

## B.E. Civil Engineering-VIII Sem

Course Code: CE - 801

Course: Quantity Surveying and Estimation

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	01	-	04	03	4 Hr	10	10	80	100

Unit	CONTENTS	Hours
<b>I</b>	<p>(a)Importance, purpose of quantity estimate, Mode and unit of measurement as per I.S.1200. Method and stages of estimates. Item of work and Description of an item of work. Approximate estimation of Civil Engineering works.</p> <p>(b)Proposal and Development of project, Nature of contract between owner &amp;Architect/Engineer, Duties &amp; liabilities of Architect/Engineer, Architect /Engineers normal professional services, various important terminology required like work charge establishment ,muster roll, contingencies, cent age charges, measurement book, overheads etc.</p>	10
<b>II</b>	<p>Quantity &amp; cost estimates.</p> <p>(a) Methods of detailed estimates, forms used for detailed estimates, working out the quantities of various materials required for construction of various Civil Engineering works such as Building, culverts, hydraulic structure, water supply &amp; sanitary works, road works, retaining walls , water tanks etc.</p> <p>(b) Earthwork estimates in road (including hill road), canals etc.</p> <p>(c) Detailed estimate of steel in RCC works, bar bending schedule.</p>	08
<b>III</b>	<p>Specifications: Purpose &amp; principles of specifications. Types of specification, Developing detailed specifications of important items.</p> <p>Cost build up: purpose &amp; principles, Importance of Current schedule rates (CSR) in cost estimate, factors affecting analysis of rates, information from National building organization. Task work, factors affecting task work, Markets rates escalation.</p>	09
<b>IV</b>	<p>Arranging works: P.W.D.as the construction agency, method of carrying out works, arranging contract works, pretender &amp; contract planning, tender notice, acceptance of tender, essentials of contract, type of</p>	08

	contract, conditions of contract, contract documents, various schedules in tender documents, measurement & payment to contractor, Indian contract law, and the Engineering contract, Land acquisition act, legal aspects of various contract provisions, arbitration.	
<b>V</b>	Valuation: purpose of valuation, Factors affecting value of property price & cost, market value, potential value, sentimental value, scrap value, reversionary value etc. Real Estate, net & gross return, tenure of land, valuation of land, free hold & lease hold , sinking fund, depreciation , capitalized value, methods of valuation, differed annuity, Time-cost relationship, valuation tables, rent fixation.  Cost accounting: various methods classification of cost, direct & indirect charges, distribution of overheads, M.A.S.Account, issue rates & store account.	10

## REFERENCES

1. Estimation & Costing by B.N.Dutta UBS Publications Distribution (P) Ltd.
2. Estimation & Costing (civil) by D.D.Kohli& Ar.R.C.Kohali( S.chand & company pvt.ltd.)
3. Estimating construction costs by Robert L.Peurify&Garold D.Oberlender ,Tata McGraw-Hill .
4. Construction Planning & Management by P.S.Gahalot & B.M.Dhir, New age International (P) Ltd. Publication.

## Questions paper Pattern:

\*One compulsory question on building estimate.

**B.E. Civil Engineering-VIII Sem**

**Course Code: CE – 813**

**Course: Quantity Surveying And Estimation**

**Course scheme Evaluation scheme (LABORATORY)**

Course scheme					Evaluation scheme (Practical)		
lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
-	-	3	3	2	25	25	50

**The candidate shall submit 08 experiments from the following.**

1. Detailed building estimate of load bearing structure & framed structure
2. A complete set of contract document including specifications.
3. Detailed estimate road work .
4. Rate analysis of 10 major item of building.
5. Specification of 10 major item of building.
6. Valuation & rate fixing.
7. Calculation of reinforcement in RCC with bar bending schedule.
8. Study of IS-1200.
9. Expert lecture by legal advisor on various legal aspects of contracts & report by students.
10. Site visit to: Study of schedule of rates & comparison with market rates & report by the students.

