

Shivaji University, Kolhapur

SYLLIBUS/ STRUCTURE (REVISED from June- 2009)

T.E. Civil (Semester – V)

Sr. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Design of Steel Structures	4	2	-	-	6	100	25	-	-	125
2	Geotechnical Engineering-I	3	2	-	-	5	100	25	50	-	175
3	Water Resources Engineering-I	3	2	-	-	5	100	25	-	-	125
4	Concrete Technology	3	2	-	-	5	100	25	-	-	125
5	Environmental Engineering-I	3	2	-	-	5	100	25	50	-	175
6	Building Planning & Design	2	-	-	4	6	-	50	-	25	75
	Total	18	10	-	4	32	500	175	100	25	800

T.E. Civil (Semester – VI)

Sr. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Structural Mechanics - III	3	2	-	-	5	100	25	-	-	125
2	Geotechnical Engineering-II	3	2	-	-	5	100	25	-	-	125
3	Engineering Management	4	2	-	-	6	100	25	-	25	150
4	Water Resources Engineering-II	3	2	-	-	5	100	25	-	25	150
5	Environmental Engineering-II	3	2	-	-	5	100	25	-	-	125
6	Structural Design & Drawing - I	-	-	-	4	4	-	50	-	25	75
7	Seminar	-	2	-	-	2	-	50	-	-	50
	Total	16	12	-	4	32	500	225		75	800

Vacation Field Training of at least 20 days should be completed during 6th & 7th semester before the commencement of 8th semester & to be evaluated in the 8th semester

1 Design of Steel Structures (Revised)

Teaching Scheme:

Lecture: 4 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

SECTION I

UNIT 1: (07)

a) Introduction to Design of Steel Structures: Advantages & Disadvantages of steel structures, permissible stresses, factor of safety, Methods of design, Types of connections, various types of standard rolled sections, Types of loads and load combinations, load calculation for roof truss.

b) Design of Welded & Bolted Connections: Types of welds, failure of welded joints, Throat thickness, permissible stresses, and analysis of axially & eccentrically loaded connections (subjected to bending & torsion); Type of bolts, bolt, nut & washer assembly, stresses in bolts and design.

UNIT 2: (05)

Tension Members: Common sections, net effective area of angle, tees and flats. Load carrying capacity, connection of section to gusset using weld / bolts. Design of tension splices

UNIT 3: (06)

Compression Members- Struts: Common sections used in trusses, effective length and slenderness ratio, permissible stresses, Load carrying capacity, connection of section to gusset using weld / bolt.

UNIT 4: (07)

Beams: Laterally supported & unsupported beams, design of simple beam, built up beams using flange plates. Curtailment of flange plates, web buckling & web crippling. Secondary and main beam arrangement, beam to beam connections

SECTION II

UNIT 5: (05)

Gantry Girder: Forces acting on a gantry girder, commonly used sections, design of gantry girder as laterally unsupported beam, connection details.

UNIT 6: (08)

a) Columns: Simple and built up section, lacing, battening, column subjected to axial force and bending moment, column splices.

b) Column Bases: Slab base, Gusseted base and moment resisting bases, Design of anchor bolts, design of pedestal.

UNIT 7: (05)

Introduction to Limit state Method: Basic concept of Limit state Method, analysis procedure and design philosophy, loads and load combinations, partial safety factors for load and materials, comparison with working stress methods, advantages and disadvantages.

UNIT 8: (07)

Tension & Compression Members: Common sections, net effective area of angle, tees and flats. Load carrying capacity, design of tension and compressive members by limit state method by IS 800-2007.

Note: Use of IS 800-2007, IS 875, and steel table is permitted for theory examinations.

TERMWORK

Term work shall consist of at least eight assignments based on theoretical course above.

RECOMMENDED BOOKS

1. Design of Steel Structures by S. K. Duggal, Tata Mc Graw Hill publishing company Ltd., New Delhi.
2. Design of Steel Structures, Vol.I & Vol.II by Ram Chandra, Standard Book House, New Delhi.
3. Design of Steel Structures, by Dayaratnam, Wheeler Publishing, New Delhi.
4. Design of Steel Structures, by Dr. N. Subramanian, Oxford University Press, New Delhi.
5. Design of Steel Structures, by B.C.Punmia, Jain & Jain Laxmi Publication, New Delhi.
6. Design of Steel Structures, by A.S.Arya and J.L.Ajamani, Nemchand and Bros., Roorkee.
7. Design of Steel Structures, by Vazirani & Ratwani.
8. Design of Steel Structures by- E.H.Gaylord and C.N. Gaylord, Mc Graw Hill, New York.
9. Design in Structural Steel Vol.-I by-J.E.Lothers, Prentice Hall New Jersey.

2 Geotechnical Engineering - I (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

Practical & Oral: 50 marks

SECTION I

UNIT 1: (07)

Properties of Soil: Introduction to Soil Mechanics, formation of soil & soil structure, three phase soil system, weight volume relationships, detail index properties of soil - methods of determination and its significance, particle size and shape, classification of soil - I.S., MIT & textural, soil consistency, field identification of soils.

UNIT 2: (05)

Permeability and Seepage: Capillary water. Darcy's law, Factors affecting permeability, Determination of permeability by constant head and falling head method as per IS - 2720, field test as per IS - 5529 (part I) - pumping in test and pumping out test. Permeability of layered soils, Seepage forces, General flow equation (Laplace equation). Flow net construction and applications, Concept of effective neutral & total stress in soil mass. Anisotropic soil conditions, quick sand condition. Uplift pressure, exit gradient, failure due to piping.

