

TENTATIVE
Likely to be Modified

Structural Analysis-I(3-0-0)

Module I

Concept of determinate and indeterminate structures, determination of degree of static and kinematic indeterminacy in plane frame and continuous structures.

Methods of Analysis: Equilibrium equations, compatibility requirements, Introduction to force and displacement methods.

Analysis of propped cantilever by consistent deformation method, Analysis of fixed and continuous beams by Moment-Area method, Conjugate beam method and theorem of three moments.

Module II

Energy theorems and its application, Strain energy method, Virtual work method, unit load method, Betti's and Maxwell's laws, Castigliano's theorem, concept of minimum potential energy.

Analysis of redundant plane trusses.

Deflection of pin jointed plane trusses. Analytical method and Williot –Mohr diagram. Introduction to space truss.

Module III

Rolling loads and influence lines for determinate structures, simply supported beams, cantilever, ILD for reaction, shear force and bending moment at a section, ILD for wheel loads, point loads and udl, maximum bending moment envelope.

Module IV

Analysis of three hinged arches, Suspension cable with three hinged stiffening girders subjected to dead and live loads, ILD for Bending Moment, Shear Force, normal thrust and radial shear for three hinged arches

Text Books:

1. Theory and Problems in Structural Analysis by L Negi, Mc Graw Hill
2. Structural Analysis by T.S. Thandamoorthy, Oxford University Press
3. Basic Structural Analysis by C S Reddy, McGraw Hill

Reference Books:

1. Elementary Structural Analysis by Norris and Wilber, McGraw Hill
2. Structural Analysis by Aslam Kassimali, Cengage Learning
3. Structural Analysis by R.C. Hibbeler, Pearson Education

Advanced Mechanics of Solids(3-0-1)

Module I

Theories of failure: Maximum principal stress theory, maximum shear stress theory, maximum strain theory, total strain energy theory, maximum distortion theory, octahedral shear stress theory graphical representation and comparison of theories of failure.

Thick cylinders subjected to internal and external pressures, compound cylinders, computer application in analyzing stresses in thick cylinders.

Module II

Unsymmetrical bending: Properties of beam cross section, slope of neutral axis, stresses and deflection in unsymmetrical bending, shear centre.

Curved Beam: Bending of beam with large initial curvature, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links.

Module III

Elementary concept of theory of elasticity, stresses in three dimensional, equations of equilibrium and compatibility, plane stress, computer analysis of two dimensional state of stress or strain at a point.

Module IV

Advanced topics in strength of materials: Repeated stresses and fatigue in metals, concept of stress Concentration, notch and stress concentration factors.

Experimental stress analysis: Resistance strain gauges, strain Rosettes, Two dimensional photoelastic methods of stress analysis, stress optic law, light and dark field in a polariscope, Isoclinic and Isochromatic fringe patterns, Computer Analysis of strain from strain rosette measurement.

Text Books:

1. Advanced Mechanics of Solids, L.S. Srinath, Mc Graw Hill.
2. Advanced Mechanics of Materials, Kumar & Ghai, Khanna Publisher.
3. Strength of Materials by R. Subramaniam, Oxford University Press
4. Strength of Material by S. S. Ratan, McGraw Hill

Reference Books:

1. Advanced Mechanics of Materials: Seely and Smith, John Willey, New York.
2. Mechanics of Materials by Gere & Timoshenko, CBS.

Highway & Traffic Engineering(3-0-1)

Module-I

Modes of transportation, importance of highway transportation, history of road construction. Principle of highway planning, road development plans, highway alignments requirements, engineering surveys for highway location.

Geometric design- Design controls, highway cross section elements, cross slope or camber, road width, road margins, typical cross sections of roads, design speed, sight distance, design of horizontal and vertical alignments, horizontal and vertical curves.

Module-II

Highway Materials:- Properties of subgrade , sub-base , base course and surface course materials , test on subgrade soil, aggregates and bituminous materials.

Traffic Engineering:- definition , fundamentals of traffic flow , traffic management, prevention of road accidents , elements of transport planning , highway drainage

Module-III

Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, IRC:37-2012, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2011).

Module-IV

Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements, Hot Mix Plants, Construction of Rigid Pavements

Highway Maintenance: Various type of failures of flexible and rigid pavements.

Text Books:

1. Highway Engineering, by S.K.Khanna and CEG Justo, Nem Chand & Bros.
2. Transportation Engineering-Highway Engineering by C Venkatramaiah, Universities Press.
3. A course in Highway Engineering by Dr. S.P. Bindra, Dhanpat Rai Publications.

Reference Books:

1. Principles of Highway Engineering and Traffic Analysis by Mannering Fred L., Washburn Scott S. and Kilaresk Walter P., Wiley India Pvt. Ltd
2. Traffic Engineering and Transportation Planning by Kadiyali, L.R., Khanna Publishers
3. Transportation Engineering and Planning by Papacostas, C.S. and Prevedouros, P.D., Prentice Hall.

Design of Concrete Structures(3-0-1)

Module I

Properties of concrete and reinforcing steel, philosophy, concept and methods of reinforced concrete design, introduction to limit state method, limit state of collapse and limit state of serviceability, application of limit state method to rectangular beams for flexure, shear, bond and torsion

Module II

Design of doubly reinforced beams, design of T and L beams, design of one way and two way slabs, design of staircases.

