INDIAN INSTITUTION OF ENGINEERS

Detailed Syllabus of

ASSOCIATE MEMBERSHIP

In

Surveying Engineering

EVOLUTION SCHEME:

Maximum Time: 3 Hrs.

Minimum Aggregate Pass Marks: 50% Passing Marks Per Subject 40%

THEORY PAPER 100 MARKS		
Section A	5 Questions 5 marks each	25 Marks
Section B	3 Questions 10 Marks each	30 Marks
Section C	3 Questions 15 Marks Each	45 Marks

SUBJECTS

SUBJECT CODE	**SUBJECT NAME**	**TOTAL MARKS**
	SECTION-A	
AMSV01	MATHEMATICS III	100
AMSV02	WATER & WASTE WATER ENGINEERING	100
AMSV03	HYDRAULICS	100
AMSV04	TRANSPORTATION ENGINEERING	100
AMSV05	SURVEYING-1	100
AMSV06	SOCIETY, ENVIRONMENT &ENGINEERING	100
AMSV07	BUILDING CONSTRUCTION	100
AMSV08	STRUCTURAL ANALYSIS	100
AMSV09	ADVANCED SURVEYING	100
	SECTION-B	
AMSV10	SOLID MECHANICS	100
AMSV11	DESIGN OF R.C STRUCTURES	100
AMSV12	FOUNDATION ENGINEERING	100
AMSV13	RIVER ENGINEERING	100
AMSV14	HYDROPOWER ENGINEERING	100
AMSV15	GEOTECHNICAL ENGINEERING	100
AMSV16	DESIGN OF STEEL STRUCTURES	100
AMSV17	ADVANCED STRUCTURAL ANALYSIS	100
AMSV18	ENGINEERING HYDROLOGY	100
AMSV19	SURVEYING & GEOMATICS	100
AMSV20	INDUSTRIAL ECONOMICS & MANAGEMENT	100
AMSV21	STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT DESIGN	100
AMSV22	PRESTRESSED CONCRETE & ADVANCED DESIGN OF STRUCTURE	100
AMSV23	QUANTITY SURVEYING, CONTRACT & TENDERS	100
AMSV24	FINITE ELEMENTS METHOD OF CIVIL ENGINEERING	100
AMSV25	VALUATION OF REAL PROPERTY	100
AMSV26	PROFESSIONAL ETHICS IN ENGINEERING	100
AMSV27	HIGHWAY MAINTENANCE & MANAGEMENT SYSTEM	100
PROJECT	PROJECT WORK	100

AMSV01 MATHEMATICS III

UNIT-1 PARTIAL DIFFERENTIATION AND PARTIAL DIFFERENTIAL EQUATION

1.1 Introduction, Limit , Partial derivatives , Partial derivatives of Higher orders, Which variable is to be treated as constant,

1.2 Homogeneous function, Euler's Theorem on Homogeneous Functions, Introduction,

1.3 Total Differential Coefficient, Important Deductions, Typical cases, Geometrical Interpretation of dx dz, dydz, Tangent plane to a surface,

1.4 Error determination, Jacobians, Properties of Jacobians, Jacobians of Implicit Functions,

1.5 Partial Derivatives of Implicit Functions by Jacobian, Taylor's series, Conditions for F(x, y) to be of two variables maximum or minimum, Lagrange's method of undermined Multipliers.

UNIT-2 PARTIAL DIFFERENTIAL EQUATIONS

2.1 Partial Differential Equations, Order, Method of Forming Partial Differential Equations,

2.2 Solution of Equation by direct Integration, Lagrange's Linear equation, Working Rule, Method of Multipliers,

2.3 Partial Differential Equations non- Linear in p,q , Linear Homogeneous Partial Diff. Eqn.,

2.4 Rules for finding the complimentary function, Rules for finding the particular Integral, Introduction,

2.5 Method of Separation of Variables, Equation of Vibrating Strain, Solution of Wave Equation, One Dimensional Heat Flow, Two dimensional Heat Flow.

UNIT-3 FOURIER SERIES

3.1 Periodic Functions, Fourier Series, Dirichlet's Conditions, Advantages of Fourier Series, Useful Integrals,

3.2 Determination of Fourier constants (Euler's Formulae), Functions defined in two or more sub spaces,

3.3 Even Functions, Half Range's series, Change of Interval, Parseval's Formula, Fourier series in Complex Form, Practical Harmonic Analysis.

UNIT-4 LAPLACE TRANSFORMATION

4.1 Introduction, Laplace Transform, Important Formulae, Properties of Laplace Transforms, Laplace Transform of the Derivative of f (t),

4.2 Laplace Transform of Derivative of order n, Laplace Transform of Integral off (t), Laplace Transform of t.f (t) (Multiplication by t),

4.3 Laplace Transform of 1 t f(t) (Diversion by t), Unit step function, second shifting theorem, Theorem, Impulse Function, Periodic Functions,

4.4 Convolution Theorem, Laplace Transform of Bessel function, Evaluation of Integral, Formulae of Laplace Transform, properties of Laplace Transform,

4.5 Inverse of Laplace Transform, Important formulae, Multiplication by s, Division of s (Multiplication by 1/s), First shifting properties, second shifting properties,

4.6 Inverse Laplace Transform of Derivatives, Inverse Laplace Transform of Integrals, Partial Fraction Method, Inverse Laplace Transform,

4.7 Solution of Differential Equations, Solution of simultaneous equations, Inversion Formulae for the Laplace Transform.

UNIT-5 NUMERICAL TECHNIQUES

5.1 Solution of Ordinary Differential Equations,

5.2 Taylor's Series Method, Picard's method of successive approximations,

5.3 Euler's method, Euler's Modified formula, Runge's Formula, Runge's Formula (Third only),

5.4 Runge'sKutta Formula (Fourth order), and Higher order Differential Equations.

UNIT-6 NUMERICAL METHODS FOR SOLUTION OF PARTIAL DIFFERENTIAL EQUATION

6.1 General Linear partial differential equations, Finite-Difference Approximation to Derivatives,

6.2 Solution of Partial Differential equation(Laplace's method), Jacobi's Iteration Formula, Guass-Seidal method,

6.3 Successive over-Relanation or S.O.R. method, Poisson Equation, Heat equation (parabolic equations), Wave equation (Hyperbolic Equation).

Reference Books:

1. Transforms and Partial Differential Equations Paperback – 22 June 2011 by T Veerarajan (Author)
2. Transforms and Partial Differential Equations (III Semester) Paperback – 1 January 2014by Gunavathi K. (Author)

AMSV02 WATER & WASTE WATER ENGINEERING

UNIT-1 WATER SUPPLY ENGINEERING

Importance and Necessity of Water Supply Schemes, Water Treatment, Importance and Reliability Of Water Works, Essentials Of Water Supply Engineering, Duties Of Water Works Engineers, Historical

UNIT-2 QUANTITY OF WATER

General, Types Of Demands, Domestic Water Demand, Commercial And Industrial Demand, Fire Demand, Demands For Public Use, Compensate Losses Demand, Per Capita Demand, Design Period, Forecasting Population, Arithmetical Increase Method, Geometrical Increase Method, Incremental Increase Method, Decrease Rate Of Growth Method Or Decreasing Rate Method, Simple Graphical Method, Comparative Graphical Method, The Master Plan Method Or Zoning Method, Logistic Curve Method, The Apportionment Method, Fluctuation In Demand Of Water, Factors Affecting The Water Demand

UNIT-3 COLLECTION & CONVEYANCE

Intakes, Design Of Intakes, Types Of Intakes, Lake Intakes, River Intake, Reservoir Intake, Canal Intake, Conveyance Of Water, Open Channels, Aqueducts, Tunnels, Flumes, Pipes, Cast-Iron Pipes, Wrought Iron Pipes, Steel Pipes, Concrete Pipes, Cement-Lined Cast-Iron Pipe, Asbestos Cement Pipe, Copper And Lead Pipes, Wooden Pipes, Plastic Pipes, Vitrified Clay Pipes, Pipe-Joints, Spigot And Socket Joint, Expansion Joint, Flanged Joint, Mechanical Joints, Flexible Joint, Crewed Joint, Collar Joint, Joint For A.C Pipes, Laying Of Water Supply Pipes, Specifications For Laying And Jointing Of Pipes, Hydrostatic Test, Disinfection Of Pipe Lines Before Use

UNIT-4 WATER TREATMENT PROCESSES

General, Standards For Quality Of Treated Water, Objects Of Treatment, Considerations For Public Water Supply, Location Of Treatment Plants, Treatment Processes, Layout Of Treatment Plant, Laboratory

UNIT-5 DISTRIBUTION SYSTEM

General, distribution system, gravity system, pumping system, dual system, layout of distribution system, dead end or tree system, grid-iron system, circular or ring system, radial system, methods of supplying water, pressure in the distribution system, distribution reservoirs, capacity of the reservoirs, determination of storage capacity, types of reservoirs, earth reservoirs, masonry and r.c.c. Reservoirs, elevated reservoirs, stand pipes, elevated tanks, accessories of reservoirs

UNIT-6 SANITARY ENGINEERING

General, Definitions of Some Common Terms, Used In Sanitary Engineering, Sanitary Works, Aims and Objects of Sewage-Disposal

UNIT-7 SYSTEMS OF SANITATION

General, Methods Of Collection, Conservancy System, Merits And Demerits Of Conservancy Systems, Merits And Demerits Of Water Carriage System, Sewerage System, Merits And Demerits Of Separate System, Merits And Demerits Of Combined System, Comparison Of Separate And Combined Systems, Merits And Demerits Of Partially Separate System, Patterns Of Collection Systems

UNIT-8 QUANTITY OF SANITARY SEWAGE

General, Sources Of Sanitary Sewage, Factors Affecting Sanitary Sewage, Additions Due To Infiltration, Subtractions Allowance, Rate Of Water Supply, Population, Type Of Area Served, Effect Of Growth Of Population, Determination Of Quantity Of Sanitary Sewage, Variation In The Quantity Of Sewage, Seasonal And Daily Variation, Peak Rates Of Flow, Minimum Flow

UNIT-9 DRAINS AND SEWERS

Open Drains, Drain Sections, Classification Of Drains, Sewer, Sewer Sections, Sewer Materials, Brick Sewers, Vitrified Clays Or Stoneware Pipes, Cement Concrete Pipes, Asbestos Cement Pipes, Cast Iron Pipes, Steel Pipes, Plastic Pipes, Miscellaneous Materials Used For Sewer Construction, Sewer Joints, Bandage Joint, Spigot And Socket Joint, Collar Joint, Flush-Joint, Filled And Poured Type Joints, Method Of Making Poured-Joints With Sulphur And Sand, Method Of Making A Filled Joint, Other Types Of Joints, Corrosion Prevention In Sewers, Protective Barriers, Modification Of Materials, Other Preventive Measures

UNIT-10 SEWER APPURTENANCES

General, Manholes, Drop Manholes, Lamp-Holes, Street Inlets, Flushing Tanks, Catch Basins Or Pits, Sand, Grease And Oil Traps, Inverted Siphon, Storm Water Relief Works, Ventilation Of Sewers, Design Of Overflows And Regulators, Design Of Inverted Syphon, Float Actuated Gates And Valves, Flap Gates And Flood Gates, Measuring Devices.

UNIT-11 CHARACTERISTICS AND EXAMINATION OF SEWAGE

General, characteristics of sewage, physical characteristics, chemical characteristics, biological characteristics, decomposition of sewage, examination of sewage, sampling of sewage, sampling of sewage, physical examination, chemical examination, solids, procedure of determining total and volatile solids, dissolved oxygen determination, biochemical oxygen demand (b.o.d.), b.o.d. Rates, chemical oxygen demand (c.o.d), stability and relative stability, chlorides and sulphides, method for determination of chlorides, chlorine demand, nitrogen, ph.- value, grease, oil and fat, biological tests.