UNIT 3: (03)

Compaction: Soil compaction phenomenon. Factors affecting compaction, Dry density and moisture content relationship. Zero air voids line. Effect of compaction on soil structure, Standard Proctor test and Modified Proctor test as per IS - 2720. Field compaction equipment and methods, Field control of compaction

UNIT 4: (05)

Consolidation: Spring analogy, Terzaghi's theory of one dimensional consolidation, Lab consolidation test; c_c , c_v , m_v and a_v Determination of coefficient of consolidation-square root of time fitting method and logarithm of time fitting method. Rate of settlement, normally consolidated and over consolidated soils, Determination of pre consolidation pressure

SECTION II

UNIT 5: (05)

Stress Distribution in Soil: Boussinesq theory- point load, line load, strip load, pressure distribution diagram on a horizontal and vertical plane, pressure bulb, Westergaard's theory, equivalent point load method, Newmark chart, contact pressure, approximate stress distribution method.

UNIT 6: (06)

Shear Strength: Concept of shear, Coulomb's theory and failure envelope, Principle stress, stress analysis (Total stress approach and effective stress approach), representation of stresses on Mohr's circle for different types of soil such as cohesive and cohesionless, saturated and partly saturated soil etc. Application of shear stress parameters in the field

UNIT 7: (04)

Determination of Shear Strength: Unconsolidated undrained, consolidated undrained and consolidated drained, type of test - box shear test, triaxial compression test with pore pressure and volume change measurement, unconfined compression test, vane shear test.

UNIT 8: (05)

Earth Pressure: Concept, Area of application, earth pressure at rest, active and passive condition. Rankine and Coulomb's theory of earth pressure, Graphical solution-Trial wedge methods, Culman's method – Rebhan's construction and modification

LABORATORY EXPERIMENTS TO BE CONDUCTED

1. Specific gravity determination by pycnometer / density bottle.
2. Particle size distribution-Mechanical sieve analysis, wet sieve analysis.
3. Determination of consistency limits and its use in soil classification.
4. Field density test by core cutter , sand replacement method
5. Determination of co-efficient of permeability by constant head and by variable head method.
6. Standard proctor test/ Modified proctor test.
7. Direct shear test
8. Unconfined Compression Test
9. Triaxial test.
10. One dimensional consolidation test.

TEXT BOOKS & REFERENCE BOOKS

1. "Text book of soil mechanics in theory and practice" by Dr. Alam Singh(Asian Publishing House, Bombay)
2. "Soil mechanics and Foundation engineering" by V. N. S. Murthy. (U. B. S. Publishers and distributors New Delhi)

3. "Soil mechanics and Foundation engineering" by B. S. Punmia.(A Saurabh and Company Pvt. Ltd., Madras)
4. "Geotechnical Engineering" by P. Purushottam Raj. (Tata Mcgraw Hill Company Ltd. New Delhi)
5. "Soil mechanics" by Terzaghi and Peak.(John Willey and Sons, New- York)
6. "Soil Testing" by T.W. Lambe.(Willey Eastern Ltd., New Delhi)
7. Geotechnical Engineering" by B. J. Kasamalkar.(Pune Vidyarthi Griha Prakashan Pune)

3. Water Resources Engineering -I (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

SECTION I

UNIT 1: (05)

Introduction of Hydrology: Definition, Importance and scope of hydrology, the hydrologic cycle, Weather and its precipitation potential.

Precipitation : Forms and types of precipitation, Methods of measurement, Factors affecting precipitation at location, Estimating missing data, Mass rainfall curves, Hyetograph, double mass analysis(Correcting precipitation data) Determination of average precipitation over the catchment,

UNIT 2: (05)

Evaporation and Evapotranspiration: Factors affecting evaporation, measurement and control of evaporation upon reservoirs, Evapotranspiration - definition and measurement.

Infiltration: Process of infiltration, Factors affecting infiltration, Infiltration indices, Effect of infiltration on runoff and ground water recharge.

Runoff: Factors affecting runoff, catchment yield calculations, SCS curve number, Rainfall-runoff relationship.

UNIT 3: (05)

Hydrograph: Storm hydrograph, Base flow and Separation of base flow, direct runoff hydrograph, Unit hydrograph – theory – assumptions and limitations, Derivation and use of unit hydrograph, S-curve hydrograph.

UNIT 4: (05)

Stream gauging: Selection of site, various methods of discharge measurement, Area velocity method, Area slope method, S. W. F., other modern methods

Floods: Definition, Factors affecting, Estimation of peak flow, Rational method and other methods, Design flood hydrograph – components, recurrence period.

SECTION II

UNIT 5: (05)

Ground water hydrology: Occurrence and distribution of ground water, Specific yield of aquifer, Movement of ground water, Darcy's law, Permeability, Safe yield of basin.

Hydraulics of well under steady flow conditions in confined and unconfined aquifers, Specific capacity of well, Well irrigation – Tube wells, Open wells-design and construction

UNIT 6: (05)

Introduction to irrigation: Definition and necessity of irrigation, Types of irrigation, Different systems of irrigation, - Flow, lift, inundation, bandhara, storage, Methods of application of water to soil - Sprinkler, Drip, basin, Furrow, Necessity,

Water logging and land drainage

UNIT 7: (05)

Soil-water relationship: Classes and availability of soil water, depth and frequency of irrigation, principal crops and crop seasons, cropping pattern and crop rotation, Command area-calculations

Water requirement of crops: Duty, delta, factors affecting duty, methods improving duty, consumptive use of water, estimation of evapo-transpiration by blaney-criddle method and penman method, assessment and efficiency of irrigation water.