Module III

Design of short and long columns with axial and eccentric loadings, Design of isolated and combined column footings

Module IV

Retaining walls, various forces acting on retaining wall, stability requirement, design of cantilever and counterfort retaining walls,
Design of water tanks, design requirements, design of tanks on ground, under ground and elevated water tanks.

Text Books:

1. Design of Reinforced Concrete Structure by N. Subramanian, Oxford University Press
2. Limit State Design by A.K.Jain, Neemchand & Bros
3. Reinforced Concrete Design by S U Pillai & D. Menon, McGraw Hill

Reference Books:

1. Design of concrete structures by J.N.Bandyopadhyay, PHI
2. Limit State Design of Reinforced Concrete -P.C Verghese
3. Reinforced Concrete Design by S.N.Sinha, McGraw Hill
4. RCC Design-B.C.Punmia, A.K.Jain and A.K.Jain-Laxmi Publications

Material Testing Lab(0-0-1)

- Brick:** (a) Shape and size test for brick
(b) Water absorption test for brick
(c) Compressive strength of brick

- Cement:** (a) Fineness of cement
(b) Soundness of cement by Lechattelier test
(c) Specific gravity of cement
(d) Fineness of cement by air permeability
(e) Standard consistency of a given sample by Vicat test
(f) Initial and final setting time of cement
(g) Fineness modulus of fine and coarse aggregate
(h) Aggregate crushing value of coarse aggregate
(i) Compressive strength of cement mortar
(j) Tensile strength of cement mortar

- Steel:** (a) Tensile strength of steel
(b) Compression test of cast iron
(b) Rigidity modulus of cast iron
(c) Fatigue test of steel (cyclic loading)
(d) Strain measurement using strain gauge and strain rosette

Advanced Surveying

Module-I

Tacheometry: General principles of stadia system, determination of tacheometric constants, analytic lens, fixed and movable hair methods, inclined sights with staff vertical, inclined sight with staff normal to the line of sight, tangential system, errors in tacheometer. **Curves:** Types of curves, elements of curve, different methods of setting out simple circular curves, compound curves, reverse curves, transition curves, types of transition curves, super elevation, vertical curves.

Module-II

Triangulation: Classification of triangulation system, operation in triangulation survey, reconnaissance, selection of site for base line, its measurement and extension, correction to base line measurement using EDM and Total station, selection of stations, triangulation figures, scaffolds and signals, marking of stations, inter visibility, strength of figures, reduction to centre.

Theory of Errors: Definitions, law of weight, probable errors, most probable value, distribution of error, normal equations, method of least square.

Module-III

Photogrammetric Surveying – Principle, Scale, Number of Photographs, Deduction of distance & height, Elements of Astronomical survey, Solution of problems dealing with celestial triangle.

Module-IV

Setting out of work: Laying out of buildings and sewer lines.

Remote Sensing & GIS-Principles of Remote Sensing & Geographic Information System, Application to Civil Engineering.

Text Books:

1. Surveying & Levelling. Vol-II by T.P.Kanethar&S.V.Kulkarni, Pune VidyarthiGrihaPrakashan
2. Surveying and Leveling by R. Subramanian, Oxford University Press
3. Surveying- Vol.II, by B.C. Punmia, Laxmi Publications

Reference Books:

1. Surveying Vol-1 by R Agor, Khanna Publishers
2. A Textbook of Surveying, C. Venkatramaiah, Universities Press
3. Surveying and Levelling, N.N. Basak, McGraw-Hill Education
4. Remote Sensing and GIS, Basudeb Bhatta, Oxford University Press

Environmental Pollution and Management

Module-I

Man and environment, Their inter relationships. Types of environmental pollutants, their sources and effects.

Water Pollution and Control, water quality in surface water, BOD and COD, nitrification, eutrophication and its effects, bacterial contamination of water, toxins and heavy metals,

Ground water pollution, principal sources of ground water pollution

Marine pollution, toxic ocean pollutants, sewage disposal in ocean, cleanup of marine pollution

Module-II

Air pollution, Classification of air pollutants and their emission sources, air quality standards, transport and removal of air pollutants, indoor air pollution

Module-III

Noise pollution and control, Measurement of Noise Pollution, Assessment and measurement of sound, Sources of noise from automobiles and industrial operation and control measures

Module-IV

Industrial wastes and their treatment. Solid wastes, generation, collection, processing and disposal.

Environmental impact assessment and auditing. Introduction to Environmental standards, laws and policies. Global issues on environment, Waste minimization, Building environment services.

Text Books:

1. Introduction to Environmental Science by Y Anjaneyulu, BS Publications.
2. Environmental Engineering by G Kiely, McGraw Hill

Reference Books:

1. Environmental Studies from Crisis to Cure by R. Rajagopalan, Oxford University Press
2. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publication.
3. Principles of Environmental Science by Cunningham W.P. and Cunningham M.A. McGraw-Hill.
4. Basic Environmental Technology by J.A Nathanson, Prentice Hall of India, New Delhi.
5. Introduction to Environmental Engineering and Science by G.M. Masters and W.P Ela, Pearson Education.

Optimization in Civil Engineering

Module-I

Idea of Engineering optimization problems, Classification of optimization algorithms, Modeling of problems and principle of modeling. Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method, Sensitivity analysis in linear programming. Transportation problems: Northwest Corner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimality test. Stepping stone method. Assignment problems: Hungarian method. Integer Programming: Branch and Bound algorithm.