**Practical Examination shall consist of written test & viva-voce based on the syllabus & sessional work.**

## B.E. Civil Engineering, VIII Sem

COURSE CODE: CE -802

COURSE:TRANSPORTATION ENGINEERING II

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	-	4	3	3 Hr	10	10	80	100

UNIT	TOPICS	HOURS
I	<b>Railway Engineering</b> : Permanent way, gauges, coning of wheels and tilting of rails.Rail types, wear and failure.Sleepers, rail Fixtures and fastening, ballast cushion.Traction and Tractive resistance, hauling capacity and tractive effort of locomotives.	5
II	Geometric design of railway track, Gauge, Gradients speed, super elevation cant deficiency Negative super elevation, curves, length of transition curves, grade compensations. Points of crossings : Left and right hand turnout, design calculations for turnout & Crossover, railway track functions. Station and Yards: Types, functions facilities & equipment.	12
III	Railway track construction,study of ballast less & magley tracks inspection & modem, techniques, of maintenance. Push through Technique. <b>Tunnel Engineering</b> :Tunnel alignment-Tunnel Surveys,Tunneling methods in Hard Rock and Soft Grounds,Tunnel lining. Drainage, Ventilation and lighting of tunnels, Advances in Tunneling&Tunnel Boring Mechanics, Case studies.	8
IV	<b>Airport Engineering</b> : Aircraft characteristics, Airport site Selection. Modem aircrafts.Airport obstructions: Zoning Laws, imaginary surfaces, Approach and turning Zone, clear zone, vert. Clearance for Highway &Railway. Runway and taxiway design: Windrose, cross wind component, Runway Orientation and configuration. Basic runway length and correction, runway geometric design standards. Taxiway Layout and exit taxiways.	9
V	<b>Airport layout. Airport classification:</b> Terminal Area Aircraft parking & parking system. Unit terminal concept, Aprons,	11

	<p>Hangers, international Airports layouts, phase development.</p> <p>Visual Aids: Airport marking and Lighting for runway, Taxiway and other areas. Air traffic control: Need, network, control aids, instrumental landing systems, advances in air traffic controls.</p>	
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**Text Books :**

1. Railway Engineering : Saxena and Arora, Dhanpat Rai & Sons
2. Airport Engineering : Khanna and Arora, Nem Chandra & Brothers, Roorkee.
3. Tunnel Engineering : S. Srinivasan, Publishing House Charotar.

**Reference Book :**

1. Airport Engineering : G. Venkatappa Rao, Tata Mc. Graw-Hill Publishing
2. Planning and Design of Airports : Robert Herorjeff, Mc. Graw-Hill Publishing
3. Railway Tracks Engineering : J.S. Mundrey, Tata Mc. Graw-Hill Publishing
4. Introduction to Tunnel Construction : David Chapman, Nicole Metje, Alfred Stark, Span Press, New York.

**Elective III- B.E. Civil Engineering, VIII Sem**

**COURSE CODE: CE -803**

**COURSE: MACHINE FOUNDATION**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	-	4	3	3 Hr	10	10	80	100

Unit	CONTENTS	Hours
<b>I</b>	<b>Introduction:</b> Types of machines, Types of machine foundations, General requirements of machine foundation, General criteria for design, Permissible amplitude. <b>Vibration analysis of Machine Foundation:</b> Methods of Analysis- Elastic Half space method, Linear elastic Weightless Spring Method etc.	<b>9</b>
<b>II</b>	<b>Foundations of reciprocating machines:</b> Modes of vibrations, Effect of footing shape on vibration response, Dynamic response of embedded block foundation, Design criteria, Design procedure	<b>9</b>
<b>III</b>	<b>Foundation of impact type machines:</b> Arrangements of foundation for different types of hammers, Dynamic analysis, Design procedure for hammer foundations	<b>9</b>
<b>IV</b>	<b>Foundation of rotary machine:</b> Design criteria, Special considerations, Two dimensional analysis – Resonant method, Amplitude method and combined method.	<b>9</b>
<b>V</b>	<b>Vibration isolation &amp; control:</b> Force isolation & motion isolation, Methods of isolation in machine foundations Isolating materials and their properties <b>Constructional details of machine foundation</b>	<b>9</b>

**Books recommended:**

1. Handbook of Machine Foundation , Srinivasunlu and Vaidyanathanan, SpringerNetherlands, 2008.
2. Soil Dynamic and Machine Foundation, Swami Saran, Second edition, GalgotiaPublication, 2009.
3. Vibrations of Soils and Foundations, F. E. Richards J. R. Hall and R. D. Woods, PHI,1970.
4. Vibration Analysis and Foundation Dynamics, N. S. V. KameswaraRao, Meeler Pub.,1998.
5. Foundation for Machines: Analysis and Design, SamsherPrakash and V. K. Puri, JohnWiley & Sons., 1998.
6. Soil Dynamics, SamasherPrakash, MGH, 1981.