UNIT 8: (05)

Minor Irrigation works: General layout and main components of - Percolation tanks, K.T.Weir, and Lift irrigation

Watershed Management: Need of watershed management, Importance of soil conservation measures, Rainwater management, methods and techniques of Rainwater harvesting and groundwater harvesting

TERM WORK:

Numerical Problems of the following' topics

1. Determination of average annual rainfall and determination of yield of catchments
2. Determination of abstraction losses – phi index calculation, effective rainfall hyetograph
3. Stream flow measurements – Area velocity and slope-area method
4. To develop a unit hydrograph from a total runoff hydrograph resulting from a given 2 or 3 successive storms,
5. Alteration of base period of given unit hydrograph using s-curve technique
6. Estimating depth and frequency of irrigation on the basis on soil moisture regime concept
7. Determination of Crop water requirement using consumptive use formulae
8. Yield calculations of open well and tube well.
9. A Case study / report of a watershed management
10. Site visit to meteorological station.

RECOMMENDED TEXT BOOKS:

1. Irrigation Engineering – S. K. Garg – Khanna Publishers, Delhi.
2. Irrigation, Water Resources and Water power Engineering – Dr P.N. Modi
3. Irrigation and Water power Engineering – Dr Punmia and Dr. Pande – Laxmi Publications, Delhi
4. 'Engineering Hydrology' - Subramany K., -Tata McGraw Hill, New Delhi.
5. 'Engineering Hydrology' - Raghunath H.M. - New Age International Publishers
6. Watershed Management in India – J.V.S.Murthy – Wiley Eastern Publications, Delhi

REFERANCE BOOKS:

1. R.K.Sharma, 'Hydrology and water resources', Dhanpatrai and sons, New Delhi.
2. Varshney, Gupta and Gupta, 'Theory and design of irrigation structures vol. I and II and III', Newchand and Brothers.
3. Michael, 'Irrigation Theory and practice', Vikas Publications House
4. Jaspal Sing, M.S.Acharya, Arun Sharma, 'Water management', Himanshu Publications.
5. Design of M.I. and Canal Structure – Satyanarayan and R. Murthy
6. Water and Soil Conservation – Ghanshyam Das

4 Concrete Technology (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

SECTION I

UNIT 1:**(05)****Ingredients of Concrete:**

a) Cement: Physical properties of cement such as fineness, consistency test, Initial and final setting time, soundness, compressive strength, specific gravity. Hydration of cement, chemical compounds of cement. Grades of cement, Types of cement- Ordinary Portland, Portland pozzolana, Rapid Hardening Portland Cement, Quick setting cement, Sulphur resisting cement, Super sulphated cement, Expansive cement, Rediset cement, High strength cement, High Alumina, Low heat, White, Coloured, Oil well, Hydrophobic cement.

b) Aggregates: Physical properties such as sieve analysis and fineness modulus, specific gravity and water absorption, silt content, Bulking of sand, Bulk density, moisture content, Flakiness index, Elongation index. Mechanical properties such as Crushing, Impact and Abrasion value, Alkali – Aggregate reaction, Grading of Aggregate, Artificial and recycled aggregate.

c) Water: Specifications of water as per IS 456 – 2000.

UNIT 2:**(05)**

Fresh Concrete: Batching, Mixing, Transportation, Placing of concrete including pumping and compaction techniques for good quality concrete, Workability of concrete and methods of measuring workability, Factors affecting workability, Segregation and bleeding, Curing of concrete, Different methods of curing, Temperature effects on fresh concrete.

UNIT 3:**(04)**

Admixtures: Types of admixtures, Plasticizers and superplasticizers and their effects on workability, Air entraining agents, Retarders, their effects on proportion of concrete, Pozzolanic admixtures, Fly ash, fly ash on fresh concrete, Silica fume, Metalaolim, Ground Granulated Blast Furnace Slag.

UNIT 4:**(05)**

Hardened Concrete: Strength of concrete, w/c ratio, Gel-space ratio, Effect of maximum size of aggregate, Factors affecting strength of concrete, Characteristic strength - compressive, tensile and flexure strength, Relation between compressive & tensile strength.

Modulus of elasticity, Relation between modulus of elasticity & strength, Creep and shrinkage of concrete

SECTION II**UNIT 5:****(05)**

Concrete Mix Design: Nominal Mix Concrete, Objectives of mix design, Factors governing mix design, Methods of expressing proportions, statistically quality

control. Mix design by ACI 211.1-91 method, IS code method as per 10262 & 456, DOE method and acceptance criteria

UNIT 6: (05)

Durability of concrete: Minimum & Maximum cement content, Strength & durability relationship, Volume change in concrete, Impact of w/c ratio on durability, permeability, Exposure to different conditions as per IS 456, Sulphate attack, Alkali aggregate reaction, Chloride attack, Corrosion of steel (chloride induced), Corrosion Control.

UNIT 7: (05)

Special concrete: Light weight concrete, No fines concrete, High density concrete, Fibre reinforced concrete and different types, Polymer concrete, High performance concrete, Self compacting concrete, Cold weather concreting, Hot weather concreting, Vacuum concrete, Shotcreting,

UNIT 8: (04)

Nondestructive testing: Schmidt's rebound hammer – Mechanical & digital, Ultrasonic pulse velocity method, techniques of measuring & factors affecting the measurement of pulse velocity, Corrosion meter, Cover meter.