Module-II

Dynamic Programming: Sequential optimization; Representation of multistage decision process; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; Problem formulation and applications for Design of continuous beam, Optimal geometric layout of a truss, Water allocation as a sequential process, Capacity expansion, Reservoir operation etc.

Module-III

Non-linear programming, Unconstraint optimization, Fibonacci and Golden Section Search method. Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method, Constrained optimization with inequality constraint: Kuhn-Tucker conditions, Quadratic programming.

Module-IV

Introduction to Genetic algorithm (GA), Difference and similarities between GA and traditional methods. Basic operations of GA: reproduction, crossover, mutation and elitism. Application of Optimization techniques: Water resource planning management, Structural Optimization, Transportation planning and Management, Slope stability and optimal dimensioning of foundations multi-objective optimization models

Text Books

1. Introduction to Optimum Design, J. S. Arora, Elsevier, 2nd Edition, 2004.
2. Optimization for Engg. Design: Algorithms & Examples, K. Deb, Prentice Hall India, 2006.

Reference Books

1. Engineering Optimization: Theory & Practice, S. S. Rao, New Age International (P) Ltd, 3rd Edition, 1996, Reprint : June, 2008
2. Multi-Objective Optimization Using Evolutionary Algorithms, K. Deb, John Wiley, 2003
3. Operations Research, F.S.Hiller, G.J.Lieberman, Eighth Edition, McDraw Hill
4. Operations Research by Pravakar Pai, Oxford University Press

B.Tech(Civil Engineering) Detail Syllabus For Admission Batch 2015-16

Semester : 5th

1.	PCI5D001 Honours(O4)	GIS and Remote Sensing	4-0-0	4
2.	PCI5D002 Honours(O4)	Quantity Surveying & Estimating	4-0-0	4
3.	PCI5G001 Minor(CP)	Water Supply & Sanitary Engineering	4-0-0	4
4.	PCI5H001 OE(CP)		4-0-0	4
5.	PCI5I101 PC(CP)	Structural Analysis - II	3-0-1	4
6.	PCI5I102 PC(CP)	Design of Steel Structures	3-0-1	4
7.	PCI5I103 PC(CP)	Water Supply & Sanitary Engineering	3-0-1	4
8.	PCI5I201 PC(O1)	Advance Lab - I (Structural Engineering Lab)	0-0-4	4
9.	PCI5I202 PC(O1)	Advanced Geotechnical Engineering Lab	0-0-4	4
10.	PCI5J001 PE(O3)	Water Resource Engineering	4-0-0	4
11.	PCI5J002 PE(O3)	Ground Water Hydrology	4-0-0	4
12.	PCI5J003 PE(O3)	Open Channel Flow	4-0-0	4

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5th Semester

Structural Analysis-II(3-0-1)

Module - I

Analysis of continuous beams and plane frames by slope deflection method and moment distribution method, analysis of continuous beam and simple portals by Kani's method

Module - II

Analysis of two hinged and fixed arches for dead and live loads, Suspension cables with two hinged stiffening girders

Module - III

Matrix methods of analysis: flexibility and stiffness methods; Application to simple trusses and beams

Module - IV

. Plastic Analysis: Plastic modulus, shear factor, plastic moment of resistance, Load factor, Plastic analysis of continuous beam and simple rectangular portals, Application of upper bound and lower bound theorems

Text Books:

1. Structural analysis by C.S. Reddy Mc Graw Hill
2. Structural Analysis by T.S. Thandamoorthy, Oxford University Press
3. Structural analysis a matrix approach by Pandit & Gupta, Mc Graw Hill.
4. Limit Analysis of Structures: Monikaselvam, Dhanpat Ray Publication

Reference Books

1. Indeterminate Structures: J.S. Kinney
2. Indeterminate Structural Analysis: C.K. Wang, Mc Graw Hill
3. Structural Analysis by D.S. Prakash Rao, Universities Press
4. Matrix Analysis of Structures by P.K. Singh, Cengage Learning

Design of Steel Structure (3-0-1)

Module I

Introduction, advantages/disadvantages of steel, structural steel, rolled steel section, various types of loads, design philosophy

Limit state design method, limit states of strength and serviceability, probabilistic basis for design

Riveted, bolted and pinned connections,

Welded connections-assumptions, types, design of fillet welds, intermittent fillet weld, plug and slot weld, failure of welded joints, welded joints vs bolted and riveted joints

Module II

Tension members, types, net cross-sectional area, types of failure, slenderness ratio, design of tension members, gusset plate.

Compression members, effective length, slenderness ratio, types of cross-section, classification of cross-section, design of axially loaded compression members, lacing, battening, design of column bases, and foundation bolts.

Module III

Design of beams, types of c/s, lateral stability of beams, lateral torsional buckling, bending and shear strength, web buckling and web crippling, deflection, design procedure.

Module IV

Plate girders- various elements and design of components

Eccentric and moment connections, roof trusses

Text Books:

1. Design of Steel Structures- Limit State Method by N. Subramanian, Oxford University Press
2. Limit State Design of Steel structures by S.K. Duggal, Mc-Graw Hill

Reference Books:

1. Design of steel structures by S.S.Bhavikatti, I.K. International Publishing house.
2. Design of Steel Structures by K. S. Sairam, Pearson
3. Steel Design by William T. Segui, Cengage Learning
4. Fundamentals of Structural Steel Design by M.L.Gambhir, Mc Graw Hill
5. Steel Structures-Design and Practice by N. Subramanian, Oxford University Press

Water Supply and Sanitary Engineering (3-0-1)

Module – I

General requirement for water supply, sources, quality of water, intake, pumping and transportation of water. Physical, chemical and biological characteristics of water and their significance, water quality criteria, water borne diseases, natural purification of water sources.