UNIT-12 SEWAGE TREATMENT PROCESSES

General, Object of Treatment, Degree of Treatment, Period of Design, Effluent Disposal and Utilization, Types of Treatments, Location of Treatment Plants, Treatment Processes, Sewage Treatment Plants, Layout of Treatment Plants, Points To Be Considered In Design, Laboratory.

UNIT-13 SCREENING AND SKIMMING

General, Purpose Of Screening, Types Of Screens, Bar-Screens, Fine Screens, Communities, Other Types Of Screens, Design Factors, Disposal Of Screenings, Removal Of Oil, Grease Etc., Floatation, Skimming Tanks, Disposal Of Skimming's

UNIT-14 SEDIMENTATION

General, Characteristics Of Settle able Solids, Theory Of Sewage Sedimentation, Classification Of Sedimentation Tanks, Design Of Sedimentation Tanks, Standard Design Loading, Detention Period, Settling Efficiency Of Particles, Sedimentation Tanks, Sludge Removal, Method Of Obtaining Uniform Flow In Sedimentation Tanks, Grit Chambers, design Of Grit Chambers, Disposal Of Grit, Detritus Tanks

UNIT-15 BIOLOGICAL TREATMENT

General, Principle Of Biological Treatment, Classification Of Sewage Filters, Intermittent Sand Filters, Contact Beds, Trickling Filters, Types Of Trickling Filters, Construction Features Of Trickling Filters, Trickling Filter Operation And Loading, High Rate Filters, Design Of Trickling Filters, Galler And Goat's Equation, Recirculation, Recirculation Factor, Bio filters, Humus Tanks, Comparison Of Low Rate And High Rate Trickling Filters, Filter Site Troubles And Remedies

UNIT-16 QUALITY OF WATER

Wholesome Water, Impurities In Water, Examination Of Water, Collection Of Water Samples, Water Analysis, Physical Tests, Chemical Tests, Living Organism In Water, Biological Tests, Standards Of Water Quality

UNIT-17 CHEMICAL PRECIPITATOIN

General, Situations When Used, Chemical Used, Handling And Storing Of Coagulants, Dosage Of Coagulants, Determination Of Optimum Coagulant Dose, Feeding Devices, Mixing And Flocculation, Sedimentation, Clarifiers, Efficiency Of Chemical Precipitation

Reference Books

1. S.K.Banerjee, Environmental Chemistry, 2nd edition. Prentice Hall of India (1999), New Delhi.
2. A.Mackenzie, A.S. Ball & S.R. Virde- Instant notes in Ecology, Viva Books Pvt. Ltd. (1999) New Delhi.

AMSV03 HYDRAULICS

UNIT-1 INTRODUCTION

1.1 Introduction, Classification of Fluid, Fundamental Units, S.I. (International System of Units),
1.2 Presentation of Units and their Values, Rules for S.I. Units, Liquids and their properties,
1.3 Density of Water, Specific weight of Water, Specific Gravity of Water,
1.4 Compressibility of Water, Surface tension of water, Capillarity of Water, Viscosity of Water.

UNIT-2 HYDROSTATICS

1.1 Total Pressure, Total Pressure on an Immersed Surface, and Total Pressure on a Horizontally Immersed Surface,
1.2 Total pressure on a Vertically Immersed Surface, Total Pressure on inclined surface, Centre of pressure, Pressure on a curved Surface.

UNIT-3 EQUILIBRIUM OF FLOATING BODIES

3.1 Archimedes Principle, Buoyancy, Centre of Buoyancy, Metacentre, Metacentric Height, Analytical Method for Metacentric Height,
3.2 Conditions of Equilibrium of a floating Body, Stable Equilibrium, Unstable Equilibrium, Unstable Equilibrium, Neutral Equilibrium,
3.3 Maximum Length of Vertically Floating Body, Conical Buoys Floating in Liquid, Experimental method for Metacentric Height, Time of Rolling (Oscillation) of a floating body.

UNIT-4 BERNOULLI'S EQUATION AND ITS APPLICATIONS

4.1 Energy of a liquid in Motion, Potential Energy of a liquid particle in Motion, Kinetic Energy of a liquid particle in Motion, Pressure Energy of a liquid particle in Motion,
4.2 Total Energy of a liquid particle in Motion, Total Head of a liquid particle in Motion,
4.3 Bernoulli's Equation, Euler's Equation for Motion, Limitations, Practical Applications of Bernoulli's Equation,
4.4 Venturimeter, Discharge through a Venturimeter, Inclined Venturimeter, Orifice Meter, Pitot tube.

UNIT-5 FLOW THROUGH ORIFICES

5.1 Types of Orifices, Jet of Water, Vena Contracta, Hydraulic Coefficients, Coefficient of Velocity, Coefficient of Discharge, Coefficient of Resistance,
5.2 Experimental Method for Hydraulic Coefficients, Discharge through a small Rectangular Orifice, Discharge through a large Rectangular Orifice,
5.3 Discharge through a Submerged or Drowned Orifice, Discharge through a Wholly Drowned Orifice, Discharge through a Partially Drowned Orifice,
5.4 Discharge through a Drowned Orifice under Pressure.

UNIT-6 FLOW THROUGH MOUTHPIECES

6.1 Types of mouthpieces, Loss of a Head of a Liquid Flowing in a pipe, Loss of Head due to Sudden Enlargement, Loss of Head due to sudden contraction,
6.2 Loss of Head at entrance to pipe, Discharge through a Mouthpiece, Discharge through an External mouthpiece,
6.3 Discharge through an Internal mouthpiece (Re-entrant or Borda's mouthpiece), Discharge through a Convergent Mouthpiece,
6.4 Discharge through a Convergent-divergent Mouthpiece (Bell-mouthpiece), Pressure in a mouthpiece, Pressure in an External mouthpiece,
6.5 Pressure in an internal mouthpiece, Pressure in a Convergent Mouthpiece, Pressure in a Convergent-divergent Mouthpiece.

UNIT-7 FLOW THROUGH SIMPLE PIPES

7.1 Loss of Head in Pipes, Darcy's Formula for loss of Head in pipes, Chezy's Formula for Loss of Head in Pipes,
7.2 Graphical Representation of Pressure Head and Velocity Head, Hydraulic Gradient Line, Total Energy Line, Transmission of Power through Pipes,
7.3 Time of Emptying a Tank through a Long Pipe, Time of Flow from One Tank into Another through a Long Pipe.

UNIT-8 UNIFORM FLOW THROUGH OPEN CHANNELS

8.1 Chezy's Formula for Discharging through an Open Channel, Values of Chezy's Constant in the formula for Discharge through an Open Channel, Bazin's Formula for Discharge,
8.2 Kutter's Formula for Discharge, Manning's Formula for Discharge, Discharge through a Circular Channel, Channels of Most Economical Cross-sections,
8.3 Condition for Maximum Discharge through a Channel of Rectangular Section, Condition for Maximum Discharge through Channel of Trapezoidal Section,
8.4 Condition for Maximum Velocity through a Channel of Circular Section, Condition for Maximum Discharge through a Channel of Circular Section,
8.5 Measurement of River Discharge, Area of Flow, Simple Segments Method, Simpson's rule, Average Velocity of Flow, Floats, Pitot Tube, Chemical Method for the Discharge of a River.

UNIT-9 VISCOUS FLOW

9.1 Viscosity, Newton's Law of Viscosity, Effect of Viscosity on Motion, Units of Viscosity, Effect of Temperature on the Viscosity, Kinematic Viscosity,
9.2 Classification of Fluids, Ideal Fluid, Real Fluid, Newtonian Fluid, Non-Newtonian Fluid, Ideal Plastic fluid,
9.3 Classification of Viscous Flows, Laminar Flow, Turbulent Flow, Reynold's Experiment of Viscous Flow, Reynold's number,
9.4 Hagen-Poiseuille Law for Laminar Flow in Pipes, Distribution of Velocity of a Flowing Liquid over a Pipe Section, Loss of Head due to Friction in a Viscous Flow.

UNIT-10 IMPACT OF JETS

10.1Force of Jet Impinging Normally on a fixed Plate, Force of Jet Impinging on an Inclined Fixed Plate, Force of Jet Impinging on a Curved Plate, Force of Jet Impinging on a Moving Plate,

10.2Force of Jet Impinging on a Series of Moving Vanes, Force of Jet Impinging on a Fixed Curved Vane, Force exerted NYa Jet of water on a series of vanes.

UNIT-11 JET PROPULSION

11.1Pressure of Water due to Deviated Flow, Principle of Jet Propulsion, Conditions for maximum efficiency, Propulsion of Ships by water Jets,

11.2Propulsion of Ships Having Inlet Orifices at Right Angles to the Direction of its Motion (i.e. Orifices Amidship), Propulsion of Ships Having Inlet Orifices Facing the Direction of Flow.

UNIT-12 WATER WHEELS

12.1Hydroelectric Power Plant, Heads of Turbine, Classification of Hydraulic Turbines, Water Wheels, Pelton

UNIT-13 IMPULSE TURBINES

13.1Pelton Wheel, Runner and Buckets, Casing, Braking Jet, Work Done by an Impulse Turbine, Design of Pelton Wheels,

13.2Governing of an Impulse Turbine (Pelton Wheel), Other Impulse Turbines.

UNIT-14 CENTRIFUGAL PUMPS

14.1Types of Pumps, Centrifugal Pump, Types of casings for the impeller of a Centrifugal Pump, Volute Casing (Spiral Casing), Vortex Casing,

14.2Volute Casing with Guide Blades, Work done by a Centrifugal Pump, Efficiencies of a Centrifugal Pump, Manometric Efficiency, Mechanical Efficiency.

UNIT-15 PUMPING DEVICES

15.1Hydraulic Ram, Air Lift Pump, and Rotary Pump.

UNIT-16 HYDRAULIC SYSTEMS

16.1Hydraulic Press, Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Crane, Hydraulic Lift, Direct Acting Hydraulic Lift,

16.2Suspend Hydraulic Lift, Hydraulic Coupling, And Hydraulic Torque Convertor.

Reference Books:

1. Open Channel Hydraulics by R H French
2. Experiments in Hydraulic Engineering by Sarbjit Singh
3. Fundamentals of Hydraulic Engineering Systems by Ned H C Hwang

AMSV04 TRANSPORTATION ENGINEERING

UNIT-1 ROAD PLANNING

1.1 Classification of Highways, Planning of a Highways, Fact Finding Surveys and Other Surveys, Reconnaissance, Preliminary Survey, Final Location Survey,

1.2 Cross- section and Profiles, Surface Drainage Survey, Soil Investigation, Road Materials Investigation, Rights of Way Investigation, Bridge Sites,

1.3 Survey Report, Annexure to the Survey Report, Phasing of Road Programmed, Saturation System, Road Planning in India.

UNIT-2 GEOMETRIC DESIGN OF HIGHWAY

2.1 Width of Formation, Right of Way, Width of Pavement, Camber, Gradient, Speed, Sight Distances, Curves and Their Radii, Road Cross-sections, Road- Rail Level Grossing's.

2.2 LOW COST ROADS:Earth Roads, Kanker Roads, Garvel Roads, Traffic Bound Macadam, Water Bound Macadam Roads.

2.3 ROAD CONSTRUCTION MATERIALS: Crushed Rock Aggregate, Gravels,Sand, Slag, Requirements of a Good Road Aggregate, Aggregate Testing, Bituminous Materials, Specifications and Tests for Bituminous Materials, Cement Testing.

2.4 STABILISED ROADS:Stabilizers, Soil Stabilized Roads or Mechanical Stabilized Roads, Sand- Clay Roads, Gravel Surfaced Stabilized Roads, Soil- Lime-Pozzolen Stabilized Roads, Soil-Cement Stabilized Roads, Bitumen Stabilized Roads.

2.5 FLEXIBLE PAVEMENT: Introduction, Type of Pavement, Structure of the Flexible Pavement, Group Index Method, California Bearing Ratio (C.B.R.) Method for the Design of Flexible Pavement.