TERM WORK:

1. Testing of cement: Consistency, fineness, setting time, Specific Gravity, Soundness and strength.
2. Testing of fine aggregate: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content.
3. Testing of coarse aggregate: Specific Gravity, sieve analysis, bulk density, flakiness index, elongation index, water absorption & moisture content, soundness of aggregate.
4. Concrete Mix design by ACI 211.1-91 method, IS code method as per 10262-2007 & 456-2000, DOE method
5. Tests on Concrete- Workability tests – Slump cone test, compaction factor test, Vee-bee consistometer test, flow table test, strength tests- compressive strength, flexural strength, split tensile strength.
6. Effects of Admixture - Accelerator, Retarder, Super Plasticizer.
7. Nondestructive Testing - Rebound Hammer test, Ultrasonic Pulse Velocity test.

REFERANCE BOOKS:

1. Concrete Technology by M. S. Shetty (S. Chand & Company Ltd, New Delhi)
2. Concrete Technology by M. L. Gambhir (Tata McGraw-Hill publishing Company Ltd, New Delhi)
3. Concrete Technology by A. M. Neville (Pearson Education, New Delhi)
4. Concrete Technology by Orchard (Asia publication, New Delhi)

5. Concrete Technology by Handoo, Puri & Kaila (Satya Prakashan, New Delhi)
6. Concrete Technology by R. S. Varshnay (New Chand & Brathers, New Delhi)
7. Concrete Technology by K. T. Krishnaswamy (Dhanpat Rai Publication, New Delhi)
8. Concrete Technology by V. N. Vazirani (Khanna Publication, New Delhi)

REFERANCE CODES:

1. IS 456 – 2000 , Plane reinforced concrete
2. IS 10262 – 2007 Doc: CED 2 (7288), Guidelines for Concrete Mix Proportioning
3. Concrete Mix Design, Code No. 21, All India Council for Technical Education, New Delhi

5 Environmental Engineering – I (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

Practical & Oral: 50 marks

SECTION I

UNIT 1: (03)

Concept of Green building- Energy efficiency, Energy budget & water budget, waste recycling, indoor air quality

UNIT 2: (05)

Sources of water, quantity & quality of sources, demand of water, factors affecting demand, fluctuations in demand, rate of water consumption, design period & population forecast.

Water quality parameters, characteristics & significance in water treatment, drinking water quality standards- BIS, WHO Standards.

UNIT 3: (09)

Intake Works - concept & design of Intake well, Jack well, Pumps & Rising mains,

Concept of water treatment:

Aeration- Types of aerators, design of cascade aerator

Coagulation & Flocculation- factors affecting, destabilization of colloidal particles, types of dosing of coagulants, selection of coagulants, jar tests, design of rapid mixer & flocculator.

Sedimentation- Theory, types of settling, types of sedimentation tanks, design principles & design, concept of tube & plate settler.

Filtration- Mechanism, head loss development, negative head loss, Types of filters- Slow sand filter, Rapid sand filter, Multimedia & Pressure filter, operation & design of slow sand rapid sand filter, rate control patterns.

Disinfection- Mechanism, factors affecting disinfection, methods of disinfection, chemistry of chlorination, chlorination practices, points of chlorination, application of chlorine

UNIT 4: (03)

Water softening processes - lime-soda process, ion exchange

Demineralization - Reverse osmosis, ion exchange, electro dialysis. Salient features of rural water supply scheme, Sequencing of treatment for various qualities of surface & ground water.

SECTION II

UNIT 5: (04)

Transmission of water, pumping & gravity mains, choice of pipe materials, forces acting on pressure pipes, leakage & pressure testing of pipes, thrust block design, corrosion types & control measures.

UNIT 6: (06)

Water distribution systems, method of distributing water, layout pattern, basic system requirements for water distribution system, methods of network analysis: equivalent pipe method, Hardy-Cross method, design problem, concept of Newton Rapson method.

UNIT 7: (07)

Water supply appurtenances- sluice valve, air relief valve, gate valve, non-return valve, scour valve, fire hydrants water meter, service connections, maintenance & leak detection of water distribution system.

Distribution reservoirs & service storages- necessity, location, head requirement, capacity determination by analytical & graphical method.

TERM WORK:

- A.** Analysis of any 10 of the following test parameters for water
1. pH
 2. Acidity
 3. Alkalinity
 4. Chlorides content
 5. Hardness – Total, temporary and permanent
 6. Turbidity
 7. Residual Chlorine
 8. Total dissolved solids through measurement of electrical conductivity
 9. Dissolved Oxygen
 10. Most Probable Number
 11. Optimum dose of alum by jar test.
 12. Fluorides & Nitrogen
 13. Iron and Manganese
- B.** Design/ Analysis problems on water treatment unit & distribution system.
- C.** Visit to a water treatment plant

RECOMMENDED BOOKS:

1. Manual of water supply and treatment by Government of India publication.
2. Water and Waste water Technology by Mark J. Hammer / John Wiley and Sons.
3. Introduction to Environmental Engineering by M. L. Davis and Davis A. Cornwell, Mc Graw Hill.
4. Water supply and sewerage by T. H. McGhee.
5. Introduction to Environmental Engineering & Sciences G. M. Master, Prentice – Hall.
6. Environmental Engineering by Peavy.
7. Water Supply Engineering by S. K. Garg, Khanna Publishers, New Delhi
8. Water Supply Engineering by Dr. B. C. Punmia, Laxmi Publishers, New Delhi
9. Water Supply Engineering by Dr. P. N. Modi, Standard Book House, New Delhi.