Module – II

Engineered systems for water treatment : aeration, sedimentation, softening coagulation, filtration, adsorption, ion exchange, and disinfection. Design of water distribution system.

Module – III

Generation and collection of waste water, sanitary, storm and combined sewerage systems, quantities of sanitary waste and storm water, design of sewerage system

Primary, secondary and tertiary treatment of wastewater. Waste water disposal standards,

Module – IV

Basic of microbiology. Biological wastewater treatment system : Aerobic processes activated sludge process and its modifications, trickling filter, RBC, Anaerobic Processes conventional anaerobic digester, High rate and hybrid anaerobic reactors, Sludge digestion and handling, Disposal of effluent and sludge, Design problems on water distribution, sewerage, water treatment units, wastewater treatment units and sludge digestion.

Text Books:

1. Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers
2. Sewage Disposal and Air Pollution Engineering - Environmental Engineering v.2 by S.K.Garg, Khanna Publishers
3. Water Supply and Sanitary Engineering by B.S.Birdi Dhanpat Rai Publishing Company

Reference Books:

1. Water Supply Engineering by B. C. Punmia and A.K.Jain, Laxmi Publications
3. Water and Wastewater Technology by M.J.Hammer, PHI

Water Resource Engineering (3-1-0)

Module-I

Precipitation, its Measurement and Analysis: Hydrologic cycle, catchment area and watershed, Rainfall and its characteristics, Rain gauges, Non-Recording and Recording type, Average rainfall over a catchment, Evapo-transpiration, Pan evaporation, Pan coefficient, Infiltration, W-Index and -Index.

Discharge Measurement: Stream gauging, Flow rating curve, Use of current meters for velocity measurement, Dye-dilution method of discharge measurement, Estimation of discharge.

Module-II

Hydrograph: Characteristics of a Run off hydrograph, Unit hydrograph, S-hydrograph, Instantaneous Unit hydrograph, Synthetic Unit hydrograph, Duration Curve, Mass flow hydrograph.

Flood Control: Flood flows, Frequency studies, Statistical analysis for flood prediction, Method of flood control, Flood routing, Reservoir routing and Channel routing, River training works

Module-III

Open Channel Flow: Definition, Uniform flow, Chezy's Kutter's equation, Most economical section, specific energy, critical, subcritical, supercritical flow, Non-uniform flow, Gradual varied flow, Hydraulic jump,

Module-IV

Text Books:

1. Engg. Hydrology by K. Subramanian, McGraw-Hill
2. Hydrology and Water Resources Engineering by K. C. Patra, Narosa Publishing House, New Delhi

Reference Books:

1. Engineering Hydrology by C.S.P. Ojha, Oxford University Press
2. Hydrology by H.M. Raghunath, New age Int. Publication, New Delhi
3. Hydrology by P.J.R. Reddy, University Science Press, New Delhi

Ground Water Hydrology (3-1-0)

Module I

Hydrologic cycle, Water balance, Occurrence of ground water: Origin, geological formations as aquifers, type of aquifers, groundwater basins, springs. Darcy's Law, validity of Darcy's Law permeability, laboratory and field measurement of permeability, groundwater Flow lines. Steady flow to a well, steady radial flow to a well in confined aquifer and unconfined aquifer, Unsteady radial flow into a confined aquifer, Non equilibrium Theis equation, Theis method of solution, multiple well system.

Module II

Methods of constructions of deep and shallow wells: The percussion (or cable tool) method of drilling, Direct circulation hydraulic rotary method, Down the hole hammer method, well logs-receptivity logging, testing of wells for yield, Effect of irrigation, stream flow, rainfall on groundwater fluctuations, seasonal and secular variations, fluctuation due to miscellaneous causes. Surface and Subsurface investigations of groundwater: Geophysical exploration, Electrical resistivity method, aerial photo interpretation, remote sensing applications to ground water exploration, test drilling, Artificial recharge by water spreading, through pits and shaft, recharge through other methods;

Module III

Ground water pollution: Municipal sources, liquid wastes from domestic uses, solid wastes, Industrial sources, tank and pipeline leakage, Mining activity, agricultural sources, septic tank and cesspools, saline water intrusion in coastal aquifers, methods to control saline water intrusion ;

Module IV

Groundwater management: Concepts of Basin management, Equation of hydrologic equilibrium, groundwater basin investigations, conjunctive use of surface and groundwater.

Reference Books:

1. Groundwater Hydrology, D. K. Todd, John Wiley and Sons.
2. Ground Water, H. M. Raghunath,.
3. Groundwater and Tube Wells, S. P. Garg, Oxford and IBH Publishing Co., New Delhi.

Open Channel Flow (3-1-0)

Module I

Basic Fluid flow concepts: Classification of open channels, classification of flow, basic equations, velocity distribution, pressure distribution, energy and momentum coefficients.

Uniform flow in rigid boundary channels: Shear stress on the boundary, flow over scattered roughness elements, Chezy's equation, Manning's equation, effect of channel shape on resistance equation, section factor curves for rectangular and trapezoidal channels, flow in a circular channel, relation between conveyance and depth.