**Elective III- B.E. Civil Engineering, VIII Sem**

**COURSE CODE: CE -804**

**COURSE: ADVANCE SURVEYING**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	-	4	3	3 Hr	10	10	80	100

Unit	CONTENTS	Hours
<b>I</b>	Triangulation and trilateration Triangulation, Network, strength of figures, selection of stations, inter, Visibility , satellite stations, measurements and computations, trigonometric leveling	<b>9</b>
<b>II</b>	Geodesy: Earth, spherical trigonometry, convergence of meridians, latitude computation,determination of bearing and distance, map projection.	<b>9</b>
<b>III</b>	Photogrammetry : Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height determinations.	<b>9</b>
<b>IV</b>	Hydrographic survey: Shoreline and river survey, soundings? methods, equipment and ranges locating sounding	<b>9</b>
<b>V</b>	Global Positioning System (GPS): GPS principles, Satellite navigation System, GPS? Space segment, Control segment, User segment, GPS satellite signals, Receivers, Static, Kinematic and Differential GPS	<b>9</b>

**REFERENCES:**

1. Surveying – Vol.2& 3 : Punmia .B.C., laxmi publications
2. Surveying – Vol 2&3 : Arora.K.R., Standard book house publication
3. Higher Surveying : A. M.Chandra , New Age International publication
4. Engineering Survey : W. Schofield; Taylor & Francis publication

**Elective III- B.E. Civil Engineering, VIII<sup>th</sup> Sem**

**COURSE CODE: CE -805**

**COURSE: Earthquake Engineering**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	<b>3</b>	<b>3 Hr</b>	<b>10</b>	<b>10</b>	<b>80</b>	<b>100</b>

Unit	CONTENTS	Hours
<b>I</b>	Introduction to earthquakes: Geology of earth, configuration of tectonic plates in a globe, influence of Geology on earthquake, behavior of plates, their motion and effects, causes of earthquake and their characteristics, Earthquake parameters, magnitudes, intensity, scales, seismic zoning of India, seismic coefficients for different zones, Natural disasters, mitigation and social aspects. Lessons from past earthquake: - Study of damages caused due to past, earthquakes in/ outside India and remedial measures.	<b>9</b>
<b>II</b>	Theory of vibrations: Vibrations - definition, causes, classifications. Single Degree of Freedom systems (SDOF) - free, forced, damped, un-damped vibrations. Introduction to Multi-degrees of Freedom systems (MDOF) - derivations of related equations and solutions to two degree and three degree of freedom systems.	<b>9</b>
<b>III</b>	Seismic design of RC structure: Effect of earthquake on RC structure, IS provision, Seismic coefficient method. Basic requirement, estimation of story shear, effect of unsymmetrical geometry and masses, mass center and stiffness center, estimation of story shear and tensional moments for unsymmetrical buildings. IS code provision to response spectrum, Modal analysis for RCC frame, Design of multistoried building, concept of ductile detailing, IS 13920 provisions for RC frame.	<b>9</b>
<b>IV</b>	Seismic foundation design: Type of forces generated due to earthquake, effects on different types of foundation, design of RCC isolated footing for earthquake loading, liquefaction, causes and its remedial measure.	<b>9</b>
<b>V</b>	Introduction of different control systems: Passive control: base isolation and active control: bracing system, TMD etc and some latest invention. Restoration and retrofitting: Evaluation of existing buildings, aging, weathering, development of cracks, improper load Path, asymmetry,	<b>9</b>



	materials and equipments for restoring and retrofitting, methodology of retrofitting for walls, slabs roofs columns, foundations etc. for buildings in stones, bricks, RCC.	
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Notes: Every design should confirm to latest versions of IS 1893, 4326, 13920, 13827, 13828, 13935

### **REFERENCE BOOKS**

1. Earthquake resistance design of structure by Duggal- Oxford University Press.
2. Dynamics of structure by Clough R.W. and Penzin J. McGraw Hill Civil Engineering Series
3. Dynamics of structure by Anil Chopra, Prentice Hall India Publication
4. Dynamics of structure by Mario Paz, CBSPD Publication
5. Earthquake Resistant Design by David J. Downik, John Wiley and Sons Publication
6. Earthquake Tips NICEE, IIT, Kanpur
7. Elements of Earthquake Engineering by Jaikrishna and Chandarsekaran.
8. Geo-technical Earthquake Engineering by Kramer S. L. Prentice Hall India Publication
9. Introduction to Structural Dynamics by John M. Biggs
10. Mechanical Vibrations by V. P. Singh
11. Relevant Latest Revisions of IS codes.