2.6 BITUMINOUS ROADS: Types of Bituminous Pavements, Surface Treatment, Intermediate Type Surfaces, High-type Bitumen Pavement.

2.7 RIGID PAVEMENTS: Advantages of Cement Concrete Pavement, Disadvantages of Cement Concrete Pavement, Stresses in Cement Concrete Pavement, Concrete, Design of Concrete Pavement, The Sheets Formulas, The Wester guard Formulas, Picket's Equation, Kelly's Equation, Spangler's Equation, Allowable Design Stress, Slab Thickness, Reinforcement in Concrete Slabs, Pavement Joints, Longitudinal Joints, Transverse Joints, Construction Equipment, Preparation of the Sub- grade and Sub-base, Forms, Concrete of Pavement.

UNIT-3 DRAINAGE& TRAFFIC ENGINEERING

3.1 Surface Drainage, Sub-Soil Drainage, Drainage of Marshy Soil, Bridges and Culverts, Causeways, Guidelines for the Design of Small Bridges and Culverts

3.2 TRAFFIC ENGINEERING: The Road Users and Their Characteristics, The Vehicles and Vehicular Characteristics, Road Characteristics, Traffic Census of Traffic Surveys,

3.3 Traffic Volume Study, Cycle Variation in Traffic Volume, 30th Highest Hourly Volume, Traffic Projection Factor, Origin and Destination Studies, Roadway Capacity, Road Parking and Studies, Parking Stalls, Parking Areas, Parking Lots and Parking Garages,

3.4 Road Accidents and Studies, Traffic Regulation, Traffic –control Devices, Investigations, Clover-leaf, By- pass, Ribbon Development, Street and Highway Lighting.

UNIT-4 HISTORY OF RAILWAYS IN INDIA

4.1 Development of Railways in India, Comparison of Roads and Railways, Gauges.

4.2 ALIGNMENT SURVEY AND PROJECT REPORT: Track Alignment and Gradient, Survey for Track Alignment, Traffic Survey, Reconnaissance Survey, Preliminary Survey, Location Survey, Survey Dragings and Projects Reports.

4.3 PERMANENT WAY Rails, Railway Sleepers, Ballast, Rail Fastenings and Fixtures

4.4 RAILWAY POINTS AND CROSSINGS AND JUNCTIONS: Turnouts, Switches, Crossing, Design of Turnout, Types of Track Junctions, Design of Simple Junctions.

4.5 RAILWAY TRACK DRAINAGE: Importance of Drainage, Requirement of Drainage System, Drainage systems, Cross Drainage, Drainage Problems.

4.6 MAINTENANCE OF RAILWAY TRACK: Advantages of Good Maintenance, Daily Maintenance , Periodical Maintenance, Modern Railway Track, Maintenance of Track Alignment, Maintenance of Drainage, Maintenance of Track Components, Maintenance of Points and Crossings, Maintenance of Level Crossing , Maintenance Organization, Track Recording , Mechanical Maintenance, Mechanized Maintenance, Measured Shovel Packing, Directed Maintenance of Track, Inspection of Track- Track Recording and Track Tolerances

4.7 RAILWAY STATION YARDS AND EQUIPMENT: Site Selection, Types of Selections, Station Yard, Requirements and Amenities of a Railway Station, Level Crossing, Types of Equipment, Platform, Water Column, Triangle, Ashpit, Ashpan, Turntable, Buffer Stop, Catch Siding or Slip Siding, Scotch Block, Derailing Switch, Sand Hump, Fouling Marks, Cow Catcher, Weigh Bridge, Loading Gauges, End- Loading Ramp, Traverser, Cranes, Engine Shed.

UNIT-5 TUNNEL

5.1 General, Advantage of Tunneling, Economics of Tunneling.

5.2 TUNNEL SURVEYING: Initial Surveys, Setting Out of the Tunnel Centre- line on the Surface, Triangulations, Setting out inside Tunnels, Settings Out Steeply Inclined Tunnels, Transferring of Alignment Through Shafts, Curves, Adjustments at Meeting Points of Tunnels.

5.3 DESIGN OF TUNNELS: Rail-road Tunnels, Vehicular Tunnels, Rapid Transit Tunnel.

5.4 METHOD OF TUNNELING IN SOFT STRATA: Introduction, Tunneling in Firm Ground, Tunneling in Soft Ground, Tunneling in Running Ground, Shield Method of Tunneling , Method of Supporting Roof and Sides in Multiple Drift Method.

5.5 METHOD OF TUNNELLING IN ROCK: Tunneling Method, Sequence of Operation for Construction of Tunnel in Rocky Strata, Drilling, Blasting, Inspection and Handling Misfires.

5.6 SAFETY PRECAUTION IN TUNNELLING WORK: Medical and Other Facilities, Electrical Installation and Lighting, Underground Excavation, Ventilation, Scaling and Mucking.

5.7 TUNNEL SHAFTS AND CAISSONS: Timber Shafts, Rock Shaft, Steel Lining for Shaft, Shaft by Caissons, Drop Shafts, Freezing Process for Shafts.

5.8 TUNNEL LINING: Objects of Linings, Materials for Tunnel Linings, Design of Tunnel Linnings, Concrete Linings.

5.9 TUNNEL VENTILATION, DUST PREVENTION AND LIGHTING: Object of Ventilation, Natural Ventilation, Mechnical Ventilation Methods, Ducts, Ventilation Shafts, Fans, Ventilation Buildings, Dust Control, Lighting, Mucking,

5.10 DESIGN OF TUNNELS CONVEYING WATER: General, Design of Tunnels Conveying Water: Hydraulic Design, Design of Tunnel Supports.

Reference books:

1. Transportation Engineering and Planning by C S Papacostas and P D Prevedouros
2. Introduction to Transportation Engineering by J H Banks
3. Highway Engineering by P H Wright and K Dixon

AMSV05 SURVEYING-1

UNIT-1 LEVELLING

1.1 Definitions of important terms in leveling, Instruments - Level Surface, Level Surface, Level line, Horizontal plane, Horizontal line, Vertical plane, Datum surface,

1.2 Elevation of a point, Line of collimation, Axis of telescope, Axis of bubble tube, Vertical axis, Back sight, Fore sight, Intermediate sight, Change point, Height of instrument,

1.3 Station point, Bench mark, Instruments – Level, Dumpy level, Wye level, Cooke's reversible level, Cushing's level, Tilting level.

1.4 General features of levels, Levelling staff, Taking staff readings, Level tube, Sensitiveness, Testing and adjustment of levels, Temporary adjustments of level –

1.5 Setting up of the instrument, levelling the instrument, Elimination of parallax. Permanent adjustments of levels –

1.6 Adjustment Precautions in leveling, Level field book, Simple Levelling, Series of differential leveling, Booking and reducing of levels, Plane of collimation method,

1.7 Rise and fall method, Comparative merits of the methods of reduction, Specimen pages of a level field book, Field work in leveling, Differential leveling,

1.8 Check leveling, Running of sections, Longitudinal section, Checking the levelling work, Profile Leveling, Profiles, Plotting the profile, Working profile,

1.9 Cross Sections, Cross-sectioning by level and staff, Cross-sectioning by theodolite, Giving levels for construction at works, Curvature and refraction, Error due to curvature,

1.10 Error due to refraction, Reciprocal leveling, Reciprocal Levelling. Adjustments of level circuits,

1.11 Principle of Reversion, Precision of Differential Leveling, Hand Signals, Adjustment of Dumpy Levels.

UNIT-2 THEODOLITE SURVEYING

2.1 Measuring angles and directions, Introduction, setting up the theodolite - Cross Hairs, Transit theodolite, Levelling head, Limb or lower plate, Spindles, Upper plate,

2.2 Standards of A-frames, Level tube, Compass, Telescope, Vertical circle, T-frame or index bar, Plumb-bob, Tripod,

2.3 Types of compasses, Circular box compass, Trough compass, Tubular compass, care of the transit, reading transit Vernier's, styles of graduations, pointing the instrument, measurement of horizontal angles, closing the horizon,

2.4 Conditions of perfect adjustments, Optics, Conjugate foci, Spherical aberration, Chromatic aberration, Types of surveying telescopes,

2.5 Main parts of a telescope-Body, Objective, Eye piece, Erecting eye piece, Diagonal eye piece, Diaphragm, Parallax, Qualities of a telescope,

2.6 Vernier reading, Measurement of horizontal angle by repetition, measuring angles by repetition, laying off an angle by repetition, Measurement of horizontal angle by reiteration,

2.7 BALANCINE –IN, Random line method for balancing-in, Laying horizontal angle by method of repetition, Locating point of intersection of two straight lines,

2.8 Traversing or traverse survey by theodolite, Closed traverse survey by theodolite, Open or unclosed traverse survey be theodolite, Methods of traversing by theodolite, Traversing by direct observation of angles, Traversing by deflection angles,

2.9 Traversing by direct observation of bearings, Linear measurements, Checks in unclosed traverse, Traversing by deflection angles, Traversing by direct observation of bearings of the survey lines, Traversing by direct angles,

2.10 Area of closed traverse from latitudes and double meridian distances (DMD),

2.11 Permanent adjustments of a transit theodolite, Adjustments of the plate levels, Adjustment of line of sight, Necessity, Test,

2.12 Adjustment of telescope level, Adjustment of the vertical index frame, General comments on adjustments, Adjustment of wye theodolite, Adjustment of plate level,

2.13 Adjustment of line of collimation, Adjustment of horizontal axis, Adjustment of telescope level, Adjustment of index error, Tavistock Theodolite, Ideal requirements of a theodolite,

2.14 Errors in non- adjustable parts of a theodolite and their elimination, Stability, Other sources of errors in theodolite work, Observational errors,

2.15 Errors of manipulation, Natural errors, Circular movement of the theodolite, Elimination of errors, Eccentricity of Vernier's, Eccentricity of the horizontal circle,

2.16 Errors of graduation, Errors of perpendicularity of planes of the circle to their respective axes, Error in desirable relationship between resolution and Vernier least count,

2.17 Error in desirable relationship between resolving power and sensitivity levels, Error in coincidence of the inner and outer axes of rotation, Omitted or missing measurements,

UNIT-3 PLANE TABLE SURVEYING

3.1 Drawing board- Alidade , Accessories, Spirit level, Trough compass or circular box compass, U-frame or plumbing fork, Waterproof cover, Paper, Advantages of plane table survey, Disadvantages of plane table survey,

3.2 Points to be borne in mind for plane tabling,, Setting up of the table, Levelling, Orientation, Orientation by back sighting, Orientation by magnetic needle, Centring, Testing and adjustments of plane table-

3.3 Board, Methods of plane table survey, Radiation method of plane tabling, Intersection or triangulation method of plane tabling, Traversing method of plane tabling,

3.4 Resection method of plane tabling, Three-point problem, Selection of station point S, Solution of three point problem method by trial and error method,

3.5 Solution of three-point problem by Lehman's rules, Solution of three-point problem by mechanical method, Solution of three-point problem by graphical method,

3.6 Bessel's method, Two-point problem, Errors in plane tabling, Instrumental errors, Errors of manipulation and sighting,

3.7 Errors of plotting, Contouring by plane table, Slotted templates, Analytical methods,

Reference books:

1. Surveying by Bannister A and Raymond S
2. Surveying by Punmia B C

AMSV06 SOCIETY, ENVIRONMENT & ENGINEERING

UNIT-1 DEFINITION AND SCOPE OF SOCIOLOGY

Introduction, History of Sociology, Meaning of Sociology, Definition of Sociology, Nature of Sociology, Scope of Sociology, Specialist OR Formalistic School, Synthetic School of Thought, Conclusion on Scope of Sociology, Differences between Social Sciences and Physical Sciences, Sociology and Other Social Sciences, Sociology and Psychology, Sociology and Anthropology, Sociology and Political Science, Advantages of Study of Sociology,

UNIT-2 BASIC SOCIOLOGICAL CONCEPT

Society, Basic Characteristics of Society, Factors affecting Social Life of a man, Social factors, Biological factors, External factors, Industrial societies/Technological society, Community, Characteristics of a Community, Comparison between Society and Community, Association, Characteristics of Association, Significance of Institution, Distinction between Institution and Community, Customs, Difference between Institution and Customs.