Module II

Uniform flow in mobile boundary channels: Incipient motion condition, regimes of flow, resistance to flow in alluvial streams. Design of channels: Rigid boundary channels, non-scouring erodible boundary channels, alluvial channels. Specific energy: Specific energy, specific force, critical depth computations, control section, application of specific energy and critical depth concepts.

Module III

Gradually varied flow: Types of non uniform flow, governing equations, characteristics of surface curves, classification of water surface profiles, sketching of water surface profiles, discharge from reservoir, profiles in compound channels, computation of gradually varied flow in prismatic channels, gradually varied flow in non prismatic channels.

Module IV

Rapidly varied flow: Application of conservation laws, channel transitions, supercritical flow past weirs, spillways, hydraulic jumps

Unsteady flow: Waves and their classification, celerity of a wave, surges, equation of motion, method of characteristics, dam break problem.

Text Books

1. Flow through open channels, Rajesh Srivastava, Oxford University Press
2. Flow through open channels - K. G. Ranga Raju

Reference Books:

1. Open channel flow - M. Hanif Chaudhry
2. Open Channel Hydraulics - V. T. Chow
3. Flow in open channels - K. Subramanya

GIS and Remote Sensing (4-0-0)

MODULE-I

Remote sensing- introduction, physics of remote sensing- electromagnetic radiations and their characteristics, thermal emissions, multi-concept in remote sensing, remote sensing satellites and their data products, sensors and orbital characteristics, spectral reflectance curves for earth surface features, methods of remotely sensed data interpretation- visual interpretation, concept of fcc, digital image processing- digital image and its characteristics, satellite data formats, image rectification and restoration, image enhancement- contrast manipulation, spatial feature manipulation, multi-image manipulation

MODULE-II

Fundamentals of GIS: introduction, definition of GIS, evolution of GIS, roots of GIS, definition, GIS architecture, models of GIS, framework for GIS, GIS categories, map as a model, spatial referencing system, map projections, commonly used map projections, grid systems, cartographic symbolization, types of maps, typography, map design, map productions, map applications,

MODULE-III

data management, models and quality issues: conceptual models, geographical data models, data primitives, data types - raster and vector approach, digital terrain modeling , approaches to digital terrain data modeling , acquisition of digital terrain data, data modeling and spatial analysis, sources of geographical data, data collectors and providers, creating digital data sets, data presentation, data updating, data storage

MODULE-IV

GIS data processing, analysis and visualization: raster based GIS data processing, vector based GIS data processing, human computer interaction and GIS, visualization of geographic information, principles of cartographic design in GIS, generation of information product, image classification and GIS, visual image interpretation, types of pictorial data products, image interpretation strategy, image interpretation process,

Text Books:

1. Remote Sensing and GIS, Basudeb Bhatta, Oxford University Press
2. Remote Sensing And GIS, M.A. Reddy, B.S. Publication, Hyderabad

Reference Books:

1. Fundamental of Remote Sensing by G. Joseph, Universities Press
2. Introduction Of GIS, Kang-Tsung Chang, Mcgraw-Hill
3. GIS, N. Panigrahi, Universities Press

Quantity Surveying and Estimating (4-0-0)

Module – I

Quality estimation:

Principles of estimation, methods and units, Estimation of materials in buildings, Culverts and bridges.

Module II

Principles of general and detailed specification for various types building works.

Analysis of rates, description, Prime cost, Schedule rates, Analysis of rates for various types of works. Estimate of R.C.C and Steel works, Scheduling, Slab, beam, column

Module – III

Estimation of Road – earthwork fully in banking, cutting, partly cutting & partly filling. Detailed estimate for WBM, Bituminous road.

Valuation, rent fixation, tenders, contracts, accounting procedure, measurement book, stores, cost & quality control, PWD & CPWD practice, Software Applications for Estimation of Buildings.

Module – III

Network techniques, Introduction to CPM/ PERT methods and their use in project planning construction schedules for jobs, materials equipments, labour and finance.

Reference Books:

1. Estimating and Costing in Civil Engineering Theory & Practice, B.N. Dutta, UBS Publishers
2. PERT and CPM, L.S. Sreenath, East West Press
3. Civil engineering contracts and estimates by B.S. Patil, University Press.

B.Tech(Civil Engineering) Detail Syllabus For Admission Batch 2015-16

Semester : 6th

1.	PCI6D001	Honours(O3)	Applications of Matrix Method in Structural Analysis	4-0-0	4
2.	PCI6D002	Honours(O3)	Earthquake Engineering	4-0-0	4
3.	PCI6D003	Honours(O3)	Town Planning	4-0-0	4
4.	PCI6D004	Honours(O3)	High rise Structures	4-0-0	4
5.	PCI6E101	HS(CP)	Business Communication & Skill for Interview	1-0-2	3
6.	PCI6G001	Minor(CP)	Irrigation Engineering	4-0-0	4
7.	PCI6H301	OE(CP)	Industrial Lecture #	0-0-1	1
8.	PCI6I101	PC(CP)	Foundation Engineering	3-0-1	4
9.	PCI6I102	PC(CP)	Irrigation Engineering	3-0-1	4
10.	PCI6J001	PE(O1)	Advanced Transportation Engineering	4-0-0	4
11.	PCI6J002	PE(O1)	Pavement Design	4-0-0	4
12.	PCI6J003	PE(O1)	Mass Transit System	4-0-0	4
13.	PCI6J004	PE(O2)	Structural Dynamics	4-0-0	4
14.	PCI6J005	PE(O2)	FEM	4-0-0	4
15.	PCI6J006	PE(O2)	Prestressed Concrete	4-0-0	4
16.	PCI6L101	^SE(CP)		3-0-1	4