**Elective III- B.E. Civil Engineering, VIII<sup>th</sup> Sem**

**COURSE CODE: CE - 806**

**COURSE: PAVEMENT DESIGN**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	<b>4</b>	<b>3 Hr</b>	<b>10</b>	<b>10</b>	<b>80</b>	<b>100</b>

Unit	CONTENTS	Hours
<b>I</b>	<p><b>General:</b> Pavement design factors, components of flexible and rigid pavement and their functions, characteristics of highway and airfield pavement.</p> <p><b>Design parameters:</b> Design wheel load, Standard axle load and wheel assemblies for road vehicles. Under carriage system for aircraft, tyre and contact pressure, contact area, imprints, computation of ESWL for flexible and rigid pavements. Load repetitions and distributions of traffic for highway and airfield, pavement, airport traffic areas, Serviceability concept.</p>	<b>7</b>
<b>II</b>	<p><b>Material characteristics:</b> AASHTO subgrade soil classification, CBR test, North Dakota cone bearing value, plate load test for K-value, modulus of elasticity and Poisson's ratio of subgrade soils, Marshall's method of Bituminous mix design, Surface dressing, Premix carpet, Mix seal surfacing , Semi-dense carpet, Asphaltic concrete, Bituminous Macadam Binder course, Dense Bituminous Macadam Binder course, Modulus of rupture, modulus of elasticity, Poisson's ratio and coefficient of thermal expansion of concrete, Layer equivalent concepts.</p>	<b>9</b>
<b>III</b>	<p><b>Analysis of flexible and rigid pavements:</b> Stress, strain, deflection analysis one layer system by Boussinesq's, Two, three layer system by Burmister's, and multi layered flexible pavement system. Stress and deflections for rigid pavements due to load and temperature, influence charts, ultimate load analysis joints.</p> <p><b>Highway Pavement Design:</b> Flexible: North Dakota cone, Design using the latest IRC code, Triaxial (Kansas), AASHTO method of design.</p> <p>Rigid: Design using the latest IRC code, PCA, AASHTO method of design, design of joints and reinforcements</p>	<b>11</b>
<b>IV</b>	<p><b>Airfield pavement design:</b></p>	<b>8</b>

	<p>a) Flexible: FAA, US Corps of engineering, CBR, Mcleod (Canadian)</p> <p>b) Rigid :FAA, PCA&amp; LCN,definitions of ACN, PCN, LCN. Calculation of LCN value. Ultimate load analysis and yield lines patterns method</p>	
<b>V</b>	<p><b>Pavement testing and evaluation:</b> field density, CBR, plate load test,Pavement Failures in both Flexible Pavement &amp; Rigid Pavement - types and causes, condition surveys and surface evaluation for unevenness, rut depth, profilometers, bump integrators, Benkleman beam deflection study.</p> <p><b>Strengthening of pavements:</b> design of flexible, composite and rigid overlays for flexible and rigid pavements, repairs, maintenance and rehabilitation of pavements</p>	<b>10</b>

**Recommended Books:**

1. Principles of Pavement Design by H.J.Yoder and Witczak, John wiley and sons.
2. Highway Engineering by Khanna O.P, Justo C.G., , Nem Chand Publishers
3. Pavement Analysis and Design by Yang H. Huang 2nd Edition, Pearson Education, Inc., Pearson Prentice Hall Company.
4. Airport Engineering by G VenkatappaRao, Tata McGraw –Hill Publishing Company Ltd.
5. IRC-37(Latest Code))Guide lines for Design of Flexible Pavement
6. IRC -58-(Latest code) Guide lines for Design of Plain Jointed Rigid Pavement for highways
7. MOST Specifications for Road and Bridge Works, 1994 (Third Revision)

**Reference Books:**

- a. Airport Engineering by Khanna and Arora, Nemchand& Brothers.

**Elective III- B.E. Civil Engineering, VIII<sup>th</sup> Sem**

**COURSE CODE: CE -807**

**COURSE: Environmental Impact Assessment**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	-	4	3	3 Hr	10	10	80	100

Unit	CONTENTS	Hours
<b>I</b>	<b>CONCEPTUAL FACTS OF EIA:</b> Introduction, Definition and Scope of EIA, Objectives in EIA, Basic EIA Principles, Classification of EIA: Strategic EIA (SEIA), Regional EIA, Sectoral EIA, Project Level EIA and Life Cycle Assessment, Project Cycle, Grouping of Environmental Impacts: Direct Impacts, Indirect Impacts, Cumulative Impacts and Induced Impacts. Significance of Impacts: Criteria/Methodology to Determine the Significance of the Identified Impacts.	<b>9</b>
<b>II</b>	<b>BASELINE DATA ACQUISITION:</b> Environmental Inventory, Data Products and Sources: thematic data, topographical data, collateral data and field data. Environmental Baseline Monitoring (EBM), Preliminary Study to determine impact significance, Environmental Monitoring network Design, Monitoring Stations, Air quality data acquisition, Water Quality data acquisition, soil data, socioeconomic data and biological data acquisition. Impact on Environmental Components: Significance of Impacts, Criteria to determine the significance of the identified Impacts.	<b>9</b>
<b>III</b>	<b>PLANNING AND MANAGEMENT OF IMPACT STUDIES:</b> Conceptual Approach for Environmental Impact Studies, Proposal Development, Interdisciplinary Team Formations, Team Leader Selection and Duties, General Study Management, Fiscal Control.	<b>9</b>
<b>IV</b>	<b>OPERATIONAL ASPECTS OF EIA:</b> Screening: Application for Prior Screening for Environmental Clearance, Screening Criteria; Category A Projects, Category B Projects, Criteria for Classification of Category B1 and B2 Projects, Consistency with other Requirements and Siting Guidelines. Scoping: Identification of Appropriate Valued Environmental Components (VEC), Identification of Impacts, Information in Form 1, Structure of a Pre-feasibility Report.	<b>9</b>