UNIT-3 SOCIAL INSTITUTION

Types of social institution, Origin of society, Theory of Divine origin, Force theory, Patriarchal and Matriarchal theories, theory of social contract, Organic theory, Types of socialization process of socialization, Factors responsible to socialization, Advantages of socialization, Marriage forms of marriage, Advantages of monogamy, selection of marriage. Partners. Divorce Reasons for Divorce, Marriage system in India, Hindu marriages Act. Divorce under marriage act 1955.

UNIT-4.SOCIAL CHANGE

Factors of social change, social movements, Types of social movements. Theories of social change, Resistance to social change. General continues responsible for social change. Causes responsible for opposition to social changes. Effects of conflict in social change, role of sociologists in Promoting social change, Social disorganization, Causes of social disorganization, Symptoms of social disorganization, Difference between social organization and Disorganization.

UNIT-5 SOCIAL CONTROL

Social control and self-control necessity of social control, means of social control informal means of social control formal methods of Social control. Agencies of social control, person's views about systems, cybernetic communication and control

UNIT-6 SOCIAL PROBLEMS:

Deviance, social problems classification of social problems, causes of social problems some important social problem, major social problems.

UNIT-7 CULTURE

What culture is? Characteristics of culture. Concept connected with culture characteristics of lag, causes of culture lag,civilization. Difference between culture and civilization, Acquired behaviour, culture Diffusion.

UNIT-8 CAPITALISM, MARXISM AND SOCIALISM:

Some important features of capitalism. Advantages of capitalism, Disadvantages of capitalism, communism or Marxism. Basic features of communism, Difference between capitalism of communism, socialism, silent features of socialism. Difference between socialism and communism.

UNIT-9 SOCIALOGY AND TECHNICAL CHANGES

Science and society , Advantages of science and technology in the economic Development , Technology and women , Influence of Technology on social Institutions , Influence of family systems, Demerits, Influence of technology on religion influence of technology on rural life.

UNIT-10 HISTORICAL PERSPECTIVE:

Introduction, phases in development of Technology, Science & technology in India after independence. Technology policy statement 1983. Role of Science and technology in development. Super conductivity programmed, Instrument development program.

UNIT-11.TECHNOLOGY ASSESSMENT AND TRANSFER:

Meaning of Technology Assessment and Transfer what Technology is information Technology, Technology Assessment, Importance of Technology, Technology forecasting and upgradation, Appropriate. Technology, criteria for success of Technology Transfer, Transfer of technology from laboratory to field.

UNIT-12 CYBERNETICS

Introduction, what cybernetics is? Control system

UNIT-13 ENGINEER IN SOCIETY

Optimization, Limitations of optimization, concepts of optimization. Advantages of optimization, Methods of optimization operation research,optimization of Human Resources. Important of Human Resources, Human Resources planning, Needs and strategies for Human Resources planning, factors affecting manpower planning. Productivity,Labour productivity, importance of productivity, Benefits of productivity measures of increase of productivity, Automation, formulation of problem, formulation of problems and alternative solution.

UNIT-14INFLATION AND POVERTY

Inflation, causes of Inflation in India, measures to control inflation and deflation; poverty, Industrialization of country; conclusion.

UNIT-15 ENVIRONMENTAL DEGRADATION AND CONTROL

Meaning of Environment ; Environment pollution, pollution, classification of pollutants; Effects of pollution on Living systems, causes of Environmental pollution , Kinds of pollution, suggestion for improving , atmospheric pollution , sources of Air pollutants, Geographical factors affecting air pollution. Treatment and disposal of sewage, treatment of sewage.

UNIT-16 PLANT LAYOUT AND SITE SELECTION

Nature of location decisions, choice of site for location, Urban Area, selection of Site in Rural Area, Suburban Area, Comparison of site for location of facilities, models of location of service facilities, Economic survey for site selection, plant layout, Advantages of good layout, Principles of plant layout, Types of pant layout.

UNIT-17 PERSONAL MANAGEMENT

Definition of personnel management, importance of personnel management, and principle of personnel management objectives of personnel management functions of personnel management, Recruitment and selection of employees. Manpower planning ; Procedure of appointing an employee in a factory ,Industrial safety , Accident Human causes, Effect of accidents, Effect to the Industry , Effect on worker, cost of society, Types of Accidents , Safety procedures.

UNIT-18 INDUSTRIAL ACTS

Indian Boiler Act 1923, The Indian factories Act 1948, Health provisions. Important provisions of the factory Act regarding safety of workers, welfare provisions , penalties for breach of provisions of the act, Indian Electricity Act, Supply& Use of Energy, The Employee's State Insurance Act 1948, Workmen's compensation Act, The Industrial Dispute Act,1947, Strikes and Lockouts, The payment of wages Act 1936 , The Indian Trade Union Act, 1926 , Minimum Wages Act 1948.

UNIT-19 STANDARDS

Indian standard Institution, BIS Publications, ISO-9000 Quality systems.

UNIT-20 FUNCTIONS OF MANAGEMENT:

Difference between Management , Administration, Organization, Functions of management , Planning , Production planning and control , steps in production planning and control , Routing procedure of Routing , Scheduling & Loading scheduling and loading , Advantages of planning. Types of organization structures, functional organization, Directing, Nature of Directing, Principles of Direction, controlling, characteristics of Good control systems, co-ordination, Tools of co-ordination, Types of co-ordination,principles of co-ordination, co-ordinationVs co-operation. Motivation

Importance of motivation, Techniques of motivation, Methods of participation, Extent of worker's participation in management, worker's participation in Indian Industries, Human needs, Importance of fulfillment of needs, Moslow's theory of motivation, Leadership, leadership Style.

Reference books:

1. Society and Environment 24th Edition Paperback–1 January 2012 by Chauhan A S (Author)
2. Updated edition of Environmental Engineering, previous Iyco - authored by J. Jeffrey Peirce and P. AarneVesilind.

AMSV07 BUILDING CONSTRUCTION

UNIT-1 FOUNDATION

1.1 General Discussion, Assessment Of Allowable Soil Pressure, Settlement In Clay, Settlement In Sand, Differential Settlement, Types Of Foundations,

1.2 Deep Foundations, Pile Foundations, Well Foundations And Caissons, Foundations In Special Conditions Foundation Failures,

1.3 Durability Of Foundation, Excavations For Foundation Trenches And Basements, Dewatering Of Foundation Excavations,

1.4 General Procedure in Foundation Design, Cofferdams, Circular Cellular Cofferdam.

UNIT-2 ACOUSTICS AND SOUND INSULATION

2.1 General Discussion And Scope Of Study, Acoustics Of Buildings, Sound Insulation Of Buildings, Characteristics Of Audible Sound,

2.2 Rating Of Intensity Levels Of Sound Or Noises (In Decibels Or Db), Behaviour Of Sound And Its Effects (Or Principles Of Acoustics),

2.3 Absorption Coefficients For Important Surfaces, Acoustical Defects, General Remarks On Reverberatlon Time And Audience Factor, Acoustics Of Buildings,

2.4 Sound Absorbents Or Acoustical Materials, Sound Insulation Of Buildings, Transmission Of Noise, Sound Insulation Vs. Sound Absorption,

2.5 Transmission Loss, Maximum Acceptable Noise Levels

UNIT-3 VENTILATION, AIR-CONDITIONING AND THERMAL INSULATION

3.1 General Remarks, Ventilation, Definitions And Necessity Of Ventilation, Functional Requirements Of A Ventilation System, Systems Of Ventilation And Their Choice,

3.2 General Considerations And Rules For Natural Ventilation Air-conditioning Of Buildings, General-Purposes And Classification,

3.3 Principles Of Comfort Air-Conditioning, Comfort Air-Conditioning Under Indian Conditions, Systems Of Air –Conditioning, Essentials Of An Air-Conditioned System,

3.4 Air Pumps, Thermal Insulation Of Buildings (Or Heat Insulation Of Buildings), General Discussion And Definitions Of Terms,

3.5 General Principles Of Thermal Insulation, Heat Insulating Materials Or Material, Of Heat Insulation, Values Of Density,

3.6 Thermal Conductivity And Thermal Resistivity Of Some Building And Insulating Materials, Methods Of Heat Insulation Or Thermal Insulation

UNIT-4 STRUCTURAL STEEL WORK

4.1 General Principles Of Steel Work, Rolled Steel Sections Or Sections In Steel Work, Methods Of Connecting Steelwork, Structural Steel Members And Their Interconnection,

4.2 Important Considerations In Fire Protection, Properties Of Fire-Resisting Materials, Fire-Resistant Construction, General Measures Of Fire Safety In Buildings

UNIT-5 MISCELLANEOUS STRUCTURES

5.1 General, Shell Structures, Folded Plate Structures, Skeletal Space-Frame Structures, Pneumatic Structures, Grain Storage Structures,

5.2 Prefabricated Structures, Fireplaces And Flues, R.C.C. Chimneys, Earthquake-Resistant Structures, Modified Mercalli Intensity Scale (Abridged)

UNIT-6 CONSTRUCTION MANAGEMENT, CONTROL AND VALUATION OF A BUILDING

6.1 Objects Of Planning, Construction Stages, Construction Operation, Construction Schedules, Bar Chart, Milestone Chart, Definitions, Pert Network, Cpm Network,

6.2 Explanation Of Table, Cost Analysis, Value Engineering Manpower And Materials Requirements In Buildings, Job Layout For Building,

6.3 Project Supervision, Project Control During Construction, Construction Contracts, Management Techniques For Rural Housing Development In India,

6.4 Demolition Works In Buildings, Building Disaster Management, Environmental Impact Management

Reference books:

1. Building Construction by B C Punmia and Ashok Kumar Jain
2. Building Materials by S K Duggal
3. Building Construction by Varghese P C

AMSV08 STRUCTURAL ANALYSIS

UNIT-1 SHEAR FORCES AND BENDING MOMENT

1.1 Beam, Types of Loads, Types of Supports, Shear Force and Bending Moment, Sign Convention, Shear Force and Bending Moment Diagrams,

1.2 S.F. and B. M. Diagrams for Simply Supported Beams, S. F. and B.M. Diagrams for Overhanging Beams, Relationship between Rate of Loading,

1.3 Shear Force and Bending Moment, Graphical Method of Plotting S. F. and B. M. Diagrams, Uniformly Distributed Loads

UNIT-2 DEFLECTION OF BEAMS

2.1 Relationship between Curvature, Slope and Deflection, deflection Curves, Macaulay's Method, Deflection Curve by Macaulay's Method,

2.2 Propped Cantilevers, Deflections by Moment Area Method, Sign Convention, Slope and Deflection for Cantilever, Slope and Deflection for simply Supported Beam,

2.3 Deflections by Conjugate Beam Method, Deflection by strain Energy, Impact Loading on Beams, Laminated Spring, Deflection Due to Shear

UNIT-3 FIXED AND CONTINUOUS BEAMS

3.1 Fixing Moments for a Fixed Beam of Uniform Section, Effect of Sinking of Support, Effect of Rotation of a Support, Slope and Deflection at a point, by Moment Area Method,

3.2 Introduction, Analysis of Continuous Beams, Reactions at the supports, Effect of Sinking of Supports

UNIT-4 COLUMNS AND STRUTS

4.1 Euler Crippling Load-Column with One End Free and the Other End Fixed, Column with both ends fixed, Column with One End Fixed and the other Hinged,

4.2 Limitation of Euler's Formula, Column with Initial Curvature, Column Carrying Eccentric Load, Laterally Loaded Columns, Empirical Formulae

UNIT-5 RIVETED CONNECTIONS

5.1 Riveted Connections, Types of Riveted Joints, Failure of Riveted Joints, Strength of Riveted Joints, Permissible Stresses in Rivets,

5.2 Design of Riveted Joints, Riveted Joints in Cylindrical and Spherical Shells, Structural Connections, Riveted Joints Subjected to Moment Acting in the Plane of the Joint, .

