

Academic Scheme

for

B.TechCivil Engineering

Four Years Programme

Syllabus for `

(V– VIII Semesters- for Batch 2013-2014)



**Department of Civil Engineering IUST,
Awantipora, Pulwama -192122**

OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2013-2014

Semester-V

Course Code	Course Title	L – P	Credit
CE 501T	Design Of Concrete Structures I	4 – 0	4
CE 502T	Geotechnical Engineering- I	4 – 0	4
CE 503T	Water supply & Sanitary Engineering	4 – 0	4
CE 504T	Engineering Geology & Seismology	4 – 0	4
CE 505T	Architecture & Town Planning	4 – 0	4
CE 506T	Traffic Engineering & Transportation Facilities	4 – 0	4
CE 507P	Geotechnical Lab I	0– 2	1
CE 508P	Water Quality Lab	0 – 2	1
CE 509P	Geology Laboratory	0 – 2	1
	Total Credits	24 - 6	27

Semester-VI

Course Code	Course Title	L – P	Credit
CE 601T	Design Of Steel Structures	4 – 0	4
CE 602T	Geotechnical Engineering-II	4 – 0	4
CE 603T	Transportation Engineering-I (Highway & Pavement Management System)	4 – 0	4
CE 604T	Water Resources Engineering	4 – 0	4
CE 605T	Advanced Structural Analysis	4 – 0	4
CE 606T	Quantity Survey & Cost Estimation	4 – 0	4
CE 607P	Geotechnical Lab II	0– 2	1
CE 608P	Transportation Lab	0 – 2	1
	Total Credits	24 - 4	26

OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2013**Semester-VII**

Course Code	Course Title	L - P	Credit
CE 701 T	Design of Concrete Structure-Ii	4 - 0	4
CE 702 T	Structural Dynamics	4 - 0	4
CE 703 T	Irrigation & Flood Structures	4 - 0	4
CE 704 T	Environmental Engineering	4 - 0	4
	Elective Courses		
	Course	Prerequisite	
CE 705 T: E1	Civil Engineering Management	Civil Engineering Background	4 - 0
	Railway & Airport Engineering	Transportation Engineering-I	
CE 706 T : E2	CADD	Engineering Background	4 - 0
	Pre-Stressed Concrete Structures	Concrete Technology & Design	
CE 707 P	Seminar	0 - 2	1
CE 708 P	Pre-Project Work	0 - 4	2
	Total Credits	24 - 6	27

SEMESTER-VIII

Course Code	Course Title	L - P	Credit
CE 801 T	Design of Bridge Structures	4 - 0	4
CE 802 T	Hydropower Engineering	4 - 0	4
CE 803 P	Project	5 - 10	10
CE 804 P	Tour & Training	-	2
CE 805 P	Professional viva-voce	-	2
	Elective Courses		
	Course	Prerequisite	
CE 806 T : E1	Earthquake Resistant Design	Structural Dynamics & Concrete Design	4
	Transportation Planning & Economics	Transportation Engineering-I	
CE 807 T : E2	Operation Research	Transportation Engineering-I, Advanced Structural Analysis, Geotechnical Engineering I & II	4
	Rock Mechanics & Tunneling Technology	Civil Engineering background	
	TOTAL CREDITS	21 - 10	30

OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-Batch 2013 &2014

Semester-V

Course Code	Course Title	L – P	Credit (L+P)
CE-501T	Design Of Concrete Structures-I	4 – 0	4
CE-502T	Geotechnical Engineering- I	4 – 0	4
CE-503T	Water supply & Sanitary Engineering	4 – 0	4
CE-504T	Engineering Geology & Seismology	4 – 0	4
CE-505T	Architecture & Town Planning	4 – 0	4
CE-506T	Traffic Engineering & Road Planning	4 – 0	4
CE-507P	Geotechnical Lab I	0– 2	1
CE-508P	Water Quality Lab	0 – 2	1
CE-509P	Geology Laboratory	0 – 2	1
	Total Credits	24 - 6	27

CE-501T-Design of Concrete Structures-I

L – P

4 –0

Credits: 4

UNIT I: PROPERTIES OF CONCRETE AND REINFORCING STEEL AND GENERAL DESIGN PHILOSOPHIES-

Characteristic strength, stress-strain curves, IS specifications. Working stress, ultimate load & limit state method of design. Analysis & design of structures in flexure/torsion by limit state method.

UNIT II: DESIGN & ANALYSIS OF BEAMS

Flexural behavior, analysis & Flexural design of Rectangular, T & L Sections; codal Provisions. Behavior of Beams in shear and Bond, design for shear, anchorage & slipping of reinforcement. Torsion of Beams and design; Detailing of reinforcement as per codal provisions with reference to IS:456. Serviceability limit state of deflection & cracking. Calculation of deflection, codal requirements.

UNIT III: DESIGN OF COLUMNS

RCC Column types: Short & long Columns, Uni-axial and bi-axial eccentrically loaded columns; Design of RCC columns; Helical Reinforcement and Transverse Reinforcement; Longitudinal reinforcement

UNIT IV: DESIGN OF SLABS

Design of one way and two way slab, with and without corners held down. Introduction to design by moment coefficients method. Concept of Flat Slabs.

UNIT V: DESIGN OF FOOTINGS

Isolated footings design. Design for Wall load, column loads. Design for varying Soil types and water table conditions.

BOOKS RECOMMENDED:

1. Design of Reinforced Concrete & Pre-Stressed Concrete Structures by Kong & Evans.
2. Design of Reinforced Concrete: Limit State Design by A.K.Jain.
3. Design of RCC Structures by Sinha.
4. Design of RCC Structures by Karve & Shah.
5. Reinforced Concrete Design by Pillia Menon.
6. Treasure of RCC Design by Sushil Kumar.
7. IS Code 456-2000.

CE-502T- Geo-Technical Engineering-I

L – P

4 –0

Credits 4

UNIT I: INTRODUCTION

Soil and its formation, various agencies for formation; Types of Soils. Three phase soil Model, Index properties and classification of soils.

UNIT II: SOIL HYDRAULICS

Flow through soils, Darcy's Law. Permeability Factors and determination in the lab/Field. Steady state Flow, seepage force, Laplace equation for steady state flow, flow nets, for homogenous embankments with & without toe filters.

UNIT III: SOIL CONSOLIDATION & COMPACTION:

One Dimensional consolidation, Terzaghi's equation, Consolidation test, e log p curves. Consolidation settlement, time required for settlement

Compaction, laboratory compaction tests, proctor compaction, compaction curve and control on field compaction.