6. Building Planning & Design (Revised)

Teaching Scheme:

Lecture: 2 hours per week

Drawing: 4 hours per week

Examination scheme:

Term Work: 50 marks

Oral Exam: 25 marks

SECTION I

Unit 1 (01)

Dimensions & space requirement in relation to body measurements, space design for passage between walls, service access, stair, ramps, elevators

Unit 2 (16)

Planning and Design, site selection, site layout for various types of building such as:

- a) Educational buildings- Younger age range, middle age range, older age range, School for mentally retarded
- b) Building for health- Sanitorium, Hospitals
- c) Assembly buildings- Recreational Halls, Community halls, Cinema theatres, Gymnasiums, Restaurant, Temples, Dance halls, Clubs.
- d) Business and Mercantile buildings- Shops, Banks, Markets and Departmental stores
- e) Industrial buildings- Factories, Warehouse
- f) Office and other buildings- Post offices, Administrative buildings etc.
- g) Buildings for transportation- Bus stations, Truck terminals
- h) Computer centers, service centers for communication and electronic media.

Unit 3 (05)

Elements of perspective drawings, parallel perspective and angular perspective

Unit 4 (02)

The nature of architecture – definition and scope of study, The aesthetic component of building, terms such as mass, space, proportion, Symmetry, balance, contrast, pattern.

Integration of aesthetics and function, introduction to concept of interior designing

TERMWORK

1. Planning and designing of a Public building project for which minimum 5 imperial size drawings shall be prepared covering scope of 1) Municipal drawing, 2) Layout plan, 3) Plan giving details of water supply, drainage, Electrification, furniture layout etc.4) Elevation treatment
2. Imperial size sheet/s for perspective view of the buildings planned above.
3. Two alternative line plans on Graph paper of at least five remaining types of buildings (not covered in I) with merits and demerits.
4. Two exercises on parallel and angular perspective of simple objects on half imperial sheets.
5. Report for the building project stated in I, including necessary sketches and design details.
6. Visit to a building complex and a report based on that.

7. One exercise of preparing a plan and elevation on CAD.

1. Structural Mechanics-III (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

SECTION I

Unit 1 (3)

Concept of Indeterminate structures, Degree of freedom, Degree of kinematic and static Indeterminacy, Methods of analysis and comparison of force and displacement methods.

Unit 2 (5)

Force Method: Consistent deformation method, Fixed Beams & Propped cantilevers with uniform section, Yielding of Supports.

Unit 3 (3)

Force Method: Clapeyron's theorem of three moments, Continuous beams, Sinking of supports.

Unit 4 (8)

Force Method: Energy Theorems, Betti's Law, maxwell's reciprocal theorem, Castigliano's theorem and Unit Load method. Statically indeterminate beams, trusses, portal frames, two hinged arches. (Degree of S.I. < 2)

SECTION II

Unit 5 (6)

Displacement method: Slope deflection equation method, Modified slope deflection equation, sinking of supports, Application to beams, Portal frames without and with sway. (Degree of S.I. < 2)

Unit 6 (6)

Displacement method: Moment distribution method, Sinking of supports, Application to beams, portal frames without and with sway. Symmetry and ansymmetry (Degree of S.I. < 2)

Unit 7 (4)

Flexibility method: flexibility coefficients, Development of flexibility matrix, Analysis of beams and portals (Degree of S.I. < 2)

Unit 8 (4)

Stiffness method: stiffness coefficients. Development of stiffness matrix, Analysis of beams and portals (Degree of S.I. < 2)

TERMWORK

Term work shall consist of minimum eight assignments based on above syllabus with at least three problems from each unit.

RECOMMENDED BOOKS

1. Analysis of Structures- Vol.II by Vazirani & Ratwani
2. Basic Structural Analysis by C.S.Reddy. Tata McGraw-Hill pub.
3. Theory of Structures by S.P. by Timoshenko & Young.
4. Structural Analysis by G.S.Pandit.
5. Structural Analysis- Matrix approach by Pandit & Gupta.
6. Mechanics of Structures- Vol.II by S.B.Junnarkar
7. Matrix analysis of structures by Gere & Weaver.
8. Indeterminate structural analysis by C.K. Wang.

2 Geotechnical Engineering - II (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

SECTION I

UNIT 1: (05)

Soil & Rock Exploration: Necessity, Planning, No & depth of bore holes, Exploration Methods- auger boring (hand and continuous flight augers), and wash boring, rotary drilling. Soil sampling- disturbed and undisturbed, Rock drilling and sampling, Mechanical properties of rock, modes of failure, behavior of rocks in uniaxial compression, tensile strength of rocks, Core barrels, Core boxes, core recovery, RQD.

UNIT 2: (04)

Stability of Slope: Slope classification, slope failure, modes of failure. Infinite slope in cohesive and cohesion less soil, Taylor's stability number, Friction circle method, Landslides.

UNIT 3: (07)

Bearing Capacity Evaluation: Definitions, Modes of failure, Terzaghi's bearing capacity equation with derivation, I.S. Code method of bearing capacity evaluation & computation, Effect of various factors on bearing capacity, Effect of water table, eccentricity of load bearing capacity evaluation from Plate load test, S.P.T. (By Terzaghi's equation & I.S. Code method) and pressuremeter tests with detailed procedure

UNIT 4: (04)

Foundation Settlement: Immediate settlement- computations from I.S. 8009-1976 (Part I) approach and from Plate load test observations, consolidation settlement computations, total, differential settlement, Tolerable settlement, Angular distortion.