5.3 Riveted Joint Subjected to Moment Acting at Right Angles to the Plane of the Joint.

UNIT-6 WELDED CONNECTIONS

6.1 The welding process, types of welds, intermittent fillet welds, combined stresses in weld, eccentric welded connection

Reference books:

1. Recent Advances in Matrix Methods of Structural Analysis and Design by J Tinsley Oden

AMSV09 ADVANCED SURVEYING

UNIT-1 TRIGONOMETRICAL LEVELLING

1.1 Introduction, Heights And Distances, Base Of The Object Accessible, Base Of The Object
1.2 Inaccessible: Instrument Stations Not In The Same Vertical Plane As The Elevated Object,
1.3 Geodetical Observations, Axis Signal Correction (Eye And Object Correction), Determination Of Difference In Elevation,

UNIT-2 TRIANGULATION

2.1 Geodetic Surveying, Classification Of Triangulation System, Triangulation Figures Or Systems, The Strength Of Figure, Routine Of Triangulation Survey,
2.2 Signals And Towers, Non-Luminous Or Opaque Signals, Base Line Measurement, Calculations Of Length Of Base, Measurement Of Horizontal Angles,
2.3 Satellite Station: Reduction To Centre, Extension Of Base: Base Net.

UNIT-3 TOPOGRAPHIC SURVEYING

3.1 Introduction, Methods of Representing Relief, Contours And Contour Interval,
3.2 Characteristics Of Contours, Procedure In Topographic Surveying,
3.3 Methods Of Locating Contours, Interpolation Of Contours

UNIT-4 ROUTE SURVEYING

4.1 Introduction, Reconnaissance Survey, Preliminary Survey, Location Survey,
4.2 Construction Survey.

Reference Books:

1. Advanced Surveying -Total Station, GIS and Remote Sensing by SatheeshGopi, R.Sathikumar and N. Madhu, Pearson publication
2. Surveying &levelling by R. Subramanian, Oxford Publication. (Best Books for Advanced Surveying)
3. GPS Satelite Surveying-Alfred Leick-Wiley
4. Remote sensing and Geographical Information System, By A. M. Chandra and S. K. Ghosh, Narosa Publishing House. (Best Books for Advanced Surveying)

AMSV10 SOLID MECHANICS

UNIT-1 ANALYSIS OF STRESS

1.1 Introduction, stress, complementary shear stress, simple shear, the state of pure shear,
1.2 Principal stresses and principal planes, sign convention,
1.3 Mohr's circle for biaxial stresses, Mohr's circle.

UNIT-2 ANALYSIS OF STRAIN

2.1 Introduction, Strain on an Oblique Plane,
2.2 Mohr's Circle Of Strain, Compatibility Equations

UNIT-3 STRESS-STRAIN RELATIONS FOR LINEARLY ELASTIC SOLIDS

1.1 Introduction, Hooke's Law, Poisson's Ratio,
1.2 Differential Equation of Equilibrium,
1.3 The Stress Function Plane Stress

UNIT-4 THEORY OF FAILURE

4.1 Introduction, Maximum Principal Stress Theory,
4.2 Maximum Shearing Stress Theory, Maximum Strain Theory,
4.3 Significance of Theories of Failure, Factor of Safety

UNIT-5 ELASTIC STABILITY

5.1 Introduction, Failure Of A Column Or Strut
5.2 Euler's Column Theory
5.3 A Sign Conventions , Limitation Of Euler's Formula
5.4 Empirical Formula For Columns,
5.5 Rankine's Formula For Columns, Euler's Formula

Reference book:

1. Advanced Mechanics of Solids Book by L. S. Srinath
2. Engineering Mechanics of Solids Textbook by Egor Popov

AMSV11 DESIGN OF R.C STRUCTURES

UNIT-1 DESIGN PHILOSOPHIES

1.1 Introduction, Working Stress Method, Ultimate Load Method, Limit State Method,
1.2 Limit State Method Vs Working Stress Method, Building Code,
1.3 Accuracy Of Computations, Type Of Construction

UNIT-2 SINGLY REINFORCED STRUCTURE

2.1 Bending Of Beams, Cracked Concrete Stage, Ultimate Strength Stage, Assumptions,
2.2 Moment Of Resistance, Modes Of Failure,
2.3 Minimum And Maximum Tension Reinforcement, Effective Span

UNIT-3 DOUBLY REINFORCED SECTIONS

3.1 Types Of Problem, Stress In Compression Reinforcement, Design Steps,
3.2 Minimum And Maximum Reinforcement, Design Tables, Flanged Beams,
3.3 Effective Width Of Flange

UNIT-4 SHEAR AND DEVELOPMENT LENGTH

4.1 Shear Stress, Diagonal Tension, Shear Reinforcement, Spacing Of Shear Reinforcement,
4.2 Development Length, Anchorage Bond, Flexural Bond

UNIT-5 TORSION

5.1 Introduction, torsional stiffness of homogeneous sections, torsional stiffness of R.C. Sections,
5.2 Torsional reinforcement, distribution of torsion reinforcement, torsion in beams curved in plan

UNIT-6 TYPES OF FLOOR

6.1 One-Way Slab Systems, Two-Way Slab Systems, Flat Slab Systems, Flat Plate Systems, Grids.

UNIT-7 COLUMNS AND WALLS

7.1 Effective height of a column, assumptions, minimum eccentricity, short column under axial compression, requirements for reinforcement, columns with helical reinforcement,
7.2 Short columns under axial load and uniaxial bending, construction of design charts, short columns under axial load and biaxial bending, slender columns,
7.3 Walls, construction of design charts, reinforcement in walls, corbels, truss analogy, detailing of reinforcement.
7.4 RETAINING OF WALLS, forces on retaining walls, stability requirements, proportioning of cantilever walls, development length, loads on the heel, rear counterforts,

UNIT-8 TYPES OF STAIRS

8.1 Common types of stairs, central-wall type stairs, central-column type stairs, slab less stairs, helicoidally stairs, free-standing stairs

UNIT-9 DESIGN OF TANKS

9.1 Roofs, ring beam, floors, walls of rectangular tanks, walls of circular tanks, shear force,

9.2 Steel ladder, base slab, cover to reinforcement , joints, design and detailing of joints, spacing of joints ,

UNIT-10 MASONARY BUILDINGS

10.1Introduction, Brick Wall Design Under Vertical Loads

UNIT-11 FOUNDATIONS

10.1Introduction, minimum foundation depth., shallow foundations, use of plinth beams,

10.2 Brick wall design under horizontal loads, resistance to earthquake forces by wall boxed in plan, deep foundations

Reference books:

1. Design of Reinforced Concrete Structures by P Dayaratnam
2. Advanced Reinforced Concrete Designby P C Varghese

AMSV12 FOUNDATION ENGINEERING

UNIT-1 INTRODUCTION

1.1 Soil as a three phase system, water content, density and unit weights, specific gravity, voids ratio, porosity and degree of saturation, Density index

1.2 CLASSIFICATION OF SOILS General, compaction, standard proctor test, equivalent for standard proctor test. [is:2720 a (part vii) : 1965 : light compaction],

1.3 Water-density relationship, modified proctor test, modified proctor test curve, jodhpur mini-compactor test, typical comparison of the standard proctor test and jodhpur mini-compactor test,

1.4 Jodhpur mini-compactor, field compaction methods, field compaction control, proctor needle, calibration curve, factors affecting compaction,

1.5 Effect of comp active effort on compaction, obtained by the jodhpur mini-compactor, shear strength

UNIT-2 STRESS DISTRIBUTION

2.1 Concentrated force: boussinesq equations, concentrated load: boussinesq, analysis, pressure distribution diagrams, variation of σz with r at constant depth,

2.2 Vertical stress distribution on a horizontal plane (influence diagram for z σ at a), z σ distribution on vertical lane, vertical pressure under a uniformly, uniformly distributed load over circular area,

2.3 Vertical pressuredue to a line load, vertical pressure under strip load, vertical. Pressure under center of strip load, vertical pressure under a uniformly loaded rectangular area, rectangular loaded area,

2.4 Influence factor for rectangular area (after Steinbrenner), equivalent point load method, Newmark's influence chart, radii of concentric circles for influence chart, contact pressure,

UNIT-3 SURFACE TENSION CAPILLARITY & EFFECTIVE STRESS

3.1 Modes of occurrence of water in soil, adsorbed water, adsorbed water and pore water (lambe, 1953), capillary water, surface tension and formation of meniscus,

3.2 Capillary rise, values of unit weight, dynamic viscosity and surface tension for water, capillary heights of soil, stress conditions in soil

3.3 Effective and neutral pressures, capillary siphoning,

UNIT-4 PERMEABILITY & SEEPAGE ANALYSIS

4.1 Darcy's law, discharge velocity and seepage velocity, validity of Darcy's law, factors affecting permeability, constant head permeability test, falling head , permeability test, permeability of stratified soil deposits,

4.2 Head gradient and potential, seepage pressure, upward flow : quick condition Sand condition, two dimensional flow:

4.3 Laplace equation, seepage through anisotropic soil, phreatic line of an earth dam , one dimensional consolidation, consolidation of laterally confined soil, semi log plot of pressure voids ratio relationship, consolidation of undisturbed specimen,

4.4 Terzaghi's theory of one dimensional consolidation, calculation of voids ratio and coefficient of volume change, calculation of voids ration by height of solids method, calculation of voids ratio by change in voids ratio method,

4.5 Determination of coefficient of consolidation, shear strength, theoretical considerations : Mohr's stress circle, Mohr coulomb failure theory, the effective stress principle, measurement of shear strength, direct shear test, triaxle compression test, vane shear test , shear strength of cohesive soils

UNIT-5 EARTH PRESSURE

5.1 Plastic equilibrium in soils: active and passive states, active and passive states of plastic equilibrium, active earth pressure

5.2 Rankine'stheory, backfill with uniform surcharge, active earth pressure of cohesive soils, passive earth pressure:Rankine's theory, coulomb's wedge theory

UNIT-6 DESIGN OF GRAVITY RELATING WALL & STABILITY OF SLOPES& SUBSOIL EXPLORATION

6.1 Design of gravity relating wall

6.2 Stability analysis of infinite slopes, stability analysis of finite slopes, the Swedish slip circle method, stability of slopes of earth dam

6.3 Site reconnaissance, site exploration, methods of site exploration, soil samples and samplers, disturbed sampling, undisturbed sampling, penetration and sounding tests, geophysical methods

UNIT-7 SHALLOW FOUNDATION & WELL FOUNDATION

7.1 Types of foundations, spread footing, safe bearing pressure, settlement of footings, combined footing and strap footing, mat or raft footing, is. Code of practice for design of raft foundations, modulus of subgrade reactions K

7.2 Caissons, shapes of wells and component parts, depth of well foundation and bearing capacity, forces acting on a well foundation, analysis of well foundation, Heavy wells

Reference Books:

1. Modern Geotechnical Engineering by A Singh
2. Principles of Foundation Engineering by B M Das
3. Theory and Practice of Foundation Design by N Som

AMSV13 RIVER ENGINEERING

UNIT-1 RUN OFF

1.1 Introduction, Hydrograph, Runoff Characteristics of Streams, Yield (Annual Runoff Volume),

1.2 Flow-Duration Curve, Flow-Mass Curve, Sequent Peak Algorithm, Droughts, Surface Wter Resources Of India

UNIT-2 STREAM FLOW MEASUREMENT

2.1 Introduction, Measurement Of Stage , Measurement Of Velocity, Dilution Technique Of Streamflow Measurement,

2.2 Electromagnetic Method, Ultrasonic Method, Stage-Discharge Relationship, Extrapolation Of Rating Curve, Hydrometric Stations