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6th Semester

Foundation Engineering (3-0-1)

Module:I

Lateral Earth Pressure and Retaining Structures: Concept of earth pressure, Earth pressure at rest, active and passive earth pressure for both cohesionless and cohesive soils, Earth pressure theories: Rankine's theory, Coulomb's Wedge theory, Graphical methods: Rebhan's and Culmann's graphical solutions, Stability conditions for retaining walls.

Module: II

Bearing Capacity: Definitions, Rankine's analysis, Types of failures: General and local shear failure, Terzaghi's Analysis, Brinch-Hansen analysis, Meyerhof's analysis, Vesic's bearing capacity equation, Effect of water table on bearing capacity, IS code method for computing bearing capacity, Field Methods: Plate load test and its limitations, Standard penetration test.

Shallow Foundations: Types of foundations: Spread footing, combined and strap footing, mat or raft footing, Settlement of footings.

Module: III

Deep Foundations: Difference between shallow and deep foundations, Types of deep foundations. Pile Foundations: Types of piles, pile driving, load carrying capacity of piles-static and dynamic formulae, Pile load test and its limitations, correlation with penetration tests, Group action in piles-settlement and efficiency of pile groups in clay, negative skin friction, Under reamed pile foundation. Basics of well foundation - types, component parts and ideas about the forces acting on a well foundation.

Module: IV

Subsoil Exploration: Necessity and planning for subsoil exploration, Methods - direct (test pits and trenches), indirect (sounding, penetration tests and geophysical methods).

Soil sampling – types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test, Rock coring, soil exploration report.

Rock Mechanics: Introduction, problems, defects in rock mass, joints, faults, folds, methods of geophysical prospecting, seismic and electrical method.

Text Books:

1. Principles of Foundation Engineering by B. M. Das, Cenage Learning
2. Foundation Analysis and Design by Joseph E. Bowles, Mc Graw Hill
3. Soil Mechanics And Foundation Engineering by K.R.Arora, STANDARD PUBLISHER DIST.

Reference Books:

1. Geotechnical Engineering by S. K. Gulati & Monoj Gupta, Mc Graw Hill
2. Soil Mechanics and Foundations by Dr B. C. Punmia et al., Laxmi Publications
3. Soil Mechanics & Foundation Engineering by B.N.D. Narasinga Rao, WILEY
4. Geotechnical Engineering by C. Venkatramiah, New Age International Publishers
5. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International Publishers

Irrigation Engineering (3-0-1)

MODULE-I

Introduction: Necessity of Irrigation in India, Advantages and disadvantages of Irrigation, Techniques of water distribution in farms, Quality of irrigation water.

Water requirements of Crops: Crops and crop season, Duty and Delta, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship.

MODULE-II

Canal Irrigation: Classification of canals, Canal losses, Alignment of canals, Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals

Lining of Irrigation Canals: Advantages and economics of lining, Various types of lining, Design of lined canals.

MODULE-III

Reclamation of Water Logged and Saline Soils: Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage.

Types of Cross-Drainage Works: Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works.

Diversion Head works: Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head works, Introduction to different components of a diversion head works.

Design of weirs and barrages: Bligh's creep theory, Design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, Exit gradient.

Canal Falls: Necessity, Proper location, Types, Design and detailing of one type of fall.

MODULE-IV

Gravity Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam.

Earth Dams: Types, Causes of failure, Preliminary section of an earth dam, Seepage control in earth dams

Spillways: Descriptive study of various types of spillways.

Text Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi

Reference Books:

1. Irrigation Engg. By Birdie and Das, Dhanpat Rai, New Delhi
2. Irrigation Engg. By Sharma and Sharma, S. Chanda and Company, New Delhi

Advanced Transportation Engineering (3-1-0)

MODULE-I

History of Indian railways, component parts of railway track, problems of multi gauge system, coning of wheels, alignments and survey, permanent way track components , Type of rail sections ,creep of rails, wear and failure in rails , Ballast requirements, sleeper requirements, types of sleepers, various train resistances

MODULE-II

Geometric design: Gradients and grade compensation, various speeds on a railway track, super-elevation, horizontal and vertical curves, Points and crossings, Design of simple turn-out, Signalling and interlocking,

MODULE-III

Airport site selection, Air craft characteristics, various surface of an airport, Wind rose diagram, Geometric elements of run way and taxiway , holding apron, parking configuration , terminal building , visual aids, air traffic control, airport marking and lighting.

MODULE-IV

Harbour Engineering: Classification of Harbour basin, general layout of harbours, Docks, Different components of docks.

Reference Books:

1. A text book of railway engineering , By S.C.Saxena and M.G.Arora
2. Railway Engineering by Satish Chandra & MM Agrawal, Oxford University Press.
3. Transportation Engineering, Volume-II- Railways, Airports, Docks and Harbours, Bridges and Tunnels by C. venkatramaih, Universities Press
4. Air-port Engineering by S.K.Khanna and M.G.Arora

Pavement Design (3-1-0)

Module - I

Introduction: Classification of pavements, Difference between highway and runway pavements, Factors affecting structural design, Characteristics of traffic loading, Concept of VDF and Computation of design traffic.