SECTION II

UNIT 5: (05)

Shallow Foundation: Types and their selection, minimum depth of footing, Assumptions & limitations of rigid design analysis. Design of Isolated, combined, strap footing (Rigid analysis), Raft foundation (elastic analysis), floating foundations (R.C.C. Design is not expected)

UNIT 6: (06)

Pile Foundation: Classification and their uses, single pile capacity evaluation by static and dynamic methods, pile load test. Negative skin friction, Group action piles, spacing of piles in a group, Group efficiency. Under reamed piles – equipment, construction and precautions

UNIT 7: (05)

Well, Caissons Foundation and Cofferdams: Element of wells, types, methods of construction, tilt and shift, remedial measures.

Pneumatic caissons: sinking method- Sand island method, Caisson disease. Types and material used for sheet piling, Illustrative use of sheet pile walls, Anchorages for sheet piling, Design of anchored sheet pile by free earth support method. Common types of cofferdams, Soil pressure distribution, Braced cofferdam.

UNIT 8: (04)

Modern Foundation Techniques: Anchoring of foundation, Stone columns, Vibroflotation, Preloading technique, Civil engineering application of geo synthetics, geo textile & geo membrane. Precast bored piles, Jet grouting.

TERM WORK:

1. Design Problem-
 - a. Bearing capacity calculation by various method
 - b. Settlement calculations
 - c. Design of shallow foundation
 - d. Pile and Pile group
 - e. Stability analysis
2. Visit to foundation construction sites and preparation of the report.

RECOMMENDED BOOKS:

1. Foundation Engineering by B.J. Kasamalkar

2. Soil Mechanics and Foundation Engg. by V.N.S.Murthy
3. Soil Mechanics and Foundation Engg. By K.R.Arora
4. Soil Mechanics and Foundation Engg. by B.C. Punmia
5. Foundation design manual-Dr. N.V. Nayak. Dhanpat Rai and Sons
6. Foundation Engineering by S.P.Brahma
7. Principles of Geotechnical Engg. By Braja Das
8. Foundation analysis & design by J.E.Bowles
9. Foundation design by W.C.Teng

3. Engineering Management (Revised)

Teaching Scheme:

Lecture: 4 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

Oral Exam: 25 marks

SECTION I

UNIT 1: (10)

1. Principles Of Management (by Henry Fayol)
2. Functions Of Management:
 - a) Planning – Nature, Process and Importance of Planning,
 - b) Organizing – Types, Organization Charts, Site Layout.
 - c) Staffing – Introduction
 - d) Directing, Co-Ordination, Communication, Motivation and Controlling.
3. Decision Making- process; Decision Tree
4. Linear Programming – Graphical Method, Introduction of Simplex Method, Transportation Problem And Assignment Problem, Sensitivity Analysis (Concept Only)

UNIT 2: (10)

1. Project Management – Objectives, Agencies, Phases; Work Breakdown Structure.
2. Project Planning - Bar Chart, Mile Stone Chart, CPM
3. Development of CPM Network – Time Estimates, Floats, Critical Path.
4. Network Compression, Resource Allocation, Network Updating

UNIT 3: (06)

1. PERT - Concept of Probability, Normal and Beta Distribution, Time Estimates, Slack, Probability of Project Completion
2. Precedence Network: Concept
3. Introduction to Work Study.

SECTION II

UNIT 4:**(14)**

1. Engineering Economics –
 - (a) Introduction, Importance.
 - (b) Time Value of Money, Equivalence, Tangible and Intangible Factors,
2. Economic Comparisons-
 - (c) Present Worth Method, Equivalent Annual Cost Method, Capitalized Cost Method, Net Present Value, Rate of Return, Benefit Cost Ratio, Payback Method
 - (d) Linear Break Even Analysis.

UNIT 5:**(06)**

1. Site Layout – Factor Affecting, Typical Layout of few Major Construction Projects.
2. Legal Aspects:
 - a. Child Labour Act.
 - b. Workmen’s Compensation Act.
 - c. Minimum Wages Act.

UNIT 6:**(06)**

Resource Management:

1. Material Management – Objectives, Functions
2. Inventory Control- Necessity, Techniques Such As ABC, EOQ Analysis, Safety Stocks
3. Queuing Theory

TERMWORKS

1. At least TWO assignments based on each unit.
2. Visit report covering Project Management and Site Layout

RECOMMENDED BOOKS

1. Engineering Management – Stoner
2. Principles of Management – Davar
3. A Text book of Management – A.S.Deshpande
4. Essentials of Management – Koontz, Dounell and Weigrick
5. Management and Organization by Kast and Rosinweig – Tata McGraw Hill publication.
6. Operation Research – S.H.Deshpande
7. Operation Research – Wagner Wikey Easter Ltd., new Delhi
8. Quantitative Techniques in Management – Vol. I, L.C.Zhamb
9. Material Management – Gopal Krishnan, Sdueshan

10. Executive Decisions & Operation Research by Miller and Stars, Prentice Hall of India, Publisher.
11. Principles of Construction Management by Roy Pilcher.
12. Project Cost Control in Construction by Roy Pilcher.
13. C.P.M. in Construction Practice by Antill and Woodhead.
14. Management and Engineering Economics by G.A.Taylor.
15. Engineering Economics – Layland Blank and Torquin.
16. Project Management by Naik
17. Work Study by O.P.Khanna
18. CPM PERT – Srinath
19. CPM PERT – B.C.Punmia
- 20.