UNIT IV: EFFECTIVE STRESS & STRESS DISTRIBUTION:

Total & effective stresses, Pore Water pressure, Stress distribution under concentrated load. Westergard's and Boussineq's method

UNIT V: SOIL INVESTIGATION & CLAY MINERALOGY:

Laboratory & Field Investigation. Sub-soil exploration, Penetration methods, Geo-Physical methods, electromagnetic method, electric resistivity method and Seismic method.

Minerals Present in clay, dependence of behavior of clay on type of mineral.

BOOKS RECOMMENDED:

1. Soil Mechanics by Alam Singh
2. Theoretical Mechanics by Terzaghi & Peck
3. Soil Mechanics by S.B. Saighal
4. Geotechnical Engineering by Purushotama Raj
5. Geotechnical Engineering by C.Venkataramiah
6. Geotechnical Engineering by K.R.Arora.
7. Geotechnical Engineering by S.K.Garg.

CE-503T-Water Supply & Sanitary Engineering

L – P

4 –0

Credits 4

UNIT I: WATER QUALITY

Water Quality parameters, methods for physico-chemical analysis of water, Limits & their significance, National & International Standards.

UNIT II: WATER CONSUMPTION & WATER DISTRIBUTION

Consumption for various uses, variation in Demand & Supply. Methods & modes of supply, Population forecasting methods, Sources of supply.

Distribution system, Patterns of Distribution, Pipe and pump design. Various losses in the Pipe system, types of pipes and Joints.

UNIT III: TREATMENT PROCESS

Design of various units, i.e; screens, sedimentation units, clarification, filtration. Slow Sand and Rapid Sand Filters. Coagulation, flocculation, screening, softening, filtration equipments.

UNIT IV: MISC TREATMENTS

Water softening, disinfection processes/units and their design. Misc. Treatment processes like aeration, addition of Fluorides, iodine, re-carbonation, etc.

UNIT V: SANITATION

Sanitation of Buildings, ill effects of Poor sanitation, diseases associated with poor sanitation, lighting, heating and ventilation of various types of buildings.

Recommended plumbing fixtures as per codes.

Public awareness programmes for Rural & Urban Sanitation.

Role of a civil Engineer in promoting sanitation awareness.

BOOKS RECOMMENDED:

1. Water supply Engineering by P.N.Modi
2. Water supply & sewerage by E Steel
3. Water supply Engg. By Punmia
4. Water supply & Sanitary Engg by S K Hussain.

CE-504T-Engineering Geology & Seismology

L – P

4 –0

Credits: 4

UNIT I:

Geology and its relevance to civil engineering, geological work of wind, rivers and glaciers types/field classification of rocks, origin of soils

UNIT II:

Structural Geology; Folds, Faults and Mechanism of Faulting, Joints, Unconformities.

UNIT III:

Engineering Geology; geological considerations in tunnels, dams, bridges, building sites; landslides.

UNIT IV:

Earthquakes; types and causes, distribution in the world, basic definitions, seismic zones.

UNIT V: SEISMOLOGY

Engineering Seismology (Definitions), Introduction to Seismic Hazards and Earthquake Phenomenon. Geographical Distribution of Earthquakes and Seismo-tectonics. Warning systems; Global network; Monitoring of Earthquakes, Seismic Instrumentation.

BOOKS RECOMMENDED

1. Engineering Geology by Parbin Singh
2. Physical Geology by Arthur Holmes
3. Engineering Geology by F.G. Bell
4. Engineering Seismology by PN Aggarwal.
5. An introduction to Seismology, Earthquakes & Earth Structures by Sethstein & Michael Wyssession

CE-505T-Architecture & Town Planning

L – P

4 –0

CREDITS 4

UNIT I: ARCHITECTURE

Architecture & Civil Engineering, classical Architecture, contemporary Architecture, General aspects of Architectural projects.

Architectural planning and design-Introduction, factors affecting Architectural Design, principles of Architectural design, organization of space, space standards, modular co-ordination.

UNIT II: FUNCTIONAL ANALYSIS

Analytical study of Buildings in respect of functional efficiency, Architectural efficiency, Building Science, environmental controls-both exterior and interior, physical and economic constraints with respect to residential and Public buildings, DhajjiDewari and Takh System.

UNIT III: ARCHITECTURAL PLANS AND PROJECTS

Introduction to Architectural plans, preparation and reading of architectural plans, analytical study of various works/projects of some architects like LE Corbusier, Philip Jhonson, F.L.Wright, etc.

UNIT IV: TOWN PLANNING

Planning at various levels-national, regional, city, village.

Origin & growth of towns, Horizontal and Vertical development.

Brief historical review of some ancient towns, present day planning in India.

UNIT V: MASTER PLAN & ZONING

Importance of Master Plan for redevelopment of existing towns & planning of new towns, implementation, building Bye-Laws, concept of Red-hood Neighbourhood Pattern.

Zoning Regulation for various urban land uses including density and height zoning, multi-story buildings and their implications on urban planning.

BOOKS RECOMMENDED-

1. Architectural Design by KR Moudgil
2. Town Planning by Rangawala
3. Town Design by Fredrick Gibberd
4. New concepts in Architecture & design by Yoshikawa

CE 506 T-Traffic Engineering & Transportation Facilities

L – P

4 – 0

Credits: 4

UNIT I:

Components of traffic system- vehicle characteristics; human characteristics, road characteristics & traffic-control devices

UNIT II:

Intersections- signalized intersections, channelization and roundabouts, interchanges-requirement & design.

UNIT III:

Traffic signs- role and types, signalized intersections, signal timing design; signal coordination

UNIT IV:

Traffic flow theory-flow parameters; fundamental relation of traffic flow, road capacity and level of service concept

UNIT V:

Parking facilities- parking demand, on-street parking, off-street parking.

Traffic Safety: Accident Analysis, Traffic safety issues, countermeasures.

ESSENTIAL READINGS:

1. Transport New York; Toronto.Planning and Traffic Engineering by CA O’Flaherty, John Wiley & Sons, Inc.,
2. Traffic Engineering by McShane&Roess, Prentice-Hall of India Private Ltd, New Delhi-110001.
3. Principles and Practices of Highway Engineering by Kadiyali&Lal, Khanna Publishers, Delhi-6
4. Principles of Transportation Engineering by Chakarborty& Das, Prentice-Hall of India Private Ltd, New Delhi-110001
5. Traffic Engineering and Transport Planning by L. R. Kadiyali, Khanna Publishers, 2-B , NaiSarak, Delhi-110006

CE-507P-Geo-Technical Lab-I

L – P

0 –2

Credits1

LIST OF EXPERIMENTS:

1. Determination of water content, bulk density and specific gravity.
2. Soil Gradation by Sieve analysis and Hydrometer analysis.
3. Consistency limits: Determination of Plastic, liquid and shrinkage limits.
4. Determination of Permeability by falling Head and Constant Head Method.
5. Conduction of 1-D consolidation.
6. Conduction of Standard Proctor Compaction Test.
7. Rapid Control Compaction test as per USBR.