Module - II

Principles of pavement design: Concepts of structural and functional failures, Performance criteria; Analysis of pavements: ESWL, Analysis of flexible and concrete pavements.

Module - III

Design of pavements: IRC, AASHTO and other important methods of design of bituminous and concrete pavements.

Module - IV

Pavement evaluation techniques: Benkelman beam, Falling weight deflectometer and other equipments, Concepts of pavement maintenance management.

Reference Books:

1. Principles of Pavement Design, E. J. Yoder & M.W. Witzack, John Wiley
2. Pavement Design by R Srinivasa Kumar, Universities Press
3. Principles of Transportation Engineering, P. Chakroborty & A. Das, PHI Publication
4. Pavement Analysis and Design, Y. H. Huang, Prentice Hall

Mass Transit System

(Uploading Soon)

Structural Dynamics (3-1-0)

Module I:

Single degree of freedom system: Equation of motion, Damped and undamped free vibration, Response to harmonic, periodic, impulse load and general dynamic load, Duhamel's integral;

Module II:

Multi-degrees of freedom system: Equation of motion, Free vibration analysis, Dynamic response and modal analysis.

Module III:

Free and Forced vibration of distributed mass system: Longitudinal, flexural and torsional vibration of rods, transeverse vibration of beams. Raleigh's principle.

Module IV:

Analysis of structural response to Earthquakes: Seismological background, Deterministic analysis of Earthquake.

Reference Books:

1. Dynamics of Structures: Theory and Applications to Earthquake Engineering, A K Chropra , Prentice Hall of India
2. Theory of Vibration with application, W. T. Thomson.
3. Structural Dynamics, M Mukhopadhyay: Ane Books Pvt Ltd, New Delhi
4. Structural Dynamics - Theory and Computation, M. Paz, Van Nostrand, 1985.
5. Dynamics of structures, W. Clough and J Penzien, McGraw-Hill, Inc,

Finite Element Method (3-1-0)

Module I:

Introduction: The Continuum, Equations of Equilibrium, Boundary Conditions, Strain displacement relations, Stress strain Relations, Plane stress and plane Strain problems, Different methods of structural analysis including numerical methods. Basics of finite element method (FEM), different steps involved in FEM, Different approaches of FEM, Direct method, Energy approach, Weighted residual Method.

Module II:

One and Two Dimensional Problems: Detail formulation including shape functions. stress strain relations, strain displacement relations and derivation of stiffness matrices using energy approach, Assembling of element matrices, application of displacement boundary conditions, Numerical solution of one dimensional problems using bar, truss, beam elements and frames. Derivation of shape function using Lagrange's interpolation, Pascal's triangle, Convergence criteria.

Module III:

Finite Element modeling of two dimensional problems using Constant strain Triangle(CST) elements, Stress strain relations for isotropic and orthotropic materials, Four noded rectangular elements, axisymmetric solids subjected to axisymmetric loading.

Isoparametric Elements: Natural coordinates, isoparametric elements, four node, eight node elements. Numerical integration, order of integration.

Module IV:

Plate Bending: Bending of plates, rectangular elements, triangular elements and quadrilateral elements, Concept of 3D modeling.

Text Books:

1. C. S. Krishnamoorthy, Finite Element analysis-Theory and Programming, TMH
2. Finite Element Method, R. Dhanraj and K. P. Nair, Oxford University Press
3. Finite Element Methods for Engineers by U.S. Dixit, Cengage Learning

Reference Books:

1. R. D. Cook., Concepts and Applications of Finite Element Analysis , Wiley.
2. M. Mukhopadhyay-Matrix and Finite Element Analysis of Structures
3. O. C Zienkiewicz .and R. L. Taylor, Finite Element Method, Mc Graw Hill
4. Introduction to Finite Elements in Engineering, T.P. Chandrupatla and A.D. Belegundu
5. Finite Element Analysis in Engineering Design, S. Rajasekharan.

Prestressed Concrete (3-1-0)

Module I

Prestressing system, materials and codes: Basic concept, Losses of prestress, analysis of prestress and bending stresses. Need for high strength steel and concrete. Advantages and applications. Pre-tensioning and post tensioning systems.

Module – II

Design of beams : Analysis and design of section for bending and shear, pressure line, concept of load balancing, cracking moment, bending of cables, limit state analysis and design, anchorage zone stresses, design of end block, Application to bridges.

Module –III

Selection of prestress concrete members, short term and long term deflections of uncracked members.

Module –IV

Flexural strength of prestressed concrete sections

Continuous beams, Design concept concordancy of cables, Secondary design consideration. Design pre-tensioned and post tensioned beam

Reference Books:

1. Prestressed Concrete, Raju,N.K., Tata McGraw Hill
2. Prestressed Concrete, T. Y. Lin

Application of Matrix Method in Structural Analysis (4-0-0)

Module I

Introduction to Flexibility Matrices and Stiffness Matrices, Static and kinematic indeterminacy - properties of stiffness and flexibility matrices, concept of co-ordinates, solution of simple problems.