UNIT-3 FLOODS

3.1 Introduction, Rational Method, Empirical Formulae, Unit Hydrograph Method, Flood-Frequency Studies,

3.2 Gumbel's Method, Log-Pearson Type iii Distribution, Partial Duration Series, Regional Flood Frequency Analysis,

3.3 Limitations Of Frequency Studies, Design Flood, Design Storm, Risk, Reliability And Safty Factor

UNIT-4 FLOOD ROUTING

4.1 Introduction, Basic Equations, Hydrologic Storage Routing, Attenation, Hydrologic Channel Routing, Hydraulic Method Of Flood Routing,

4.2 Routing In Conceptual Hydrograph Development , Clark's Method For Iuh,

4.3 Nash's Conceptual Model, Flood Control, Flood Forecasting, Flood Control In India

Reference Books:

1. River Engineering by K D Gupta
2. Applied Fluvial Geomorphology for River Engineering and Management by Malcolm D Newson and Richard D Hey
3. Swiss Competences in River Engineering and Restoration by Anton J Schleiss and JürgSpeerli

AMSV14 HYDROPOWER ENGINEERING

UNIT-1 WATER POWER DEVELOPMENT

1.1 Definition, the hydrologic cycle, hydrograph, flow duration curve, mass curve,

1.2 Hydropower plant, hydro plant controls, combined hydro and steam power plants.

UNIT-2 HYDRAULIC MACHINES

2.1 Introduction, turbines, general layout of a hydro-electric power plant, definitions of heads and efficiencies of turbines,

2.2 Classification of hydraulic turbines, Pelton wheel (or turbine), radial flow reaction turbines,

2.3 velocity triangles and work done by water on runner, outward radial flow reaction turbine,

2.4 Francis turbine, design of Francis turbine runner, design of Francis turbine runner,

2.5 deriaz turbine, and scaleeffect Performance characteristics of hydraulic turbines, constant efficiency or iso-efficiency or muschel curves,

2.6 Governing of reaction turbines, cavitation's, selection of hydraulic turbines, surge tanks.

UNIT-3 CENTRIFUGAL PUMPS

3.1 Introduction, classification of pumps, water hammer in pipes

Reference Books:

1. Hydro Power Engineering: A Textbook for Civil Engineers by James Joseph Doland
2. Hydropower engineeringBy Warnick, C C

AMSV15 GEOTECHNICAL ENGINEERING

UNIT-1 ORIGIN AND CLASSIFICATION

1.1 Preview of Geotechnical field problems in Civil Engineering,
1.2 Soil formation, transport and deposit, Soil composition,
1.3 Basic definitions, Weight volume relationships, Clay minerals, Soil structure,
1.4 Index properties, sensitivity and thixotropic, Particle size analysis,
1.5 Unified and Indian standard soil classification system.

UNIT-2 SOIL HYDRAULICS

2.1 Stress conditions in soil- total, effective and neutral stresses and relationships.
2.2 Permeability - Darcy's Law, hydraulic conductivity, equivalent hydraulic conductivity in stratified soil.
2.3 Seepage, flow nets, seepage calculation from a flow net, flow nets in anisotropic soils, seepage through earth dam, capillarity, critical hydraulic gradient and quick sand condition, uplift pressure, piping;

UNIT-3 SOIL COMPACTION

3.1 Water content- dry unit weight relationships.
3.2 Factors controlling compaction.
3.3 Field compaction equipment; field compaction control; Proctor needle method.
3.4 Consolidation: Primary and secondary consolidation,
3.5 Terzaghi's one dimensional theory of consolidation, Consolidation test, Normal and Over Consolidated soils, Over Consolidation Ratio,
3.6 Determination of coefficient of consolidation, Contact pressure.

UNIT-4 SHEAR STRENGTH

4.1 Mohr-Coulomb failure criterion, shear strength parameters and determination;
4.2 Direct and tri-axial shear test; unconfined compression test; pore pressure, Skempton's pore pressure coefficients.
4.3 Earth pressure: Classical theories, Coulomb and Rankin's approaches for frictional and cφ soils, inclined backfill, Graphical methods of earth pressure determination,
4.4 Stability of slopes, Culman method & Method of slices, Stability number & chart.

UNIT-5 SUB SURFACE STRUCTURE

5.1 Bearing capacity of shallow foundations, SPT, Plate load test; Effect of water table.
5.2 Deep foundations: Types of piles, Static and dynamic formulae, Pile group, Settlement of Pile Group, Negative skin friction.

References Books

1 V.N.S. Murthy- Soil Mechanics and Foundation Engineering (Fifth Edition)
2 K.R. Arora- Soil Mechanics and Foundation Engineering

AMSV16 DESIGN OF STEEL STRUCTURES

UNIT-1 GENERAL CONSTRUCTION

1.1 Introduction, Advantages of steel as a structural material, Disadvantages of steel as a structural material, Structural steel,

1.2 Stress-strain curve for mild steel, Rolled steel sections, Loads, Permissible stresses, Working stresses,

1.3 Factor of safety, Minimum thickness of structural members, Design methods.

UNIT-2 STRUCTURAL FASTENERS RIVETING, BOLTED JOINTS

2.1 Types of riveted and bolted joints, Definition, Failure of a riveted joint, Strength of riveted/bolted joint, Assumptions in the theory of riveted joints,

2.2 Efficiency of a joint, Design of riveted joints for axially loaded members,

2.3 Welded joints, Advantages of welded joints, Disadvantages of welded joints, Types of welds and their symbols,

2.4 Design of fillet welds, Design of butt weld, Design of plug and slot welds.

UNIT-3 COMPRESSION MEMBERS

3.1 Effective length, Slenderness ratio, Column design formula, Types of sections, Assumptions,

3.2 Design of axially loaded compression members, Built-up columns (latticed columns), Lacing, Batten,

3.3 Compression members composed of two components back-to-back, Encased column, eccentrically loaded columns, and solved examples.

3.4 Tension Members Introduction, Net sectional area, Permissible stress, Design of axially loaded tension member, Lug angle, Tension splice.

UNIT-4 COLUMN BASES & FOOTINGS & BEAMS

4.1 Types of column bases, Slab base, Gusset base, Welded column bases, Design of hold-down angles and base plates, Grillage footing, solved examples.

4.2 Design procedure, Built-up beams, Plate thickness, and Simple beam end connections.

UNIT-5 INDUSTRIAL BUILDINGS & BEAMS&COLUMN

5.1 Introduction, Planning, Structural framing, Types, Roof and side coverings,

5.2 Elements of an industrial building, Design steps of industrial building, Solved examples.

5.3 Introduction, Eccentricity of load, eccentrically loaded base plates.

UNIT-6 ELEMENTARY PLASTIC ANALYSIS & DESIGN

6.1 Idealized stress-strain curve for mild steel, Scope of plastic analysis, Ultimate load carrying capacity of tension members,

6.2 Ultimate load carrying capacity of compression members, Flexural members, Shape factor, Load factor, Mechanism, Plastic collapse, Conditions in plastic analysis,

6.3 Principle of virtual work, Theorems of plastic analysis, Methods of analysis, Cancellation of hinge in the combined mechanism [beam + panel),

6.4 Design, Limitations of plastic analysis, Plastic design vs elastic design, Solved examples.

UNIT-7 PLATE GIRDER

7.1 Economical depth and self-weight of plate girder, Design of web,
7.2 Design of flanges, Curtailment of flange plates, Riveted connections,
7.3 Web stiffeners, Web splice, Flange splice.

Reference Books:

1. Design of Steel Structures by Duggal
2. Design of Steel Structures: By Limit State Method as Per IS: 800-2007 by S SBhavikatti
3. Steel Structures: Design and Practice by N Subramanian

AMSV17 ADVANCED STRUCTURAL ANALYSIS

UNIT-1 FUNDAMENTAL CONCEPTS

1.1 Introduction, historical background, outline of presentation, stresses and equilibrium, boundary conditions, strain displacement relations, stress-strain relations,

1.2 Temperature effects, potential energy and equilibrium,

1.3 Alerkin's method, von mises stress, computer programs, historical references.

UNIT-2 ONE-DIMENSIONAL PROBLEMS

2.1 Introduction, finite element modeling, coordinates and shape functions, the potential-energy approach, the galerkin approach,

2.2 Assembly of the global stiffness matrix and load vector, the finite element equations; treatment of boundary, quadratic shape functions, temperature effects.

UNIT-3 TWO-DIMENSIONAL PROBLEMS USING CONSTANT STRAIN TRIANGLES

3.1 Introduction, finite element modeling, constant-strain triangle (cst), orthotropic materials, meshgen input file.

UNIT-4 BEAMS AND FRAMES

4.1 Introduction, finite element formulation, load vector, boundary considerations, shear force and bending moment, beams on elastic supports, plane frames,

4.2 Some comments, three-dimensional problems in stress analysis, finite element formulation, stress calculations, mesh preparation, hexahedral elements and higher order elements,

4.3 Problem modeling, frontal method for finite element matrices.

UNIT-5 DYNAMIC CONSIDERATIONS

5.1 Introduction, element mass matrices, evaluation of eigenvalues and eigenvectors, interfacing with previous finite element,

5.2 Programs and a program for determining critical speeds of shafts, guyan reduction, rigid body modes.

Reference books:

1. Matrix and Digital Computer Methods in Structural Analysis by W M Jenkins
2. Matrix Methods of Structural Analysis by P N Godbole and R S Sonparote

AMSV18 ENGINEERING HYDROLOGY

UNIT-1 BASIC CONCEPT OF HYDROLOGY AND HYDROLOGIC CYCLE

1.1 Test for consistency of rainfall records- Analysis of rainfall data

1.2 Correlation between intensity and duration- intensity, duration and frequency- depth area duration (DAD) curve.

1.3 Hydrologic abstractions- infiltratio- Green Ampt method Evapotranspiration different methods- Blaney Criddle method- penman method.

UNIT-2 CATCHMENT CHARACTERISTICS

2.1 Classification of streams- stream pattern-stream order- stream gauging rating of current meter

2.2 Extension of stage discharge curve

2.3 Adjustment of stage discharge curve selection of site for stream gauging stations.

UNIT-3 RUNOFF

3.1 Computation of runoff

3.2 Hydrograph analysis-Rational method

3.3 S-hydrograph- unit hydrograph from complex storm - synthetic unit hydrograph-

3.4 Instantaneous unit hydrograph (Brief description only) - linear reservoir model.

UNIT-4 PARTIAL DIFFERENTIAL EQUATION GOVERNING UNSTEADY GROUNDWATER FLOW

4.1 Evaluation of aquifer parameters the is method -Jacob's approximation method.

4.2 Well flow near aquifer boundaries

4.3 Method of images surface investigation of groundwater Electrical resistivity method.

4.4 Graphical representation of hydro chemical data - Pollution of groundwater, sources.

4.5 Seawater intrusion- Ghyben-Herzberg relationship Method of control of seawater intrusion- Artificial recharge of groundwater.

UNIT-5 RAINFALL

5.1 Runoff correlation using linear regression and multiple linear regression analysis.

5.2 Design flood and their Estimation - Different methods

5.3 Flood frequency studies -Gumbel's method.

UNIT-6 FLOOD ROUTING THROUGH RESERVOIRS

6.1 ISD method- Modified Pulse method.

6.2 Flood routing through channels by Muskingum method.

6.3 Flood control methods - Flood forecasting and warning (Brief descriptions only)

References Books

1 Garg S. K. Hydrology and Water Resources Engineering, Khanna Publishers, 2005

AMSV19 SURVEYING & GEOMATICS

UNIT-1 INTRODUCTION TO SURVEYING

1.1 Definition, Classification, Principles, Survey stations and Survey lines;

1.2 Introduction to measurement of distance, direction and elevation; Ranging and it methods, Meridians and Bearings,

1.3 Methods of levelling, Booking and reducing levels, Reciprocal levelling, distance of visible horizon, Profile levelling and cross sectioning, Errors in levelling;

1.4 Introduction to methods of plane table surveying; Contouring: Characteristics, methods, uses, computation of areas and volumes.