CE-508P-WATER QUALITY LAB

L – P

0 –2

Credits1

LIST OF EXPERMENTS:

1. To determine the total solids, suspended solids and dissolved solids for a given sample of water.
2. To determine the alkalinity of a given sample of water.
3. To determine the total hardness and the carbonate hardness for a given sample of water.
4. To determine the turbidity of a given sample of water.
5. To find the color and odor of a given sample of water.
6. To determine the percentage of Magnesium, Calcium, Iron, Silica and Aluminium in a given sample of water.
7. To determine the percentage of Sulphates, Chlorides, Iodide and Fluoride.
8. To determine the percentage of Na and K in a given sample of water.
9. To determine the concentration of dissolved oxygen in a given sample of water and find out the oxygen consumed.
10. To determine the percentage of Ammonia and Nitrogen present in a given sample of water.

CE-509P-Geology Laboratory

L – P

0 –2

Credits1

LIST OF EXPERIMENTS:

1. The study of Physical Properties of Minerals.
2. Determination of specific Gravity by:
 - a. Jolly's Spring Balance
 - b. Walker's Steel Yard Balance
 - c. Beam Balance
3. Study of Rocks and their characteristics.
4. Study & Sketching of various types of Geological structures.
5. Determination of Dip and Strike with a clinometer Compass.

OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING

Semester-VI

Course Code	Course Title	L – P	Credit
CE 601T	Design Of Steel Structures	4 – 0	4
CE 602T	Geotechnical Engineering-II	4 – 0	4
CE 603T	Transportation Engineering-I (Highway & Pavement Management System)	4 – 0	4
CE 604T	Water Resources Engineering	4 – 0	4
CE 605T	Advanced Structural Analysis	4 – 0	4
CE 606T	Quantity Survey & Cost Estimation	4 – 0	4
CE 607P	Geotechnical Lab-II	0– 2	1
CE 608P	Transportation Lab	0 – 2	1
	Total Credits	24 - 4	26

CE-601T-Design of Steel Structures

L – P

4 –0

Credits 4

UNIT I: CONCEPTS OF DESIGN OF STEEL STRUCTURES

Structural steels and their properties. Working stress and Plastic design concepts. Riveted, bolted and welded connections and their design. Design of Eccentric Connections.

UNIT II: DESIGN OF TENSION MEMBERS

Limit State design of tension members, plates, angles; Design of cables and of other tension members; Codal Provisions.

UNIT III: DESIGN OF FLEXURAL MEMBERS

Design of axial and flexural forces, Design of flexural member: Steel beams, built-up sections. Design of Plate Girders with stiffeners

UNIT IV: DESIGN OF COMPRESSION MEMBERS

Buckling phenomenon of compression members. Design of Struts, purlins; built up sections, lacings and battens.

UNIT V: DESIGN FOR STABILITY

Design of column bases & grillage foundation; beam-column joint; slab base and stability consideration.

BOOKS RECOMMENDED:

1. Design of Steel structures (Vol I & II) by Ramachandra
2. Design of Steel Structures by Arya&Ajmani
3. Design of Steel Structures by Duggal
4. Design of Steel Structures by Vizrani&Ratwani
5. Design of steel structures by Negi
6. Design of steel structures by Gaylord
7. Design of wooden structures by Donald Breyer, Kinneth Fridley, Kelly Cobeen, Jr. pollock
8. Design of Steel Structures by Subramanyam
9. IS code 800-2007.

CE-602T-GEOTECHNICAL ENGINEERING-II

L – P

4 –0

Credits 4

UNIT I: SHEAR STRENGTH

Shear Strength concept, Mohr's Columb equation, laboratory determination. Tri-axial compression test under different Drainage conditions, viz; undrained, drained and consolidated, direct shear test. Unconfined compression test. Strength envelope.

UNIT II: BEARING CAPACITY & FOUNDATION

Basic definitions and methods of determination.Prandtl'ssolution.Terzaghi's solution for ultimate bearing capacity.Sizeeffects.Effects of rigidity of footings.Plate load test.

UNIT III: FOUNDATION DESIGN (GEOTECHNICAL ASPECTS)

Basic terminology, bearing capacity of shallow foundations.Importance and types of foundations. Design principles for footings and rafts. Foundations on clays and sands.Foundations-types and applications. Pile foundation types. Classification and determination of load carrying capacity, dynamic and static methods. Pile load test, pile groups, efficiency of pile groups.

UNIT IV: EARTH PRESSURE AND EARTH STABILIZATION

Lateral earth pressure. Rankine's Theory of Active and Passive states. Lateral earth pressure under various conditions-like surcharge, sloping backfill and high water table behind the wall. Earth pressure diagrams, total thrust. Tension cracks and bracing of excavations.

Methods of Stabilization.Brief introduction to each of the methods of the methods of stabilization such as Shot-creting, geo-reinforcement.

UNIT V: STABILITY OF SLOPES AND SOIL DYNAMICS

Infinite slopes, conjugate stresses, stability number. Swedish and French circle methods. Submergence case, complete Draw-down case. Steady seepage case.

Dynamic behavior of soils and its impact on Foundation design.

BOOKS RECOMMENDED:

1. Soil mechanics by Alam Singh
2. Soil mechanics & Foundation Engineering by K.R.Arora
3. Soil Mechanics by S.B.Saighal
4. Soil Mechanics and Foundation Engineering by P Purushotham
5. Soil Mechanics and Foundation Engineering Engineering by S.K.Garg

CE603T-Transportation Engineering-I

L – P

4 – 0

Credits:4

UNIT-I: Scope, history, classification of roads. Comparison with other modes of transportation

UNIT-II: Alignment design: route survey and highway location. Geometric design : cross section elements; sight distances, horizontal and vertical alignment

UNIT-III: Pavement design: factors effecting pavement design, types of pavements, Empirical methods of flexible pavement design (e.g C.B.R, GROUP INDEX AND Burmister's layer theory) stress due to load and temperature in rigid pavements, introduction to design methods of rigid pavements

UNIT-IV: Highway materials and construction: Properties and tests for road aggregates and bituminous materials, design of bituminous concrete mix, methods of preparing subgrade, base course and construction of various types of surface covers, joints in cement concrete roads.