Module II

Analysis of Beams: Flexibility and stiffness matrices for beams, solution of problems, bending moment diagram

Analysis of Plane Truss: Flexibility and stiffness matrices for plane truss, solution of problems, internal forces due to thermal expansion, lack of fit.

Module III

Analysis of Plane Frame: Flexibility and stiffness matrices for plane frame, solution of problems, bending moment diagram.

Module IV

Use of Software Packages

Analysis of beam, plane truss & plane frame by STAAD-PRO.

Reference Books

1. Mukkopadhyay M and Sheikh A.H (2004) Matrix and Finite element analyses of structures, First edition, Ane Books Pvt. Ltd.
2. Pandit G.S., & Gupta S.P. (1998), Structural Analysis (A matrix approach), Tata McGraw Hill Publishing Ltd.

Earthquake Engineering (4-0-0)

Module I

Elements of Earthquake origin & Propagation: Elements of Seismology, Earthquakes, Structure of the Earth, History of the Earth, Earthquake Mechanism, Propagation of Seismic Waves , Earthquake Phenomena, Earthquake Measurements, Definitions of magnitude, intensity, epicenter etc; Plate tectonics, seismographs, liquefaction, Types, effects and controlling factors

Module II

Theory of Vibration Effects: Dynamic Loads. D'Alembert's Principle and inertia forces, Stiffness and flexibility of elastic structures, Theory of Vibrations, Free vibrations of single and multiple degree freedom systems, computations of dynamic response to time dependent forces, mass and stiffness matrices, natural frequencies, Plate Tectonics Theory.

Module III

Earthquake Resistant Design: Principles of Earthquake Resistant Design, Response spectrum theory. Time – Acceleration method, Application of response spectrum theory to seismic design of structures.

Module IV

Earthquake Damages: Earthquake Damages to Various Civil Engineering Structures, Case Histories Earthquake, Earthquake response of structures, Soft storey collapse, Slender structures, unsymmetrical structures

Methods of disaster prevention: Earthquake resistant building Regulations, specification, guidelines for construction – Materials selection.

Reference Books

1. A K. Chopra (2003), Dynamics of Structures-Theory and Applications to Earthquake Engineering, Second Edition, Printice-Hall India Pvt Ltd.
2. Pauley & Priestly (1995), Seismic design of reinforced concrete and masonry buildings, John Wiley & Sons.
3. Stratta.J.L. (2000), Manual of Seismic Design, Prentice-Hall India Pvt Ltd.
4. Kramer.S.L. (2000), Geotechnical Earthquake Engineering, Prentice-Hall India Pvt Ltd.
5. Agarwal & Shrinkhardo (2006), Earthquake Resistant design of a structures, Prentice-Hall India.
6. Earthquake Resistant Design of Structures, S.K.Duggal, Oxford University Press

Town Planning (4-0-0)

Module – I

Principles of architectural design –primary elements, form, space, organization, circulation, proportion and scale, ordering principles.

Functional planning of buildings: Planning, designing and construction, General building requirements, Permit and Inspection (as per the National building Code)

Module – II

Town Planning ; Evolution of towns : History and trends in town planning:-origin and growth, Historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town

Module – III

New Concepts in town planning : Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning.

Module – IV

Planning Principles, Practice and Techniques: Elements of City plan, Estimating future needs, Planning standards, Zoning:- its definition, procedure and districts, height and bulk zoning, F.A.R., Master Plan; Concepts of urban planning , design and landscaping.

Reference Books:

1. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design - C B S publishers.
2. D. K. Francis Ching, Architectures: Form, Space and Order, John Wiley.
3. S. Eisner, A. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design, JohnWiley

B.Tech(Civil Engineering) Detail Syllabus For Admission Batch 2015-16

Semester : 7th

1.	PCI7C001 GS(CP)	Nano & Bioscience	4-0-0	4
2.	PCI7D001 Honours (O5)	Water Resources System and Management	4-0-0	4
3.	PCI7D002 Honours (O5)	Advanced Design of Reinforced Concrete Structures	4-0-0	4
4.	PCI7D003 Honours (O5)	Computational Fluid Dynamics	4-0-0	4
5.	PCI7G001 Minor(CP)	Design of Concrete Structures	4-0-0	4
6.	PCI7H001 OE(O4)	Soft Computing	4-0-0	4
7.	PCI7H002 OE(O4)	Other subjects	4-0-0	4
8.	PCI7H201 FE(CP)	Projects on Internet of Things	0-0-4	4
9.	PCI7I201 PC(O3)	Advance Lab - II	0-0-4	4
10.	PCI7I202 PC(O3)	Project	0-0-4	4
11.	PCI7J001 PE(O1)	Architecture & Town planning	4-0-0	4
12.	PCI7J002 PE(O1)	Ground improvement Technique	4-0-0	4
13.	PCI7J003 PE(O1)	Soil Dynamics & Machine Foundation	4-0-0	4
14.	PCI7J004 PE(O2)	Environmental Impact Assessment	4-0-0	4
15.	PCI7J005 PE(O2)	Industrial Waste Management & Disposal	4-0-0	4
16.	PCI7J006 PE(O2)	Quantity Surveying & Estimating	4-0-0	4

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Semester : 8th

1.	PCI8I201 PC(O1)	Entrepreneurship Training cum Project	0-0-20	20
2.	PCI8I202 PC(O1)	Startup Training cum Project	0-0-20	20
3.	PCI8I301 PC(O1)	Industrial Training cum Project	0-0-20	20

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