	Public consultation: Appraisal, Decision Making, Post-clearance Monitoring Protocol.	
<b>V</b>	<p><b>METHODS FOR IMPACT IDENTIFICATION:</b></p> <p>Background Information, Interaction-Matrix Methodologies: simple matrices, stepped matrices, development of a simple matrix, other types of matrices, summary observations on matrices, Network Methodologies: Checklist methodologies, simple checklists, descriptive Checklists, summary observations on simple and descriptive Checklists.</p> <p><b>PREDICTION OF IMPACTS (AIR AND WATER):</b>Air Environment: Basic information on air quality, Sources of Pollutants, effects of pollutions, Conceptual approach for addressing air environment impacts, Air quality standards, Impact Prediction, Impact significance.</p> <p>Water Environment: Basic Information on surface-Water Quantity and Quality, Conceptual Approach for Addressing Surface-Water-Environment Impacts, Identification of Surface-Water Quantity or Quality Impacts, Procurement of Relevant Surface-Water Quantity-Quality Standards, Impact Predictions, Assessment of ImpacSignificance.</p>	<b>9</b>

#### **REFERENCES:**

1. Textbook of Environmental Science & Technology by M.Anji Reddy, BS Publications, 2010
2. Technological guidance manuals of EIA. MoEF.
3. EIA by Canter
4. Man and Environment, D.H.Carson 1976 Interactions Part I and III.
5. Environmental Impact Assessment, 2003, Y.Anjaneyulu, B.S Publications
6. Erickson, P.A.1979 Environmental Impact Assessment Principles and applications
7. Basic Concepts in Remote Sensing and Arial Photogrammetry, Lillesand and Keifer Prentice Hall Intl., 1994.
8. Renewable Energy Environment and Development, Hameswar Dayal Konark Publishers, Pvt., Ltd.

## Elective IV-B.E. Civil Engineering-VIII<sup>th</sup> Sem

Course Code: CE - 808

Course: Experimental Stress Analysis

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	01	-	04	03	4 Hr	10	10	80	100

Unit	CONTENTS	Hours
<b>I</b>	Introduction to experimental stress analysis, advantages of ESA technique, Fundamental concept of strain measurement.  Development of ERSG, types, construction and material, Gauge sensitivity and gauge factor, transverse sensitivity, correction for transverse strain effect, Grid, Backing material, Adhesive, Mounting method, checking gauge installation, Performance characteristics of foil strain gauge, linearity, hysteresis, zero shift, environmental effect, moisture proofing.	10
<b>II</b>	Wheatstone bridge circuit, sensitivity, types, balancing of bridges, constant current circuit, Transducer application, diaphragm pressure transducer, displacement transducer, axial force transducer, bending force transducer, torque transducer.	08
<b>III</b>	Determination of principal strains, principal stresses, maximum shear stress and principal angles, three and four element rectangular rosette, delta rosette, tee rosette .  General principles, advantages and disadvantages, state of stress and laws of failure, detection of cracks, types of brittle coating, test procedure, calibration technique.	09
<b>IV</b>	Basic optics related to photo elasticity, ordinary light, monochromatic light, polarized light, natural and artificial, Stress optic law in two dimensions at normal incidence, Material fringe value in terms of stress function	08
<b>V</b>	Plane polariscope, isoclinics, isochromatics, Circular polariscope, different arrangements, isochromatics, Fractional fringe measurement, Tardy's method , Babinet Soleil method, Selection and properties of model materials, Calibration methods, circular disc, tensile specimen, Separation methods, oblique incidence method, shear difference method	10

## REFERENCES

1. Experimental stress analysis by Dailly and Riley, McGraw Hill
2. Experimental stress analysis by Dr. Sadhu Singh, Khanna Publications
3. Experimental stress analysis by Holister Dove and Adams.
4. Photoelasticity Vol. I by Frecht
5. Applied stress analysis by Direlli
6. The strain gauge primer by Perry Listner