1.5 Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Methods of horizontal and vertical control,

1.6 Triangulation: Figures or systems, Signals, Satellite station, Baseline and its importance, corrections, Trigonometric levelling: Accessible and inaccessible objects.

UNIT-2 CURVES

2.5 Elements of simple circular curves,

2.6 Theory and methods of setting out simple circular curves,

2.7 Transition curves- types,

2.8 Characteristics and equations of various transition curves;

2.9 Introduction to vertical curves.

UNIT-3 MODERN FIELD SURVEY SYSTEMS

3.1 Principle and types of Electronic Distance Measurement systems and instruments,

3.2 Total Station- its advantages and applications;

3.3 Global Positioning Systems- Segments, working principle, errors and biases.

3.4 Geographic Information System: Concepts and data types, data models, data acquisition.

3.5 GIS applications in civil engineering.

UNIT-4 PHOTOGRAMMETRIC SURVEY

4.1 Basic principles, aerial camera, scale of a vertical photograph,

4.2 Relief Displacement of a vertical photograph, height of object from relief displacement,

4.3 Flight planning for aerial photography,

4.4 Selection of altitude, interval between exposures, crab and drift,

4.5 Stereoscope and stereoscopic views, parallax equations. Introduction to digital photogrammetry.

UNIT-5 REMOTE SENSING

5.1 Concepts and physical basis of Remote Sensing, Electromagnetic spectrum, atmospheric effects, image characteristics.

5.2 Remote sensing systems, spectral signatures and characteristics spectral reflectance curves.

5.3 Salient features of some of Remote Sensing satellites missions.

5.4 Digital image processing: Introduction, image rectification and restoration, image enhancement, image transformation, image classification.

5.5 Applications of remote sensing to civil engineering.

References Books

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS And Remote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.

AMSV20 INDUSTRIAL ECONOMICS & MANAGEMENT

UNIT-1 NATURE AND SIGNIFICANCE OF ECONOMICS

1.1 Science, Engineering and Technology and their relationship with economics development,

1.2 Appropriate technology for development countries

UNIT-2 DEMAND AND SUPPLY ANALYSIS:

2.1 Elasticity, Competition, Monopoly, Oligopoly, Monopolistic competition,

2.2 Price Discrimination, Equilibrium of firm.

UNIT-3 FUNCTION OF MONEY

3.1 Supply and Demand for money, Inflation, Black Money.

UNIT-4 FUNCTIONS OF COMMERCIAL BANK

4.1 Multiple credit creation, banking systems in India.

4.2 Central Banking: Functions of Central Banking, monetary policy.

UNIT-5SOURCES OF PUBLIC REVENUE

5.1 Principles of taxation, Direct and Indirect taxes, reform of tax system.

UNIT-6 THEORY OF INTERNATIONAL TRADE

6.1 Balance of trade and payment, Theory of protection, Exchange control, Devaluation.

UNIT-7 NEW ECONOMICS POLICY

7.1 Liberalization, Extending, Privatization, Globalization, Market- Friendly state, Export led growth.

UNIT-8 CAUSES OF UNDERDEVELOPMENT

8.1 Determinants of economic development, stages of economics growth, Strategy of development, Critical minimum effort strategy.

UNIT-9 MANAGEMENT FUNCTIONS

9.1 Developments of management thought, Contribution of F.W. Taylor, Henri Fayol, Elton-Mayo, and System Approach to Management.

UNIT-10 NATURE OF PLANNING, ORGANIZATION & COMMUNICATION PROCESS

10.1 Decision making process, MBO.

10.2Line and Staff relationships, Decentralization of delegation of authority.

10.3Media Channels and barriers to effective communication.

UNIT-11 THEORY OF MOTIVATION

11.1Maslow, Herzberg and McGregor Theory of motivation, McClelland's achievement theory.

UNIT-12 PRODUCTION MANAGEMENT

12.1 Production Planning and control, inventory control, quality control, total quality management.

UNIT-13 PROJECT MANAGEMENT

13.1 Project Development life cycle, project feasibility, CPM, PERT.

UNIT-14 COST ACCOUNTING AND FINANCE

14.1 Techniques of Financial Control, Financial Statements Financial Ratios, Break-even analysis, Budgeting and budgetary control.

UNIT-15 MARKETING FUNCTIONS

15.1 Management of Sales and advertising, marketing research.

UNIT-16 HUMAN RESOURCE MANAGEMENT

16.1 Functions, Selection, Training.

UNIT-17 ENGINEERING ECONOMICS

17.1 Investment Decisions, Payback time.

Reference Books:

1. Akerlof, G. A. (1970). The market for "lemons": Quality, uncertainty, and the market mechanism. Quarterly Journal of Economics 84(3), 488–500.
2. Arrow, K. J. (1962). The economic implications of learning by doing. Review of Economic Studies 29(3), 155–173.
3. Baumol, W. J., Panzar, J. C., &Willig, R. J. (1982). Contestable markets and the theory of industry structure. San Diego, CA: Harcourt Brace Jovanovich.
4. Baye, M. R. (2010). Microeconomics and business strategy. New York, NY: McGraw-Hill Irwin.

AMSV21 STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT DESIGN

UNIT-1 INTRODUCTION TO STRUCTURAL DYNAMICS

1.1 Theory of vibrations- Lumped mass and continuous mass systems
1.2 Single Degree of Freedom (SDOF) Systems- Formulation of equations of motion
1.3 Un damped and damped free vibration- Damped- Force vibrations
1.4 Response to harmonic excitation- Concept of response spectrum.

UNIT-2 MULTI-DEGREES OF FREEDOM (MDOF) SYSTEMS (LIMITED TO 2 DOF)

2.1 Formulation of equations of motion- Free vibration
2.2 Determination of natural frequencies of vibration and mode shapes
2.3 Orthogonal properties of normal modes
2.4 Mode superposition method of obtaining response.

UNIT-3 EARTHQUAKE ENGINEERING

3.1 Engineering Seismology- Earthquake phenomenon- Causes and effects of earthquakes
3.2 Faults- Structure of earth- Plate Tectonics- Elastic Rebound Theory
3.3 Earthquake Terminology- Source, Focus, Epicenter etc.
3.4 Earthquake size-Magnitude and intensity of earthquakes, Classification of earthquakes
3.5 Seismic waves- Seismic zones- Seismic Zoning Map of India- Seismograms and Accelerate grams.

UNIT-4 CODAL DESIGN PROVISIONS

4.1 Review of the latest Indian seismic code IS:1893- 2002 (Part-I) provisions for buildings
4.2 Earthquake design philosophy- Assumptions- Analysis by seismic coefficient and response spectrum methods
4.3 Displacements and drift requirements- Provisions for torsion
4.4 Analysis of a multistoried building using Seismic Coefficient method.

UNIT-5 SEISMIC PLANNING

5.1 Plan Configurations- Torsion Irregularities- Re-entrant corners- Non-parallel systems
5.2 Diaphragm Discontinuity- Vertical Discontinuities in load path
5.3 Irregularity in strength and stiffnes Mass Irregularities- Vertical Geometric Irregularity
5.4 Proximity of Adjacent Buildings.

UNT-6 CODAL DETAILING PROVISIONS

6.1 Review of the latest Indian codes IS: 4326 and IS: 13920 Provisions for ductile detailing of R.C buildings – Beam, column and joints.
6.2 SHEAR WALLS: Types- Design of Shear walls as per IS: 13920- Detailing of reinforcements.

Reference Books

1 Earthquake resistance design of structure by Duggal- Oxford University Press.

2 Earthquake Resistant Design by David J. Downik, John Wiley and Sons Publication

AMSV22 PRESTRESSED CONCRETE & ADVANCED DESIGN OF STRUCTURE

UNIT-1 INTRODUCTION TO PRESTRESSED CONCRETE

1.1 Reinforced Concrete Versus Prestressed Concrete, Prestressing System,
1.2 Loss Of Prestress, Steel For Prestressing,
1.3 Basic Concepts Of Prestressed Concrete, Homogeneous Beam Concept,
1.4 Pressure Line, Load Balancing Concept, Shear And PrincipalStresses

UNIT-2 SYSTEMS OF PRESTRESSING

2.1 Classifications Of Prestressed Concrete Members, Hoyer System,
2.2 The Freyssinet System, The MagnelBalton System, Gifford Udall System,
2.3 P.S.C.Monowire System,
2.4 C.C.L Standards System, LEE-McCall System

UNIT-3 PRESTRESSED CONCRETE BEAMS

3.1 Limit State Of Collapse , Limit State Of Collapse In Shear ,
3.2 Limit State Of Serviceability , Prestressed Concrete Poles,
3.3 Other Design Considerations,
3.4 Selection Of Sectional Dimensions,
3.5 Detailing Of Reinforcement, Limits State Of Serviceability For Deflection

UNIT-4 END BLOCK

4.1 Magnel's Method, Guyon's Method, Beam with Two Anchor Plates
4.2 Symmetrically Placed On The Face Of The Beam,
4.3 Cable At An Eccentricity

UNIT-5 PRESTRESSED CIRCULAR TANKS AND PIPES

5.1 Principles of Circumference central Prestressing,
5.2 Methods Of Design

UNIT-6 SMALL PRESTRESSED CONCRETE DAMS

6.1 Introduction, Design Requirements, Design

UNIT-7 PRESTRESSED CONCRETE PILES

7.1 Introduction, Convenient Ways of Lifting A Pile,
7.2 Maximum Length Of Pile

Reference Books:

1. Design of Prestressed Concrete Structures by T Y Lin and Ned H Burns
2. Prestressed Concrete and Advance Design of Structure by Asheesh Kumar
3. Design of Prestressed Concrete by Arthur H Nilson

AMSV23 QUANTITY SURVEYING, CONTRACT & TENDERS

UNIT-1 ESTIMATING

1.1 Introduction, Definition, Data Required for Preparation of an estimate, Types of Estimates, Items of Work, Description of an Item of Work,

1.2 Measurement of Works, Guidelines for Measurements, I.S. mode or Units of Measurements, Plinth Area, Floor Area, Carpet and F.S.I.