4. Water Resources Engineering -II (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

Oral Exam: 25 marks

SECTION I

UNIT 1: (05)

Planning of Reservoirs: Storage Calculations, Control levels, silting of reservoirs, Losses in reservoirs

Dams: Introduction, necessity, types of dams, selection of site for dams, selection of type of dam. Introduction to Instrumentation in dams

UNIT 2: (05)

Earth dam: Components and their functions check list for design control of seepage through earth dam and foundation stability of slopes, slip circle methods, filters in earth dam and their design, drainage of earth dam, construction of earth dam.

UNIT 3: (07)

Gravity Dams: Forces acting on dam, design criteria, theoretical and practical profile, high and low dam, stability calculations, methods of construction, galleries and joints in dams. Arch dams – types, layouts of constant angle and constant radius arch dams

UNIT 4: (04)

Spillway: Necessity and function components of spillway, different types, factors affecting choice of type of spillway. Elementary hydraulic design, types of energy dissipation arrangements, gates for spillway.

Outlets in Dams: Outlets through concrete and earth dams, different types, determination of important control levels, choice of type of energy dissipation in outlets transition.

SECTION II

UNIT 5: (04)

Diversion Head Works: Introduction, types, component parts, Causes of failure and remedies

Introduction to Theory of seepage - Bligh's creep theory, exit gradient, Khosla's theory,

UNIT 6: (07)

Canals: Types, alignment, Kennedy's and Lacey's silt theories, typical sections of canals, balancing depth, canal lining - purpose, types, selection and economics. Canal structures (Introduction)

C.D. Works: Necessity, aqueduct, culvert, super passage, level crossing,

Canal Regulatory Works: head regulator, cross regulator, canal siphon, canal fall, canal escape, standing wave flume.

UNIT 7 (04)

River Engineering: Classification and types of rivers, meandering phenomenon,

River training works: Classification, Types, Design considerations for Guide banks and Groynes, River navigation.

Interlinking of rivers, National perspective plan, Himalayan and peninsular river component

UNIT 8: (04)

Elements of hydro-power: Water power, importance, types of water power plants, layout and components of each type. Intakes, conveyance system, surge tanks, Power house types, Components and layout, Tail race.

TERM WORK:

Minimum seven assignments from of the following

1. Determination of height of dam: demand/supply reservoir calculation and control levels and free board.
2. Design of gravity dam: Elementary and practical profile with stability calculations
3. Design of earth dam:
 - a. Determination of section - one slip circle calculations.
 - b. Design of filters.
4. Spillway: Design of spillway, geometrical section, energy dissipation

- arrangement and gates.
5. Outlet through earth dam and masonry dam, layout
 6. Arch dam: Layout of constant angle and constant radius.
 7. Typical section of Weir / Barrage
 8. A typical layout of Hydropower plant and its functioning
 9. Design of one canal structure / cross drainage work
 10. Report based on field visits to irrigation and water power engineering project.

RECOMMENDED BOOKS:

1. Priyani, 'Irrigation and water power', Charotar Publication, Anand.
2. Punmia, 'Irrigation and water power engineering', 1986, Standard Publications, New Delhi.
3. U.S.B.R, Oxford and IBH Publ. Co.. 'Design of small dams'
4. Justinn, Creager and Hinds, 'Engg. For Dams. Vol. I, II,III'
5. Bharat Singh, 'Irrigation'. New Chand and Bros., Roorkee.
6. Varshney and Gupta, 'Irrigation Engg. Vol. 1'. Nemchand Publisher
7. Leliavsky, 'Design of hydraulic structures'.
8. S. K. Garg, "Irrigation Engg."
9. River Behaviour and Management and Training, - CBIP publication

5. Environmental Engineering – II (Revised)

Teaching Scheme:

Lecture: 3 hours per week

Practical: 2 hours per week

Examination scheme:

Theory paper: 100 marks

Term Work: 25 marks

SECTION I

UNIT 1: (03)

Components of wastewater flows, wastewater sources and flow rate, Variations in flow rates and strength, wastewater constituents, Characteristic of Municipal waste water, Problems on B.O.D. calculations, Quantity of storm water, Ground water infiltration.

Sewerage system, Types, Layout, Types of sewers, Collection system, Appurtenances, Design of sanitary and storm water sewers, Maintenance of sewerage systems Sewage and Sludge pumping, Location, Capacity, Types of pumps, Pumping station design

UNIT 2: (05)

Primary Treatment-Screening, comminuting, Grit removal, Oil and Grease trap Primary settling tank. Secondary Treatment-Activated sludge process, Process design and operating parameters, modification of ASP, Operational problems, Concept of trickling filter, Secondary Settling Tank

UNIT 3: (09)

Sludge characteristics, Treatment and disposal, Concept of anaerobic digestion, types of reactors. Low cost wastewater treatment methods-Principles of waste stabilization pond. Design and operation of oxidation pond, aerobic & anaerobic Lagoons, Aerated Lagoon, Oxidation ditch, Septic tank. Selection of alternative Treatment process flow sheets, Concept of recycling of sewage

UNIT 4: (03)

Stream pollution, Self Purification, DO sag curve, Streeter Phelps Equation, Stream classification, disposal of waste water methods, effluents standards for stream and land disposal as per MPCB and CPCB standards

SECTION II

UNIT 5: (04)