### Elective IV- B.E. Civil Engineering, VIII Sem

**COURSE CODE: CE 809      COURSE: ADVANCED DESIGN OF STEEL STRUCTURES**

Course scheme					Evaluation scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	0	0	4	4	10	10	80	100

UNIT	CONTENT	HOUR
<b>1</b>	Analysis and design of industrial building with roof truss. Calculation of wind and earthquake forces. Gable frame with and without haunch IS code provision of IS 800-2007	<b>12</b>
<b>2</b>	Design of overhead tank, pressed steel tank. Wind load calculation. Steel staging and its RCC foundation	<b>10</b>
<b>3</b>	Analysis and design of steel chimney. Wind load and earthquake load calculation, Maximum base shear. Design of foundation.	<b>10</b>
<b>4</b>	Design of Bridges, IRC loading, Deck and through Bridges, Moving load , plate girder and truss girder bridges.	<b>13</b>

References Books and I. S. Codes

1. Ram Chandra, Design of steel Structures, Volume II, Standard Book House, Delhi.
2. Punmia and Jain, Comprehensive Design of steel structure, Laxmi Publication, Delhi.
3. M Raghupathi, Design of steel structures, Tata McGraw Hill, New Delhi. 10/44
4. S K Duggal, Limit state design of steel structures, Tata McGraw Hill Education.
5. N Subramanian, Design of steel structures, Oxford University Press.
6. Sarwar Alam Raz—Structural Design in Steel---New Age International Publishers
7. IS: 800 - 2007, Code of Practice for General Construction in Steel, BIS, New Delhi.
8. IS: 800 - 1984, Code of Practice for General Construction in Steel, BIS, New Delhi.
9. IS: 801 - 1975, Code of Practice for use of cold formed light gauge steel structural members in general building construction, BIS, New Delhi.

### Elective IV- B.E. Civil Engineering, VIII Sem



Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	-	4	3	3 Hr	10	10	80	100

UNIT	TOPICS	HOURS
I	General Hydraulic Principles: Frictional head loss in pipes, different formulae, minor head loss in pipes, equivalent pipe Reservoir, Pumps and Valves: Impounding reservoir, Service and balancing reservoir, Three reservoir system, Multi reservoir system, pumps and pump co-ordinations, Valves- their types, Analysis of reservoir system with checks valves and pressure reducing valves.	6
II	Reservoir capacity: Estimation of minimum required reservoir capacity using graphical and analytical method. Design of pumping main: Optimal design of pumping main considering pipe diameter as continuous and discrete variable.	12
III	Analysis of Water Distribution Networks: Types and parameters, Parameter relationship, Formulation of equations, Analysis of network using Hardy Cross method, Newton Raphson method and linear theory method.	9
IV	Node Flow Analysis (NFA): Difference between Node Head and Node Flow Analysis, Necessity of NFA, Bhave's approach- Node classification, node category compatibility, NFA theory.  Design of Water Distribution Networks: Design of single source branching networks using critical path method, number of branching, configuration of looped networks using Graph Theory principles, selection of branching configuration using path concept	10

	and minimum spanning tree concept. Design of single source looped networks using critical path method.	
V	Optimal Design Water Distribution Networks: Cost Head Loss Ratio (CHR) method- CHR criterion, Problem formulation, CHR methodology for single source branching networks. Linear programming formulation and solution using simplex method.	8

**Text Books :**

1. Bhav P.R and Gupta ( 1991), "Analysis of flow in water distribution networks", Technomic Publishing Co. Lancaster, Pennsylvania, USA.
2. BhavP.R , “ Design of Water Distribution Networks” networks"Technomic Publishing CO. Lancaster, Pennsylvania,USA.

**Reference Books :**

1. Jeppaon R.W.(1977), “Analysis of Flow in Pipe Networks" Ann Arbor Science. Ann Arbor Michigan, USA.
2. Walski. T.M.(1984)," Analysis of flow in water distribution networks"Technomic Publishing CO. Lancaster, Pennsylvania,USA.