UNIT-VI: Pavement management system: basic concept, data requirements & collection methods, maintenance and rehab treatments, priority programming, implementation of PMS

BOOKS RECOMMENDED:

1. Khanna, S.K. and Justo, C.E.G. 2002. "Highway Engineering". Nem Chand Brothers, Roorkee.
2. Bhanot, K.L. 1990. " Highway Engineering", S. Chand and Company (P) Ltd., New Delhi.
3. Rao, G.V. 1996. "Principles of Transportation and Highway Engineering", Tata McGraw Hill, New Delhi
4. Pavement Design and Management Guide by Transportation Association of Canada, Ottawa, Ontario, Edn. Dr. Ralph Haas,

CE-604T-Water Resources Engineering

L – P

4 –0

Credits 4

UNIT I: HYDROLOGY

Scope and applications of Hydrological cycle; precipitation measurement by rain Guages, guagenetworks. Hyetographs and methods of determining mean rainfall.

Hydrological Abstractions: Evaporation, Transportation, Interception, Depression storage, Infiltration.

UNIT II: STREAM FLOW

Factors affecting Runoff.Rainfall-Runoff relationships. Unit Hydrograph, Peak Flow, low flows, requirements for Hydrological design, velocity & Discharge measurements.

UNIT III: FLOOD ESTIMATION AND GROUND WATER

Occurrence and distribution of floods; various methods of flood estimation; viz. rational method and Unit hydrograph method, etc.

Occurrence and distribution of ground Water, specific yield of acquifers, movement of ground water.Darcy's Law, safe yield of a basin, steady flow in a well for confined and unconfined acquifers.

UNIT IV: FLUVIAL HYDRAULICS

Principles of sediment transport, critical tractive force, Shield's plot, Bed and suspended load. Bed movement, Einstein's Analysis, White's Theory, Rigid and loose Boundaries.

UNIT V: RESERVOIR DESIGN STUDIES

Area-Volume curves, types of reservoirs and zones of storage, storage capacity of reservoirs. Mass-curve technique, reservoir flood routing, sedimentation of reservoirs.

BOOKS RECOMMENDED:

1. Irrigation, Water Power & Water Resources Engineering by K.R.Arora
2. Engineering Hydrology by K Subramanya
3. Engineering Hydrology by EM Wilson
4. Mechanics of sediment transportation and alluvial stream problems by RJ Garde& KG Rangaraju
5. Hydrology Principles Analysis & design by HM Ragunath
6. Applied Hydrology by K Linsley, A Kohler, LH Paulhus
7. Hydrology & Water Resources Engineering by SK Garg

CE-605T-Advanced Structural Analysis

L – P

4 –0

Credits 4

UNIT I: MATRIX METHODS OF STRUCTURAL ANALYSIS

Introduction to matrix stiffening & Flexibility Methods. Formulation of Stiffness matrix for simple Planar Elements- Trusses & Beams.

UNIT II: APPLICATION OF MATRIX METHOD OF STRUCTURAL ANALYSIS

Analysis of Planar Trusses & Beams using Direct Stiffness method. Application of matrix displacement method to rigid Jointed frames.

UNIT III: FINITE ELEMENT METHOD

Introduction to Finite Element Method of Structural Analysis. Review of principle of Virtual work.

UNIT IV: APPLICATION OF FINITE ELEMENT METHOD OF STRUCTURAL ANALYSIS

Formulation of Element Stiffness Matrix for 1D Bar & Beam Element. Application of Finite Element Method of structural Analysis to beams and frames.

UNIT V: FINITE ELEMENT METHOD APPLIED TO HIGHER ORDER

Application to Bar Elements with varying area of cross-section and Beams with varying Moment of inertia.

Plane Stress & plane Strain Problems. Use of Higher order Elements.

BOOKS RECOMMENDED:

1. Finite Element Method by Deb Debasis
2. Theory of Structures by Ramamurathan
3. Matrix Analysis of Framed Structures by Harry h. West
4. Concepts & Applications of Finite Element Analysis by Robert D Cook
5. Basic Structural Analysis by CS Reddy

CE-606T-Quantity Survey & Cost Estimation

L – P

4 –0

Credits 4

UNIT I: ESTIMATE

Importance, items of a work and their units. Types of Estimate, viz; preliminary; approximate; Abstract estimate; plinth area estimate; detailed estimate; revised estimate; supplementary estimate, bill of quantities and abstract of cost.

UNIT II: ANALYSIS OF RATES

Preparing of rates, Labour schedule, material schedule and rate schedule. Analysis of rates-of lime concrete in Foundation; Brickwork in foundation in superstructure; stone masonry; RCC masonry; RCC work; RB work; Plastering; Pointing; white washing; colour; washing; painting; woodwork; earthwork in foundation; earthwork in road; DPC; steel work for reinforcement; steel work in trusses; woodwork in frames, shutters, etc.

UNIT III: SPECIFICATIONS & WORKS ESTIMATE

General specifications & detailed specifications, Book of specifications, specifications, specifications for earthwork in foundation; LC in foundation; RCC work; Brick work; RB work; woodwork in doors, windows, etc. DPC centering & shuttering; earthwork in canal & road.

Estimates of building; Estimates of walls; methods of building estimate; Longwall, shortwall & centerline methods; Estimate of masonry platform; estimate of a masonry tank, estimate of roof trusses; Estimate of a single roomed building; estimate of a 2 roomed building with CGI roof over wooden trusses and over steel truss; estimate of a shop; estimate of a RCC Beam; RCC slab.

UNIT IV: ESTIMATE OF ROAD

Methods of estimate; materials for different items of works and labour; methods of estimating earthwork; estimate of a metalled road.

UNIT V: VALUATION & RENT FIXATION

Valuation of building various methods; rent fixation, plinth area requirements.

BOOKS RECOMMENDED-

1. Estimating & Costing by Datta
2. Estimating & Costing by Mahajan
3. Estimating, Costing & Valuation by SC Rangawala

CE-607P-Geo-Technical Laboratory II

L – P

0 –2

Credits1

LIST OF EXPERIMENTS:

1. Shear strength tests:
 - a. Unconfined Compression Test
 - b. Direct Shear Test
 - c. Tri-axial Compression test (UU)
 - d. Vane Shear Test.

Conduct and determination of Shear Parameters.

2. Conduct of Plate Load Test
3. Conduct of SPT
4. Sub-soil exploration by electric resistivity method

CE-608P-Highway Laboratory

L – P

0 –2

Credits1

LIST OF EXPERIMENTS:

1. TESTS ON AGGREGATE-

- a. Aggregate grading
- b. Specific Gravity
- c. Crushing
- d. Abrasion
- e. Impact
- f. Soundness
- g. Flakiness
- h. Shape
- i. Fineness Modulus
- j. Silica content
- k. Silt content,
- l. Alkalinity.

