pointing and Painting Work as per IS 1200.

UNIT –V

Rate Analysis:- Definition, purpose, importance and factors affecting, Lead (Standard and Extra), lift, overhead charges, water charges and contractors profit, Task work- Definition, factors, Affecting, types. Task Work of different skilled labour for different items.

Procedure of rate analysis:- Load carrying capacity of different types of vehicles, transportation of materials and their hire- charges. Preparing rate analysis of different items of work – PCC, RCC work in (column, beam, lintel, slab), brick masonary, stone masonary, Vitrified tile flooring, plastering, for doors.

Reference Book :-

1. Estimating and Costing in Civil Engineering, by Dutta, B.N.

2. A Text Book of Estimating and Costing (Civil), by Kohli, D.D and Kohli, R.C.

Irrigation Engineering (CE-5.4)

UNIT-I

Introduction:-

Necessity of irrigation- scope of irrigation engineering- benefits and ill effects of irrigation. development in India- types of irrigation systems, Soil-water plant relationship: Classification of soil water- soil moisture contents- depth of soil water available to plants permanent and ultimate wilting point.

UNIT –II

Water requirements of crops:-

Depth of water applied during irrigation- Duty of water and delta improvement of duty command area and intensity of irrigation consumptive use of water and evapotration spiration irrigation efficiencies- assessment of irrigation water.

Design of Irrigation Channel:-

Alignment- canal capacity- losses- FSL of canal- design of canal in alluvial soil and non alluvial soils- Kennedy's silt theory- Lacey's regime theory- balancing depth- use of Garrets Teaching scheme Total Credit Evaluation Scheme L T P Total Theory Mid Sem Exam CIA Pract/ Tut. Total diagrams and Lacey's Regime diagrams- lining of irrigation channels- design of lined canal drainage behind lining. Water logging: Causes, Measures: surface and sub-surface drains, land reclamation.

UNIT – III

Methods of Irrigation:-

Classification- choice of method of irrigation- surface and subsurface irrigation methods, Sprinkler and Drip Irrigation.

UNIT – IV

Diversion head works:-

Types- selection of the suitable site for the diversion headwork components of diversion headwork- Causes of failure of structure on pervious foundation- Khosla's theory- Design of concrete sloping glacis weir.

Canal regulation works:-

Canal fall- necessity and location- types of falls- Cross regulator and distributory head regulator- their functions, Silt control devices, Canal escapes- types of escapes.

UNIT –V

Cross drainage works:-

Types- selection of suitable type of CD works- aqueduct and Syphon aqueductdetermination of maximum flood discharge and waterway for drain, fluming of canal- uplift pressure on underside of barrel roof and at the floor of the culvert- design of bank connections.

Reference Book :-

1. Irrigation Engineering by (Santosh kumar garg)
2. Irrigation Engineering by (S. K. Mazumder)

Highway Engineering (CE-5.5)

UNIT-I

Highway Introduction, Planning & Development:- Highway planning in India, Development, Rural and urban roads, Road departments in India, Road classification, Road authorities i.e. IRC, CRRI, NHAI, NHDP etc.

Highway Alignment & Surveys:- Reconnaissance, Aerial surveys, Location surveys, Location of bridges, Problems in rural and urban areas. Highway drawings & reports Highway project preparation. Topographic map, reading the data given on a topographic map, Basic considerations governing alignment for a road in plain and hilly area, Highway location, marking of alignment.

UNIT –II

Highway Geometric Design:- Topography and physical features, Cross section elements like carriageway width, formation width, right of way, etc., friction, Light reflecting characteristics, roughness, camber, sight distances, horizontal alignment, design speed, minimum radius, super-elevation, transition curve, gradients, design of summit and valley curves.

UNIT – III

Highway Construction Materials:- Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials. Different types of road materials in use,soil, aggregate, binders bitumen, cutback, emulsion and Modified Bitumen (CRMB, PMB)

Highway Construction:- Construction of various types of roads, Joints in cement concrete pavements, Road side development: Arboriculture, street lighting.

Highway Economics & Finance:- Financing of road projects, administration of roads, PPP models, Road safety audit, Methods of economic evaluation of highway projects.

UNIT – IV

Design of Highway Pavements: - Design of flexible (G.I. method and CBR method using million standard axles) and rigid pavements (Fatigue concept of pavement design), Maintenance of pavements. Introduction to California Bearing Ratio, Method of finding CBR value and its significance. Aggregate. Source and types, important properties, strength, durability.

Highway Drainage & Maintenance: - Importance of highway drainage, Pavement failures, strengthening of existing pavements, Surface and sub-surface drainage arrangements, sketches and design.

UNIT –V

Traffic Engineering:- Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies - definition, purpose, types, survey methods. Accident studies - purpose, types, causes, collision diagram, condition diagram, preventive measures. Traffic control devices like pavement marking, signs, signals. Traffic management, various types of intersection and their design concept.

Reference Book: -

1. Highway Engineering by (Hamid Yaghoubi)
2. Highway Engineering by (Athanassios Nikolaides)

Entrepreneurship Development And Management (CE-6.1)

UNIT-I

Introduction:- Meaning and Importance, Evolution of term 'Entrepreneurship, Factors influencing entrepreneurship, Psychological factors, Social factors, Economic factor, Environmental factors, Characteristics of an entrepreneur, Entrepreneur and Entrepreneur, Barriers to entrepreneurship.