Solid waste management-Solid wastes Definition, Types, Sources, Characteristics, Functional outlines-storage, Collection, Processing techniques, Methods of treatment of solid waste-Composting, Incineration, Pyrolysis and Sanitary land filling. Concept of Hazardous waste management

UNIT 6: (06)

Air Pollution-Definition, Sources and classification of pollutants, Effects on man material and vegetation, Introduction to Meteorological aspects such as atmospheric stability, mixing heights, and plume behavior. Control of industrial air pollution, Settling Chamber, Bag Filters, Cyclone separators, Scrubbers, Electrostatic precipitators, Introduction to global issues – Global warming, Acid rain, Ozone depletion, Photochemical Smog, Carbon credits Control of vehicular pollution. Air quality standards

UNIT 7: (07)

Noise Pollution-Decibel scales, Noise characteristics and measurements, Levels of noise and standards, control measures of community and industrial noise. Introduction to Environmental Impact Assessment and Environmental Legislation

TERM WORK:

Term work shall consist of the following:

A. Characterization of Municipal Waste water (Any 5 of the following):

1. pH
2. Alkalinity
3. Solids
4. Chlorides
5. DO

6. BOD
 7. COD
 8. Sulphates
 9. Oil & grease
 10. Volatile acids
- B. Demonstration of HVS and Auto exhaust analyzer.
 - C. Design of sewerage system and treatment system for a small urban area
 - D. Visit to sewage treatment plant.

RECOMMENDED BOOKS:

1. Peavey, H. S. Rowe, D.R., Environmental Engineering, McGraw-Hill Book Company.
2. Waste water Engineering, P. N. Modi.
3. Viessman W. and Hammer M.J. Water supply and pollution Control, Harper Collins College publishers.
4. Hammer M.J. Water and Waste water Technology, Prentice-Hall of India Private Limited.
5. Water Supply & Sanitary Engineering, G. S. Birdie, Dhanpat Rai & Sons, New Delhi.
6. Manual on sewerage and sewage Treatment-Government of India Publication.
7. Masters. G. M. Introduction to Environmental Engineering and Science.
8. Rao. M. N. and Rao H.V. Air pollution, Tata McGraw Hill, 1990.
9. Canter, Environmental Impact Assessment, TMH Publication.
10. Manual on Municipal Solid Waste Management, Ministry of Urban Development Govt. of India.

6. Structural Design & Drawing – I (Revised)

Teaching Scheme:

Drawing: 4 hours per week

Examination scheme:

Term Work: 50 marks

Oral Exam: 25 marks

The term work shall consist of detailed structural design and drawing of the following steel structure along with necessary drawings.

1. INDUSTRIAL SHED:

Roof truss, Gantry girder, Roof and gantry columns, bracing system, column bases.

2. ANY ONE of the following:

(1) BUILDING FRAMES:

Secondary and main beams, column and column bases, beam- to- beam connection, column- beam connection, design of typical members.

(2) FOOT BRIDGE:

Influence lines, cross beam, main Truss, Raker, joint details, support details.

(3) PLATE GIRDER:

Design of welded plate girder

Note:

Analysis results of the first problem shall be compared with the results by any standard software package.

7. Seminar (Revised)

Teaching Scheme:**Practical: 2 hours per week****Examination scheme:****Term Work: 50 marks**

The topic for the Seminar may be related to Civil Engineering area and interdisciplinary area related to Civil Engineering such as –

1. Structural Engineering
2. Concrete Technology
3. Environmental Engineering
4. Geotechnical Engineering
5. Transportation Engineering
6. Infrastructural Engineering
7. Water Resources Engineering
8. Town & Country Planning
9. Construction Engineering
10. Surveying & Remote Sensing Techniques
11. Project Management
12. Legal Aspects in Civil Engineering
13. Earthquake Engineering
14. Disaster Management

7. b) Vacation Field Training (Revised)

Examination scheme:**Term Work: 25 marks**

ASSESSMENT ON VACATION FIELD TRAINING (20 DAYS)

The students are required to undergo rigorous field training in Civil Engineering for 20 days at the end of 6th & 7th semester and before the commencement of 8th semester. Students shall submit the report of the field training taken and necessary certificate from the organization where such training is undertaken.

The Report Should Consist:

1. Daily Material Consumption Report
2. Daily Work Progress Report

3. Daily Muster of Labours on Site
4. Site Layout
5. Site Details (Includes Plan)
6. Bar Chart of Work Done

Note: Evaluation of Report by External Examiner from other college should be done at the end of 8th semester.

Shivaji University, Kolhapur

Equivalences of T.E. Civil for repeater students

	Revised Subject	Pre Revised Subject Equivalence
1)	Design of Steel Structure	Design of Steel Structure
2)	Geotechnical Engineering -I	Geotechnical Engineering-I
3)	Water Resources Engineering – I	Water Resources Engineering – I * (college level exam)

4)	Concrete Technology	Concrete Technology
5)	Environmental Engineering - I	Environmental Engineering - I
6)	Building Planning & Design	No Exam

I

7)	Structural Mechanics - III	Structural Mechanics - III
8)	Geotechnical Engineering -II	Geotechnical Engineering -II
9)	Engineering Management –II	Engineering Management-II
10)	Water Resources Engineering – II	Water Resources Engineering – I * (college level exam)
11)	Environmental Engineering - II	Environmental Engineering - II
12)	Structural Design & Drawing -I	Structural Design & Drawing –I
* WREI & WRE-II exam to be conducted at college level		