2. TESTS ON BITUMEN-

- a. Viscosity
- b. Penetration,
- c. Softening point
- d. Flash & Fire Point.
- e. Ductility,
- f. specific gravity,
- g. elastic recovery,
- h. marshall stability

3. TESTS ON SUB-GRADE-

- a. Sub-grade Modulus
- b. CBR.

Books recommended:

1. Khanna, S.K. and Justo, C.E.G. 2002. “Highway Engineering”.Nem Chand Brothers, Roorkee
- 2.Highway Materials and Pavement Testing by Khanna, Justo &Veeraragavan, Nem Chand Brothers, Roorkee
- 3.Material Testing Laboratory Manual by Kukreja, Kishore &Chawla, Standard Publishers, NaiSarak, Delhi

OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING

Semester-VII

Course Code	Course Title		L - P	Credit
CE 701 T	Design of Concrete Structure-Ii		4 - 0	4
CE 702 T	Structural Dynamics		4 - 0	4
CE 703 T	Irrigation & Flood Structures		4 - 0	4
CE 704 T	Environmental Engineering		4 - 0	4
Elective Courses				
	Course	Prerequisite		
CE 705 T: E1	Civil Engineering Management	Civil Engineering Background	4 - 0	4
	Railway & Airport Engineering	Transportation Engineering-I	4 - 0	
CE 706 T : E2	CADD	Engineering Background	4 - 0	4
	Pre-Stressed Concrete Structures	Concrete Technology & Design	4 - 0	
CE 707 P	Seminar		0 - 2	1
CE 708 P	Pre-Project Work		0 - 4	2
	Total Credits		24 - 6	27

CE-701 T-Design of Concrete Structures-II

L – P

4 –0

Credits: 4

UNIT I: FOUNDATIONS

Various types of RCC footings, Design of combined footings. Introduction to Raft foundation and design procedure as per IS: 456-2000.

UNIT II:RETAININGWALLS

Stability analysis of retaining walls, design of cantilever and counter-fort type RCC retaining walls.

UNIT III: WATER RETAINING STRUCTURES

Design of underground, circular & rectangular water tanks with reference to IS: 3370.

UNIT IV: PRE-STRESSED CONCRETE

General principles, methods of pre-stressing, pre-tensioning & post-tensioning, losses in pre-stress. Design of rectangular, T & I section beams.

UNIT V: SHELL STRUCTURES

Membrane analysis of spherical & conical domes by static methods. Design of domes & ring beams, Analysis of Plate Structures.

BOOKS RECOMMENDED

1. Design of footings by Kurien
2. Design of RCC structures by Jain & Jai Krishan
3. Pre-stressed concrete structures by Krishna Raju
4. Relevant IS codes & specifications

CE-702T -Structural Dynamics

L – P

4 –0

Credits: 4

UNIT I:

Dynamic, earthquake & blast loading. Single degree of freedom systems. Equation of motion, problem statement and solution methods. Free vibrations- Un-damped and Damped free vibrations.

UNIT II:

SDOFS with Harmonic and periodic excitations and their responses- Damped and Un-damped systems. Response to periodic excitations- Fourier series representation. Arbitrary, step and pulse excitations and their responses.

UNIT III:

Numerical Evaluation of dynamic response; Time stepping methods central difference method and Newmark's method.

UNIT IV:

Earthquake response of linear systems- Equation of motion, response quantities, response history, response spectrum concept. Deformation, Pseudo-velocity and pseudo-acceleration response spectra. Peak structural response from response spectrum. Response spectrum characteristics. Design spectrum and comparison. Introduction to Earthquake codes.

UNIT V:

Multi Degree of freedom systems- Two story shear building; General approach of linear systems; static condensation. Free vibration- natural vibration frequencies and modes and free vibration response. Undamped and damped systems.

BOOKS RECOMMENDED

1. Dynamics of structures by Anil K. Chopra
2. Dynamics of structures by Clough & Penzien
3. Structural Dynamics by Mario Paz

SUPPLEMENTARY READING:

1. S. P. Timoshenko and D. H. Young, Vibration Problem in Engineering, D. Van -Nostrang Company. Inc. Affiliated East-West Press Pvt. Ltd., New Delhi.

CE-703T-Irrigation & Flood Structures

L – P

4 –0

Credits: 4

UNIT I: GENERAL INTRODUCTION

Necessity of Irrigation in India, advantages and disadvantages of Irrigation, Techniques of water distribution in farms, Soil moisture & crop water requirements; Duty, Delta, Consumptive use, irrigation requirements.

UNIT II: CANAL IRRIGATION

Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses; design of channels by regime & semi-theoretical approaches; canal lining

UNIT III: CROSS DRAINAGE WORKS

Necessity of Cross Drainage works, their types & selection; Design of various types of Cross Drainage works- Aqueduct, Syphon Aqueduct, Super passage, siphon, Level Crossing.

UNIT IV: DIVERSION HEADWORKS

Parts of diversion headworks, types of weirs and barrages, introduction to design of weirs on permeable foundations, control of silt entry into canal, silt excluders & their types.

UNIT V: WATER LOGGING & FLOOD CONTROL

Causes & preventive measures of water logging , Drainage of irrigated lands, saline & alkaline lands. Flood problems, types of floods, Flood control measures.

BOOKS RECOMMENDED

1. Arora, K.R. “ Irrigation Water power & water Resources Engineering”, standard publishers Distributors, Delhi, 2002.
2. B. Singh, *Irrigation Engineering*, Nem Chand and Sons, Roorkee.

SUPPLEMENTARY READING:

1. Varshney & Gupta, *Theory and Design of Irrigation Structures*, Nem Chand and Bros, Roorkee.
2. I. E. Hook, *Irrigation Engineering*, John Wiley and Sons, New York.
3. J. D. Zimmerman, *Irrigation*, John Wiley and Sons, New York.

CE-704T-Environmental Engineering

L – P

4 –0

Credits: 4

UNIT I: ENVIRONMENTAL POLLUTION

Importance of clean environment, Sources of pollution to land, water & air, General effects of pollution, pollution by sewage, calculation of storm water & sewage, pollution of water resources with special reference to J&K State.

UNIT II: Air POLLUTION

Air Pollution & its effects on human health, factors responsible for air pollution, measurement of air pollution, air quality standards, and Engineering interventions to check air pollution, case studies relating to the topic.