Types of entrepreneur:- According to Type of Business, According to Use of Technology, According to Motivation, According to Growth, According to Stages, New generations of entrepreneurship viz. social entrepreneurship, Edupreneurship, Health entrepreneurship, Tourism entrepreneurship, Women entrepreneurship etc.

UNIT –II

Entrepreneurial Motivation:- Motivation, Maslow's theory, Herjburg's theory, McGragor's Theory, McClelland's Need – Achievement Theory, Culture & Society , Values / Ethics , Risk taking behavior.

Creativity:- Creativity and entrepreneurship, Steps in Creativity, Innovation and inventions, Using left brain skills to harvest right brain ideas, Legal Protection of innovation, Skills of an entrepreneur, Decision making and Problem Solving (steps indecision making).

UNIT – III

Organisation Assistance:- Assistance to an entrepreneur, New Ventures, Industrial Park (Meaning, features, & examples), Special Economic Zone (Meaning, features & examples), Financial assistance by different agencies, MSME Act Small Scale Industries, Carry on Business (COB) licence, Environmental Clearance, National Small Industries Corporation (NSIC), Government Stores Purchase scheme (e-tender process), Excise exemptions and concession, Exemption from income tax, Quality Standards with special reference to ISO, Financial assistance to MSME, Modernisation assistance to small scale unit, The Small Industries Development Bank of India(SIDBI), The State Small Industries Development Corporation(SSIDC), Export oriented units, Incentives and facilities to exports entrepreneurs, Export-Import Bank of India, Export oriented zone.

UNIT – IV

Rules And Legislation:- Applicability of Legislation, Industries Development (Regulations) Act, 1951., Factories Act, 1948, The Industrial Employment (Standing Orders) Act, 1946, Suspension, Stoppage of work, Termination of employment, West Bengal Shops and Establishment Act, 1963, Environment (Protection) Act, 1986, The sale of Goods Ac, 1950, Industrial Dispute Act 1947.

Project Report:- Introduction, Idea Selection, Selection of the Product / Service, Aspects of a Project, Phases of a Project, Project Report, Contents of a Project Report, Proforma of a Suggested Project Report for a manufacturing Organization, Suggested Readings.

UNIT –V

Agencies for industrial assistance:- West Bengal Electronics Development Corporation, ICICI West Bengal Infrastructure Development Corporation, West Bengal Industrial Infrastructure Development Corporation, Other Corporations with focus as specific segments, State Industrial Development Corporation (SIDC), State Financial Corporation (SFCs), Directorate General of Supplies and Disposals(DGS & D), Registration with DGS & D, Registration Categories, Registration Procedure, Benefits of DGS & D, Information facilities centre in DGS & D, Khadi and Village Industries Commission (KVIC), Industrial Estate, Financing of Industrial Estates, Shilpabandhu-M Incentives for entrepreneurs 9reference to The West Bengal State Support for Industries Scheme 2008 & 2013.

Reference Book :-

1. Entrepreneurial Development, by S S Khanka.

2. The Entrepreneur, by Mark Casson.

Construction Management (CE-6.2)

UNIT-I

Probability:- Probability theory and its importance: Definition of probability, Rules of Probability, The Baye's theorem. Random variable. Probability distribution. Mean or Expectation of Random variable. Properties of Mean of Expectation.

Distributions:- Theoretical probability Distributions: Binomial Distribution, Poisson Distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.

UNIT –II

Sampling:- Sampling and sampling distribution: Probability samples, Non-probability Samples, sample Random sampling, other sampling schemes, sampling distribution and Standard error, some Sampling and Quality control. Use of concepts of standard deviation, Coefficient of variance, range in quality control of concreting and similar such activities.

UNIT – III

Testing:- Testing Hypothesis: Sampling of distribution – Test based on Normal Distribution, Studentst test, chi-square, K-S test for goodness of fit and distribution. Analysis of variance one Way & two way classification.

Applications:- Use of mathematical models based on probabilistic and statistical methods, Simulation in risk identification, analysis and mitigation of project risks. EOQ in civil Engineering, Sensitivity analysis, ABC analysis.

UNIT – IV

Correlation Analysis:- Correlation types, co-efficient. Bi-variate Frequency Distribution, Scatter Diagram, Correlation Analysis, Practical applications in civil engineering projects.

Regression Analysis:- Regression and Multivariate Analysis, Multiple Regression Analysis Nonlinear Regression. Use of regression analysis in Construction Projects.

UNIT –V

Simulation:- Simulation – Types, case studies in construction using simulation Techniques, simulation software‘s used. Griffi‘s waiting line Method, Concept of Downtime Cost of Equipment, Cox and Nunally Model, Failure Cost Profile (FCP), LID.

Reference Book :-

1. Construction Management by Eugenio Pellicer, Victor Yepes, Jose C. Teixeira.

2. Construction Project Management by Frederick E. Gould, Nancy Eleanor Joyce.

Project (CE-6.3)

Select any one topic:-

1. Polymer fiber Reinforced Concrete Pavements.
2. Waste & Recycled Material in Concrete technology.
3. Highway Network System.
4. Design Of Under Ground water System.
5. Treatment of Waste Water.
6. Hydraulic Bridge.
7. Determination of Road Profile in an area.
8. Noise Absorbing Composite Materials Using Agro waste Products.