**Elective IV- B.E. Civil Engineering, VIII Sem**

**COURSE CODE: CE -811**

**COURSE: DESIGN OF WATER AND WASTE**

**WATER TREATMENT**

Course scheme					Evaluation scheme (Theory)				
lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper hour	MSE	IE	ESE	Total
3	1	-	4	3	3 Hr	10	10	80	100

UNIT	TOPICS	HOURS
<b>I</b>	Objective of water treatment, unit operation and unit processes, treatment flow, site selection for water treatment plant. Aeration: objective of aeration, types or aerators, design of cascade aerator, gas transfer, two film theory; spray aerator.	5
<b>II</b>	Coagulation- Flocculation: Theory of coagulation objectives, types of rapid and slow mixing devices (hydraulic and mechanical), factors affecting coagulation and flocculation, nature and types of chemical coagulants used in water treatment, coagulant and flocculent aids.  Sedimentation: Theory of sedimentation, factors affecting, types of settling, analysis of discrete and flocculent settling, design of sedimentation tank and clariflocculators.	10
<b>III</b>	Filtration: mechanism of filtration, types of filters, design of rapid sand filters, filter media specifications, preparation of filter sand from stock sand, problems in filtration.  Disinfection: Method of disinfection, kinetics of disinfection, types of disinfectants, Chlorination, method of chlorination (breakpoint chlorination), factors affecting efficiency of chlorination.	8
<b>IV</b>	Treatment Methods: Waste water treatment flow sheet, preliminary, primary and secondary methods of treatment, design of screen. Girt chamber and primary settling tank.	12

<b>V</b>	<p>Biological unit processes: principle of biological treatment processes, design parameters of activated sludge process and trickling filters.</p> <p>Aerated lagoons, stabilization ponds, Sludge treatment, aerobic and anaerobic digestion and sludge drying beds.</p>	10
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**Books:**

1. CPHEEO Manual of water supply & treatment
2. CPHEEO Manual on Sewerage & sewage treatment.
3. Water supply Engineering Vol I & II by B.C. Punmia — Laxmi Publication
4. Wastewater Engineering by Metcalf & Eddy – Tata McGraw Hill
5. Water supply & Sewage by M.S. Macghee, -- Tata McGraw Hill

**Elective IV- B.E. Civil Engineering, VIII Sem**

**Course Code: CE812**

**Course: Application of System Engineering**

Course Scheme					Evaluation Scheme(Theory)				
Lecture	Tutorial	Practical	Periods/Week	Credits	Duration of paper hour	MSE	IE	ESE	Total
03	01	03	04	03	03	10	10	80	100

Unit No.	Content	Hours
I	<p>INTRODUCTION AND BASIC CONCEPT</p> <p>Introduction, System Components, Planning and Management</p> <p>Concept of a System, Advantages and Limitations of a system Approach, Modeling of a various Problems in Civil. Optimization, Economics in Civil Engineering, Challenges in Water sector.</p> <p>INTRODUCTION TO OPTIMIZATION.</p> <p>Objective function, Maxima, minima saddle points, convex and concave functions. Constrained and unconstrained optimization using calculus Lagrange multipliers, Kuhn-Tucker Condition.</p>	06
II	<p>LINEAER PROGRAMMING AND APPLICATIONS</p> <p>General form of LP, Standard and Canonical forms of LP, Elementary transformations. Graphical method, Feasible and infeasible solutions. Simplex method, Dual and Sensitivity Analysis. LP problem formulation, Reservoir sizing and Reservoir operation using LP.</p>	10
III	<p>DYNAMIC PROGRAMING AND APPLICATIONS</p> <p>Introduction, Multistage decision problem, Recursive Equations, Principle of optimality, Discrete DP, curse of Dimensionality., Water allocation problem., Capacity expansion problem., Reservoir operation., Multipurpose reservoir operation.</p>	09
IV	<p>MULTI-OBJECTIVE OPTIMIZATION</p> <p>Introduction, Non-inferior solutions, Trade of analysis, Pareto optimal solutions. Multipurpose reservoir operations. Weighted and constraint methods, Other methods., Review of probability theory., Uncertainty and reliability analysis.</p> <p>SIMULATION</p> <p>Introduction, River basin Simulation, Reservoir operation simulation,</p>	10

	some simulation models	
V	River basin planning and management., Water Distribution systems, Groundwater systems, Water quality modeling., Floodplain management, Urban storm management  ADVANCED TOPICS  Fuzzy optimization, Genetic algorithms, Multi Criteria decision making, Decision support systems, Expert systems	10

**References:**

1. Loucks D.P, Stedinger J.R and Haith D.A, 'Water Resources Systems Planning and Analysis', Prentice Hall, USA, 1981.
2. Mays L.W and Tung Y-K, 'Hydrosystems Engineering and Management', McGraw Hill, USA, 1992.
3. Vedula S. and Mujumdar P.P., 'Water Resources Systems: Modelling Techniques and Analysis', Tata-McGraw Hill, 2005.
4. Jain S.K. and Singh V.P., 'Water Resources Systems Planning and Management', Elsevier, The Netherlands, 2003.
5. Loucks D.P. and van Beek E., 'Water Resources Systems Planning and Management', UNESCO Publishing, The Netherlands, 2005.
6. S.S. RAO "Engineering Optimization Theory and Practice " John Wiley & Sons, 20-Jul-2009