UNIT III: SEWAGE DISPOSAL

Methods of sewage disposal, effects of disposal on land & in water bodies, self-purification of streams, BOD & COD calculations, Types & design of sewers.

UNIT IV: UNIT OPERATIONS IN DESIGN OF SEWAGE TREATMENT

Screening, sedimentation (septic & inhoff tanks), soakage's for isolated systems, sewage filtration, activated sludge process, grit removal etc.

UNIT V: SOLID WASTE MANAGEMENT

Solid waste problems, constituents of solid waste, sanitary land filling, composting, incineration.

BOOKS RECOMMENDED

1. Environmental engineering & management by Suresh K Dhameja
2. Environmental Engg. (A design approach) by Sincero&Sincero
3. Waste water treatment by P.N. Modi
4. Water supply & sanitary Engg. by B.C.Punmia

SUGGESTED READINGS

1. Metcalf & Eddy Inc., George Tchobanoglous, Franklin, L., Burton, H. D. Stensel, *Wastewater Engineering: Treatment and Reuse*, McGraw-Hill Higher Education; 4th edition, 2002.
2. T. J. McGhee, E. W. Steel, *Water Supply and Sewerage*, McGraw-Hill College; 6th edition, 1991.

CE-705 T: E1-Civil Engineering Management

L – P

4 –0

Credits: 4

UNIT I: BASIC CONCEPTS

Types of business operations, sole proprietorship partnership, company, public and private sector enterprises/ joint ventures, collaborations. Functions of management / principles of managements. Production management – planning, scheduling – procurement, inventory control. Management tools LP, PERT, CPM etc

UNIT II:INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT

Marketing – marketing segmentation, positioning, marketing research, marketing planning, scope of financial management – cost accounting vs financial accounting. Appraisal of projects, investment decisions, concept of pay back.

UNIT III:MATERIALS AND EQUIPMENT MANAGEMENT

Planning – identification, procurement, schedule and cost control – systems approach in resource management.

Material: Time of purchase, quantity of material, sources, Transportation, Delivery and Distribution. ABC analysis, VED analysis, FSN analysis.

Equipment: Planning and selecting by optimistic choice with respect to cost, Time Source and handling

UNIT IV:HUMAN RESOURCE MANAGEMENT

Scope and objective of HRM – man power policy and planning - recruitment and selection. Training performance appraisal. Wage policy and compensation systems. Accidents, absenteeism and turn over – grievances/conflicts – identification and resolution

UNIT V: INTRODUCTION TO COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT

Planning, Scheduling and Resource analysis. Recording and operations project accounting, costing and finance usage of project management software.

BOOKS RECOMMENDED

1. Civil Engineering Management by O.N. Wakhloo
2. Works Management by Maheshverma.
3. Konni, Donnel C.O. and Weighrich H., Management, Eighth edition. McGraw Hill International Book Company,1997
4. Philip kotler, marketing management, Prentice Hall of India, Edition 1998

CE-705 T: E1-Applied Hydrology

L – P

4 –0

Credits: 4

UNIT I: PRECIPITATION

Selection of precipitation networks, storm analysis, storm selection, DAD analysis, Depth-area frequency curve, concept of probable maximum precipitation & effective rainfall.

UNIT II:EVAPORATION AND EVAPOTRANSPIRATION

Measurement, factors affecting evaporation & evapotranspiration, evaporation reduction.

UNIT III:INFILTRATION& RUNOFF

Factors affecting infiltration, measurement, infiltration capacity by hydrograph analysis, infiltration indices. Derivation of unitgraph from complex storm hydrograph, S-curve hydrograph, IUH & its determination, elementary idea of conceptual models, synthetic unitgraphs.

UNIT IV:EXTREME FLOWS

Estimation of design flood by flood frequency analysis, factors affecting droughts, analysis of droughts.

UNIT V:REGRESSION& CORRELATION

Elementary treatment with two variables & application to hydrologic problems.

BOOKS RECOMMENDED

Vijay P. Singh (1994). Elementary Hydrology, Prentice Hall of India.

H.M. Rangunath (1996). Hydrology, Wiley Eastern Ltd.

Vent e Chow, etal (1995). Handbook of applied Hydrology, Mcgraw Hill publications

CE-705 T: E1-Railway and Airport Engineering

L – P

4 –0

Credits:4

UNIT I:TRANSPORTATION SYSTEM

Importance of transportation systems,history of railways and it's development, development of Indian railways.

UNIT II: PERMANENT WAY

Permanent way and it's component parts, formation,ballast,sleepers, rails. Creep and tilt in rails.

UNIT III:RAILWAY TRACKS

Track resistance and tractive effort, gauge problem,super- elevation near branching of curves,gradients.Track fittings and fastenings, points and crossings, stationPlatforms, yards and sidings.

UNIT IV:AIRPORT

Classification of airports; planning, surveys and site selection of airports;Airport geometrics: runway length and patterns & orientation, wind rose diagram, width and grades of runway,taxiways and aprons.

UNIT V:AIRPORT PAVEMENT DESIGN

Airport pavement design:difference between highway and airport pavements,introduction to various design methods, airport drainage.

BOOKS RECOMMENDED:

1. Rangawala, S.C. 2002. “Railway Engineering”, Charotar Publishers, Anand
2. Arora, S.P. and Saxena. 2001. “ Railway Engineering” , DhanpatRai Publishers, New Delhi.
2. Khanna, Arora and Jain. 2002. “Airport Planning and Design”, Nem Chand and Brothers, Roorkee.
3. Horren Jeff. “Airport Planning and Design

CE 706 T: E2-CADD

L – P

4 –0

Credits: 4

UNIT I: AUTOCADD 2012

Annotation scale overview; Working with annotative styles; Annotation scale and model space; Using Fields; Updating and Modifying Fields; Object Fields; Fields in Blocks; Fields in Attributes; Working with Tables; Dynamic Blocks-Working with Dynamic Blocks.

UNIT II: AUTOCADD 2012 PLOTTING

Attributes, Inserting Blocks with Attributes, What are Attributes?, How Attribute Values Are Entered, Editing Attribute Values, Defining Attributes, Redefining Blocks with Attributes, Updating Blocks with New Attributes, Output and Publishing, Output for Electronic Review, Plotting Electronic Files, Exporting DWF or PDF Files, Autodesk Design Review, Viewing Markups in AutoCAD, Publishing Drawing Sets.