UNIT-2 APPROXIMATE ESTIMATES

2.1 Definition, Purpose of Necessity, General Principle of Preparing Approximate Estimates, Methods of Preparing Approximate Estimates

UNIT-3 TAKING OUT QUANTITIES

3.1 Definition, General procedure of measurement of works, Methods of taking out Quantities, Comparison of English and P.W.D. method,

3.2 Various items of works, Prime Costs (P.C.) and Provisional Sums (P.S.), Provisional Quantities, Spot Items, Contingencies, Work-charged Establishment,

3.3 Centage Charges, Building Estimate Methods, Checks over the Accuracy of Detailed Estimates, Relation between Cost of various Items with respect to Total Cost of Building,

3.4 Some typical estimates of Works, Schedule of Rates for Common Items of works in Building construction

UNIT-4 ANALYSIS OF RATES (OR PRICES)

4.1 Purpose of Analysis of Rates, Factors Affecting Rate analysis, Task Work, Table showing the Task Work, Table showing Materials Required for Different Items of Works,

4.2 Labour Requirements for different Items of Works, Computations of Quantities of Materials required for Various Items of Works, Increase in Rates or Prices for Additional Floors,

4.3 Water Charges, Requirements of Cement bags for various items of works, Approximate Rates of Materials of Construction, Approximate Rates of Equipment/Machinery required for works,

4.4 Transportation of Materials and cost, Rates specified for various categories of Laborers in Building Industry,

4.5 Analysis of Rates of Principles of Items of Work in the Building Construction

UNIT-5 SPECIFICATIONS

5.1 Definition of Specifications, Purpose of Specifications, Types of Specifications, Classification of Specifications According to Purpose, Requirements of Good Specifications,

5.2 Detailed Specifications, Standard Specifications, Detailed Specifications for Common Items of Building Work

UNIT-6 VALUATION OF PROPERTY

6.1 Cost Price and Value, Purpose (or Object) of Valuation,

6.2 Factors affecting Valuation of a Property, Different Nomenclatures for the Value, Year Purchases (Y.P.),

6.3 Sinking Fund and Sinking Fund Installment, Valuation Tables, Annuity, Ownership of the Property, Returns from the Property,

6.4 Depreciation and Methods of Computations of Depreciation, Mortgage, Easement, Methods of Valuation Property, Fixation of Rent of a Property,

6.5 Reversionary Value of Land (or Land on Reversion), Illustrative Problems, Valuation of a (Building) Property

UNIT-7 CONTRACTS AND TENDERS

7.1 Methods of Executing Works, Tenders, Contracts

Reference Books:

1. Quantity surveying, contracts and tenders by G.B. Deshpande (Author), j. P. Nayak (author)
2. Estimating and costing (17501) [print replica] by Mukesh N. Gangrade (author)

AMSV24 FINITE ELEMENTS METHOD OF CIVIL ENGINEERING

UNIT-1 INTRODUCTION

1.1 Introduction. Historical Background. Design Considerations. Need of Finite Element Method. The Process Of Finite Element Method,

1.2 Field and Boundary Conditions, Steps Involved In Fem, the Standard Discrete System, Transformation of Co-Ordinates.

UNIT-2 FINITE ELEMENTS OF ELASTIC CONTINUUM DISPLACEMENT APPROACH

2.1 Direct Formulation Of Finite Element Characteristic, Generalized Nature Of Displacements, Strains, And Stresses, Generalization To The Whole Region

2.2 Internal Nodal Force Concept Abandoned, Displacement Approach As A Minimization Of Total Potential Energy, Convergence Criteria,

2.3 Discretization Error And Convergence Rate,

2.4 Displacement Functions With Discontinuity Between Elements--Non-Conforming Elements And The Patch Test,

2.5 Bound On Strain Energy In A Displacement Formulation, Direct Minimization.

UNIT-3 GENERALIZATION OF THE FINITE ELEMENT CONCEPTS WEIGHTED RESIDUAL AND VARIATIONAL APPROACHES

3.1 Weighted Residual Methods, Approximation To Integral Formulations: The Weighted Residual Method, Virtual Work As The 'Weak Form' Of Equilibrium Equations For Analysis Of Solids Or Fluids,

3.2 Variational Principles, Establishment Of Natural Variational Principles For Linear, Self-Adjoin Differential Equations, Maximum,

3.3 Minimum, Or A Saddle Point, Constrained Variation Principles, Lagrange Multipliers And Adjoin Functions.

UNIT-4 STRAIN PLANE STRESS AND PLANE

4.1 Element Characteristics, Some Practical Applications,

4.2 Special Treatment Of Plane Strain With An Incompressible Material.

UNIT-5 AXI-SYMMETRIC STRESS ANALYSIS

5.1 Element Characteristics, Some Illustrative Examples.

UNIT-6 THREE–DIMENSIONAL STRESS ANALYSIS

6.1 Tetrahedral Element Characteristics.

UNIT-7 ELEMENT SHAPE FUNCTIONS SOME GENERAL FAMILIES OF CONTINUITY

7.1 Two-Dimensional Elements, Completeness of Polynomials, Rectangular Elements,
7.2 Lagrange Family, Rectangular Elements, 'Serendipity' Family, Triangular Element Family,
7.3 One-dimensional Elopements, Three-Dimensional Elements, Other Simple Three-Dimensional Elements.

UNIT-8 CURVED, ISOPARAMETRIC ELEMENTS AND NUMERICAL INTEGRATION

8.1 Introduction, Parametric Curvilinear Co-Ordinates, Geometrical Conformability Of Elements,
8.2 Variation Of The Unknown Function With In Distorted, Curvilinear, Elements,
8.3 Continuity Requirements, Transformations, Element Matrices, Area and Volume Co-Ordinates, Convergence of Elements In Curvilinear Co-Ordinates, Numerical Integration.

UNIT-9 SOME APPLICATIONS OF ISOPARAMETRIC ELEMENTS IN TWO- AND THREEDIMENSIONAL STRESS ANALYSIS

9.1 A Computational Advantage of Numerically Integrated Finite Elements.

Reference Books:

1. Introduction to Finite Elements in Engineeringby T R Chandrupatla and A D Belegundu
2. Finite Element Analysis: Theory and Programming by C S Krishnamurthy
3. Introduction to the Finite Element Method by J N Reddy

AMSV25 VALUATION OF REAL PROPERTY

UNIT-1 INTRODUCTION

1.1 General, Doctrine of estate, Types of estates in England, Land systems in India, Cost, Price and valuation, Concept of the term value, Purposes of valuations,

1.2 Different forms of value, Supply and demand forces, Occupation value and investment value, Factors affecting changes in market value,

1.3 Concepts of right of compulsory purchase and value in India, Emergence of profession of real estate valuation in India, Role of the valuer, New horizons of valuation

UNIT-2 INVESTMENT IN REAL PROPERTY

2.1 General, Characteristics of land, Investment, Investment market, Investment opportunities, Characteristics of ideal investment, Interest on capital, Nature of real property,

2.2 Factors affecting real property market, Determination of value of real property, Estate brokers

2.3 INTERESTS IN REAL PROPERTY**:** General, Types of interests, Freehold interests, Leasehold interests, Mortgage, Development process

UNIT-3METHODS OF VALUATION

3.1 General, Methods of valuation for open lands, Methods of valuations for lands with buildings, conclusion

3.2 OUTGOINGS**:** Definition, Usual types of outgoings, Conclusion

UNIT-4 DEPRECIATION

4.1 Meaning of the term, Depreciation as cost in operation, Depreciation as decrease in worth, Methods for estimating cost depreciation, Cost of construction,

4.2 Cost depreciation and value depreciation, Reproduction cost and replacement cost, Conclusion

UNIT-5VALUATION OF LICENSED PREMISES

5.1 General principle of valuation, Valuation of a cinema, valuation of a hotel

5.2 VALUATION OF LIFE INTERESTS**:** General, Types of life interest, Mortality tables, Compilation of mortality tables, Application of mortality tables, Jellicoe's formula

UNIT-6VALUATION FOR RATING

6.1 General, Definitions, Principles of rating, Rent as evidence of annual value, Hypothetical tenant and hypothetical rent, Exemptions from ratability,

6.2 Process of assessment, Methods of assessment, Conclusion

UNIT-7 VALUATION OF AGRICULTURAL LANDS

7.1 General, Importance, Factors affecting value of agricultural land, Methods of valuation of agricultural lands, Agricultural land and direct tax laws

UNIT-8 FINANCE FOR INVESTMENT IN REAL PROPERTIES

8.1 General, Terms of borrowing, Sources of borrowing, Genaring and equity, Conclusion

8.2 VALUATION TABLES: General, Valuation tables I to VIII

UNIT-9 MISCELLANEOUS TOPICS

9.1 General, Capitalized value, Cost inflation index, Deferred or reversionary land value, Discounted cash flow, encumbrance factor, Floating F.S.I. ,

9.2 Forms of rent, life of structures, Mobilization fund, Rate of interest, Record of rights, Valuation as a going concern, Year's Purchase

UNIT-10 EASEMENTS:

10.1General, Definition, Essential characteristics of easements, Creation of easements, Extinguishment of easements, Easements and natural rights, Effect on valuation due to easement

UNIT-11 STANDARD RENT

11.1General, Objects of Rent Act, Meaning of standard rent, Exemptions from the Rent Act, Process of fixing standard rent, Methods of ascertaining standard rent,

11.2Important factors, Inheritance of tenancy right, Paying guests and Rent Act, Recovery of possession from tenant by landlord, Conclusion

UNIT-12 COMPULSORY ACQUISITION OF LAND

10.1General, The land Acquisition Act, 1894, important aspects of the L. A. Act, 1894, Conclusion

UNIT-13 THE TRANSFER OF PROPERTY ACT

13.1General, Meaning of transfer, Definition of transfer of property, Requirements of a valid transfer, Contingent interest, Conditional transfer, Sales of immoveable property,

13.2Mortgages of immovable property, Leases of immoveable property, Exchanges, Gifts, Actionable claims

UNIT-14 URBAN LAND CEILING ACT

14.1General, Selection of towns, Objects of the Act, Important provisions in the Act, Effects of the U.L.S. Act, Summary

Reference Books:

1. Property Valuation Paperback – Import, 28 June 2013 by Peter Wyatt (Author)
2. Valuation of Real Property: A Guide to the Principles of Valuation of Land and Buildings, Etc, for Various Purposes, Including the Taxation of Land Values, with Numerous Examples (Classic Reprint) Paperback – 19 November 2018 by Arthur Hunnings (Author)

AMSV26 PROFESSIONAL ETHICS IN ENGINEERING

UNIT-1 HUMAN VALUES

1.1 Morals, values and Ethics, Integrity, Work ethic, Service learning, Civic virtue,
1.2 Respect for others, living peacefully, Caring, Sharing, Honesty, Courage,
1.3 Valuing time, Cooperation, Commitment, Empathy,
1.4 Self-confidence, Character, Spirituality,
1.5 Introduction to Yoga and meditation for professional excellence and stress management.

UNIT-2 ENGINEERING ETHICS

2.1 Senses of 'Engineering Ethics', Variety of moral issues,
2.2 Types of inquiry, Moral dilemmas,
2.3 Moral Autonomy, Kohlberg's theory, Gilligan's theory,
2.4 Consensus and Controversy, Models of professional roles,
2.5 Theories about right action, Self-interest,
2.6 Customs and Religion, Uses of Ethical Theories.

UNIT-3 ENGINEERING AS SOCIAL EXPERIMENTATION

3.1 Engineering as Experimentation,
3.2 Engineers as responsible Experimenters
3.3 Codes of Ethics, a Balanced Outlook on Law.

UNIT-4 SAFETY, RESPONSIBILITIES AND RIGHTS

4.1 Safety and Risk, Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk,
4.2 Respect for Authority, Collective Bargaining, Confidentiality, Conflicts of Interest.
4.3 Occupational Crime, Professional Rights, Employee Rights,
4.4 Intellectual Property Rights (IPR), Discrimination.

UNIT-5 GLOBAL ISSUES

5.1 Multinational Corporations, Environmental Ethics, Computer Ethics,
5.2 Weapons Development, Engineers as Managers,
5.3 Consulting Engineers, Engineers as Expert Witnesses and Advisors,
5.4 Moral Leadership, Code of Conduct, Corporate Social Responsibility.

Reference Books:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003

AMSV27 HIGHWAY MAINTENANCE & MANAGEMENT SYSTEM

1. Maintenance of Road Surface, Shoulders, Roadway Drainage, Bridge and Other Structure, Roadside, Amenity, Equipment.

2. High Profile Maintenance

3. Carriageway Maintenance.

4. Footways /Shoulders

5. Street Lightening and Illuminated Traffic Signs

6. Aid to Movement.

7. Road Assessment & Management System

8. Accident Precaution &Winter Maintenance.

9. Maintenance of Highway Structure.

10. Maintenance and Management System Include Development Of Annual Work Programme Budgeting and Allocation Recovery, Work Authorization and Control, Scheduling, Performance Evaluation, Fiscal Control

11. Maintenance of Approaches.

12. Vegetation Management and Control, Maintenance of Rest Area.

13. Maintenance and Traffic Control & Safety Devices

14. Pavement Rehabilitation

15. Milling Of Pavement. &Pavement Recycling

Reference Books:

1. Construction Maintenance Restoration And Rehabilitation Of Highway Bridges by Rakshit KS
2. Heavy/Highway Construction Trainee Guide, Paperback (Contren Learning) by NCCER