**B.E. Civil Engineering-VIII<sup>th</sup> Sem**

**COURSE CODE: 814      COURSE: ADVANCED DESIGN OF STEEL STRUCTURES**

**Course scheme Evaluation scheme (LABORATORY)**

Course scheme				Evaluation scheme (LABORATORY)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
		3	2	25	25	50

**LIST OF EXPERIMENTS**

1. Minimum two designs on above syllabus and drawing on A 1 Size drawing sheet.

## B.E. Civil Engineering-VIII<sup>th</sup> Sem

Course Code: CE – 815

### Course: WATER TRANSMISSION AND DISTRIBUTION SYSTEM

#### Course scheme Evaluation scheme (LABORATORY)

Course scheme					Evaluation scheme (Practical)		
lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
-	-	3	3	2	25	25	50

#### Minimum 8 assignments based on following topics

1. Water distribution network analysis by Hardy cross method.
2. Water distribution network analysis by Newton Raphson method.
3. Water distribution network analysis by Linear theory method.
4. Water distribution network analysis by Gradient method.
5. Water distribution network analysis by Node flow analysis.
6. Design of water distribution network using critical path method.
7. Design of water distribution network using cost head loss ratio method.
8. Design of water distribution network using software TORA of Linear programming technique.
9. Design/ analysis of water distribution network with the application of software like Loop, Branch, EPANET, Water GEMS or Water CAD.
10. Conversion of Loop network into branch network using minimum spanning tree concept / Path length concept.
11. Pressure Dependant Demand (PDD) analysis of water distribution network.



## ELECTIVE IV B.E. Civil Engineering-VIII Sem

Course Code: CE-816

Course: DESIGN OF WATER AND WASTE WATER

TREATMENT SYSTEM

### Course scheme Evaluation scheme (LABORATORY)

Course scheme					Evaluation scheme (Practical)		
lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
-	-	3	3	2	25	25	50

#### Minimum five experiments

A)

1. Determination of sulphates
2. Determination of chlorides
3. Residual available chlorination and chlorine demand
4. Determination of BOD
5. Determination of COD
6. Jar test
7. Effective size and uniformity coefficient of filter sand
8. Bacteriological test (MPN Test)

B) Design of individual unit of water or waste water treatment

## B.E. Civil Engineering-VIII<sup>th</sup> Sem

Course Code: CE 817

Course- Application of System Engineering

Course scheme Evaluation scheme (LABORATORY)

Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	3	2	25	25	50

### TERM WORK

Minimum Five Assignment based on theory syllabus along with the five problems to be solved by using MATLAB

Practical Examination shall be based on the above Practical work.

## B.E. Civil Engineering-VIII<sup>th</sup> Sem

Course Code: CE – 818

Course: Experimental stress analysis

### Course scheme Evaluation scheme (LABORATORY)

Course scheme					Evaluation scheme (Practical)		
lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
-	-	3	3	2	25	25	50

Term Work: Minimum ten of the following experiments to be performed

- 1 Study of electrical resistance strain gauge
- 2 Study of commercial strain indicator
- 3 Calibration of electrical resistance strain gauge. Determination of gauge factor  $S_g$
- 4 Determination of unknown weight. Transducer application of strain gauge
- 5 Calculation of gauge factor and strain for single and two arm bridges.
- 6 Calculation of gauge factor and strain for four arms lateral and linear sensitive bridges.
- 7 Measurement by using commercial strain indicator and transducers.
- 8 Study of isoclinics and isochromatics and use of white light
- 9 Calibration of photo elastic model material. Determination of material fringe value.
- 10 Determination of fringe order by Tardy's method.
- 11 Separation of stresses by oblique incidence method.
- 12 Study of brittle coating method.

**Practical Examination shall consist of written test & viva-voce based on the syllabus & sessional work.**

### B.E. Civil Engineering-VIII<sup>th</sup> Sem

Course Code: CE – 819

Course: PROJECT (PHASE –II)

Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	6 hrs	6	100	100	200

The project work started in the seventh semester will continue in this semester. The students will complete the project work in this semester and present it before the assessing committee. The term work assessment committee as constituted in the seventh semester will assess the various projects for the relative grading and group average. The guides will award the marks for the individual students depending on the group average. Each group will submit the copies of the completed project report signed by the guide to the department. The head of the department and college principal will certify the copies and return them to the students. One copy will be kept in the departmental library.