UNIT III: STAAD Pro concepts

Generating the model geometry; Specifying member properties; Specifying material constants; Specifying member specifications; Specifying supports; Defining and Specifying Loads; Analysis types, Post analysis print

UNIT IV: STADD Pro design

Concrete Design Parameters; Concrete Design per IS:456; Steel Design Parameters; Steel Design per IS:800; Printing information to output files; Perform analysis, View output file, Graphical post processing, Diagrams, Results, Creating customized reports; Printing of reports; Interactive designs

UNIT V:

Brief Introduction to SAP 2000 v14; SAFE, STADD foundation; and ANSYS, CORAL DRAW; features and feasibility of usage

CE 706 T: E2-Pre-Stressed Concrete Structures

L – P

4 –0

Credits: 4

UNIT I: INTRODUCTION

Basic concept of prestressing – Advantages of prestressed concrete over reinforced concrete – materials for prestressed concrete and their characteristics. Uniform prestress distribution in prestressed concrete – non-uniform prestress distribution – moments of resistance.

UNIT II: SYSTEMS OF PRESTRESSING & LOSSES IN PRESTRESS

Tensioning devices, Pre-tensioning systems, post-tensioning systems, thermo-electric prestressing, chemical prestressing; Nature of prestress losses, Losses due to: Elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, anchorage slip. Total losses allowed for in Design.

UNIT III: ANALYSIS OF MEMBERS

Analysis of pre-stressed structural members for axial loads, flexure, shear & torsion. Analysis calculations for various elements.

UNIT IV: LIMIT STATE DESIGN CRITERIA FOR PRESTRESSED CONCRETE MEMBERS

Inadequacies of the Elastic & Ultimate Load Methods, philosophy of Limit state Design, Criteria for limit states, Design Loads & Strengths, Strength & serviceability Limit States, Principles of Dimensioning Concrete Members.

UNIT V: DESIGN OF PRESTRESSED CONCRETE SECTIONS

Design of Pre-stressed sections for flexure, axial tension, shear & Torsional forces. Combination of stresses.

BOOKS RECOMMENDED:

1. N. Krishna Raju, Prestressed Concrete, Tata McGraw Hill Publishing Co. Ltd, New Delhi.
2. S K Mallick, A P Gupta, Prestressed concrete, Oxford and IBI Series.
3. R. H. Evans, Bennet E W, Prestressed concrete theory and design, Chapman and Hall, London.
4. T. Y. Lin, Design of Prestressed Concrete Structures, Asia Publishing House.

CE 707P- Seminar

L – P

0 –2

Credits: 1

A seminar shall be organized at the 7th semester of the Civil Engineering curriculum leading to the Degree of B. Tech. The students shall do research on a topic of their choice which may be either library research and/or laboratory research. The students shall be guided in their research work by the staff members of the department. The students shall make a power-point presentation of 15-20 minutes duration on the research work in front of their fellow students under the supervision of the staff members of the department. A discussion on the talk follows the presentation.

The students shall make a hard-copy of their seminar report & present it before the intended date of the presentation.

CE 708 P-Pre-Project Works

L – P

0 –4

Credits: 2

A project will be assigned to the students & the students shall start working on the project assigned to them under internal & external guides. The students shall have to submit an acknowledgement from the agency executing the project & the project shall be duly approved by the project approving authority from the department. At the end of the semester a preliminary synopsis report on the project shall be submitted to the Department for assessment.

The students are required to appear for viva voce which shall be conducted in the department, in presence of the faculty members under the supervision of the HOD.

OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING

Semester-VIII

Course Code	Course Title	L - P	Credit
CE 801 T	Design of Bridge Structures	4 - 0	4
CE 802 T	Hydropower Engineering	4 - 0	4
CE 803 P	Project	5 - 10	10
CE 804 P	Tour & Training	-	2
CE 805 P	Professional viva-voce	-	2
Elective Courses			
	Course	Prerequisite	
CE 806 T : E1	Earthquake Resistant Design	Structural Dynamics & Concrete Design	4
	Transportation Planning & Economics	Transportation Engineering-I	
CE 807 T : E2	Operation Research	Transportation Engineering-I, Advanced Structural Analysis, Geotechnical Engineering I & II	4
	Rock Mechanics & Tunneling Technology	Civil Engineering background	
	TOTAL CREDITS	21 - 10	30

CE 801 T- Design of Bridge Structures

L – P

4 –0

Credits: 4

UNIT I:INTRODUCTION TO BRIDGES

Introduction to bridge components, design codes, bridge types, Types of Loads on bridges, Standard loads on bridges; Preparing of Bridge Design report.

UNIT II:

Introduction to Hydraulic Design of Bridges, scour depth, afflux, stream flow (discharges); Introduction into Sub-structure of Bridge and types of loads on sub-structure.

UNIT III:DESIGN OF STEEL BRIDGES

Various forms of steel bridges (Plate girder & trussed bridges) Super structure as per IRC standards; Design of stringer and cross girder for single & multi-lane bridges for standard IRC loading.

UNIT IV:DESIGN OF BRIDGE DECK SLABS

Design of various forms of concrete bridge decks as per- Design for standard IRC loading- IRC 6-2000; Courbon's Method of Bridge Deck Analysis.

UNIT V:DESIGN OF TRUSS MEMBERS

Design of various forms of truss members for steel bridges based on standard IRC loading

BOOKS RECOMMENDED:

1. Design of Bridges by John victor
2. Design of Bridges by Krishna Raju
3. Design of Masonry& timber structures by A.S. Arya
4. Relevant IRC/IS codes & specifications.

CE-802 T-Hydropower Engineering

L – P

4 –0

Credits: 4

UNIT I: GENERAL INTRODUCTION

Development of water power, Estimation of Hydropower potential, Comparison of hydro, thermal & nuclear power.

Classification of hydro-power plants.

UNIT II: ANALYSIS OF STREAM FLOW & DEMAND

Flow duration curve, firm power, secondary power, load & Load duration curves, load factor etc.

UNIT III: WATER CONVEYANCE SYSTEM

Power canals, Alignment, Design of power canals, flumes, covered conduits & tunnels.

Penstocks- Alignment, types of penstocks, Economic diameter of penstocks, Anchor blocks.

UNIT IV: DAMS

Selection of site, preliminary investigations, Final investigations.

Rigid Dams: Basic principles of design & details of construction.

Embankment Dams: Earthen dams, rock-fill dams, design Considerations.

Spillways: Types of spillways, Spillway gates, Design of stilling basins.

UNIT V: POWER HOUSE DETAILS

Forebay, intakes, General layout of power house & arrangement of hydropower units; Underground power stations.

BOOKS RECOMMENDED:

1. Dandekar, M.M. “Water Power Engineering”.
2. Deshmukh, M.M. “Water Power engineering”, DanpatRai& Sons, New Delhi.
3. Arora, K.R. “Irrigation, Water Power & Water Resources Engineering”, Standard Publishers Distributors, Delhi.

CE 803 P- Project

L – P

5 –10

Credits: 10

The project assigned to the group of students at the 7th semester level will have to be completed at the 8th semester. It may require complete field survey, a design & calculations of various structures associated with the project, comparative economic studies, preparations of estimates, laboratory/experimental work etc.

On completion of the project work, a detailed technical report is to be submitted by every student in accordance with the standards adopted for technical report. There will be a viva-voce examination after the submission of the technical report. The H.O.D. would constitute a project evaluation board which will assess the individual project work. The weightage will be as follows:

- i) Supervisor or Internal guide (From the department) = 40 %
Supervisor or internal guide will assess 20% for work performed and 20% for Project report.
- ii) Project Report = 20 % (To be assessed by the evaluation board).

Evaluation board assessment will be done by internal expert/supervisor & the external expert in the ratio of 1:1.

- iii) Presentation & viva-voce = 40 %.

The evaluation board will comprise of supervisor, internal expert & one subject expert preferably from outside the University.

CE 804 P-Tour & Training

L – P

0 –0

Credits: 2

The students shall go for tour & training to study an ongoing project work in the state or outside so as to acquaint themselves with the latest technologies in engineering. The students are required to submit a detailed tour & training report and shall submit the same to the evaluation board to be constituted by the HOD.

The weightage shall be as follows:

- i) Expert/supervisor (From the department) = 40 %
- ii) Project Report = 20 %
- iii) HOD/Board/Viva = 40 %

CE 805 P-Professional Viva -Voce

L – P

0 –0

Credits: 2

A viva-Voce shall be conducted at the 8th semester to assess the students' knowledge of the various subjects that have been taught all through the Engineering degree. The HOD shall constitute an evaluation board to conduct the Viva-Voce.

CE 806 T : E1- Earthquake Resistant Design

L – P

4 –0

Credits: 4

UNIT I:

Introduction to earthquakes, Acceleration time history, Response spectrum, Design spectra

UNIT II:

Response of buildings subjected to ground motion based on modal analysis.

UNIT III:

Seismic design of R.C.C. structures (up to 2-storey Buildings) based on Codal provisions IS: 1893.

UNIT IV:

Seismic design of brick masonry structures based on Codal provisions.

UNIT V:

Detailing of RCC Elements as per IS: 13920, Repair & seismic strengthening of buildings as per IS: 13935.

BOOKS RECOMMENDED:

1. Dynamics of structures by Anil K Chopra.
2. Seismic design of structures by Pankaj Aggarwal, Shrikhande
Seismic design of RCC & Masonry structures by pauley, T & Priestley.

CE 806 T: E1-Transportation Planning & Economics

L – P

4 –0

Credits: 4

UNIT I:

Introduction and scope of transportation planning and transportation economics, transportation planning issues.

UNIT II:

Public Transportation: public transport modes, desirable characteristics of public transport systems, transit system operations, route development, stopping policy, stop location, scheduling, capacity of transit systems, socially optimal pricing

UNIT III:

Transport analysis and forecasting: transport planning process, transportation and land use, transport planning strategies, transport planning models, travel demand analysis, operational transportation and land use models.

UNIT IV:

Transport economics and finance: pavement economics- construction cost; maintenance cost and vehicle operation cost, economic evaluation of highway projects- basic principles

UNIT V:

Time value of money; costs and benefits; net present value (NPV) method; benefit-cost (B/C) ratio method; internal rate of return (IRR) method; comparison of evaluation techniques, freight transport-trends and economic growth.

BOOKS RECOMMENDED:

1. Transport Planning and Traffic Engineering by CA O'Flaherty, John Wiley & Sons, Inc., New York; Toronto.
2. Transportation Engineering and Planning by Papacostas & Prevedouros, Prentice-Hall of India Private Ltd, New Delhi-110001
3. Principles of Transportation Engineering by Chakaraborty & Das, Prentice-Hall of India Private Ltd, New Delhi-110001
4. Urban Transportation Planning by Meyer & Miller, McGraw Hill, New Delhi

CE 807 T: E2-Operation Research

L – P

4 –0

Credits: 4

UNIT I: INTRODUCTION

Introduction to operation Research, Basic definitions, scope , objectives, phases, models and limitations of operations research. Linear Programming problem – Formulation of LPP, graphical solution of LPP, simplex method, artificial variables, big-M method, two phase method, degeneracy and unbound methods.

UNIT II:Transportation Problems

Formulation, solution, unbalanced transportation problem. Finding basic feasible solutions – North-west corner rule, least cost method and Vogel's approximation method. Optimality test; the stepping stone method and MODI method.

UNIT III: Assignment Model and Hungarian method

Assignment Model Formulation, Hungarian method for optimal solution; solving unbalanced problems; travelling salesman problem and assignment.

UNIT IV:Sequencing Models

Solution of sequencing problem – processing n jobs through two machines, – processing n jobs through three machines – Processing two jobs through m machines – processing n jobs through n machines.

UNIT V:Dynamic Programming

Characteristics of Dynamic Programming, Dynamic Programming approach for priority management, employment smoothening, capital budgeting, stage coach/shortest path, cargo loading and reliability problems.

BOOKS RECOMMENDED:

1. P. SankarAiyer, – Operations Research, Tata McGraw Hill 2008
2. A.M. Natarajan, P.Balasubramani, A. Tamilarasi, – Operations, Pearson Education, 2005.

CE 807 T: E2-Rock Mechanics & Tunneling Technology

L – P

4 –0

Credits: 4

UNIT I: INTRODUCTION TO ROCK MECHANICS

Introduction, terminology, Rock classification systems, physical & mechanical properties of rocks, laboratory testing, stability of rock slopes, Rock bolting.

UNIT II: INTRODUCTION TO TUNNELS

Introduction, Classification of tunnels. Survey for a tunnel project

UNIT III: METHODS OF TUNNELING

Methods of Tunneling in soft & hard rock. Methods of rock blasting in tunnels.

UNIT IV: TUNNEL SERVICES

Tunnel services in rock tunnels; ventilation, drainage and lighting.

UNIT V: TUNNEL LINING & SUPPORTS

Lining of tunnels in soft grounds methods and types, tunnel supports for weak rocks including rock bolting.

BOOKS RECOMMENDED:

1. Brown, E.T. “Analytical & computational Methods in Engineering Rock Mechanic, CBS Publishers & Distributors, New Delhi.
2. Godman, P.E. “Introduction to Rock Mechanics”, John Wiley, 1989.