DUMKA ENGINEERING COLLEGE

(ESTD BY GOVT. OF JHARKHAND AND RUN BY TECHNO INDIA UNDER PPP)

DUMKA, JHARKHAND-814101

(AFFILIATED TO SKMU, JHARKHAND)

Syllabus to be implemented from the Academic Year 2014

CIVIL ENGINEERING SEMESTER – V

SI No.	CODE	THEORY	Contacts periods Per week			Total	Credits
			L	T	P		
1	HU501	Economics for Engineers	3	0	0	3	3
2	CE501	Foundation Engineering	3	1	0	4	4
3	CE502	Design of RC Structures	3	1	0	4	4
4	CE503	Concrete Technology	3	0	0	3	3
5	CE504	Engineering Geology	3	0	0	3	3
TOTAL OF THEORY						**17**	**17**

A. THEORY:

B. PRACTICAL:

SI No.	CODE	THEORY	Contacts periods Per week			Total	Credits
			L	T	P		
6	CE591	Soil Mechanics Lab – II	0	0	3	3	2
7	CE 592	Concrete Laboratory	0	0	3	3	2
8	CE 593	Quantity Surveying, Specifications and Valuation	0	0	3	3	2
9	CE594	Engineering Geology Laboratory	0	0	3	3	2
TOTAL OF PRACTICAL						**12**	**8**
TOTAL OF SEMESTER						**29**	**25**

Economics for Engineers
HU-501
Contracts: 3L
Credits- 3

Module-I

1. Economic Decisions Making – Overview, Problems, Role, Decision making process.
2. Engineering Costs & Estimation – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per-Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.

Module-II

3. Cash Flow, Interest and Equivalence: Cash Flow – Diagrams, Categories & Computation, Time Value of Money, Debt repayment, Nominal & Effective Interest.
4. Cash Flow & Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits & drawbacks.

Module-III

5. Inflation And Price Change – Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.
6. Present Worth Analysis: End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.
7. Uncertainty In Future Events - Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options.

Module-IV

8. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.

9. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems.
10. Accounting – Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

Readings

1. James L.Riggs,David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E.Case,David B.Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R.Paneer Seelvan: Engineering Economics, PHI
6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pub

The hours allotted are lecture hours, the tutorial classes should be held accordingly to contact hours allotted subject wise

FOUNDATION ENGINEERING
Code: CE501
Contact: 3L + 1T
Credits: 4

SI No.	Details of Course Content	Hours	Total
1	**Earth pressure theories**: Plastic equilibrium of soil, Earth pressure at rest, Active & passive earth pressure, Rankine's & Coulomb's earth pressure theories, wedge method of analysis, estimation of earth pressure by graphical construction (Culmann Method).	4	36 + 12 for tutorial
2	**Retaining wall & sheet pile structures**: Proportions of retaining walls, stability checks, cantilever and anchored sheet piles, free earth and fixed earth method of analysis of anchoredbulk heads	6	
3	**Stability of slopes**: Analysis of finite and infinite slopes, Swedish And friction circle method, Taylor's stability number, Bishop's method of stability analysis	4	
4	**Site investigation & soil exploration**: Planning of sub-surface exploration, methods, sampling, samples, Insitu tests: SPT, SCPT, DCPT, Field vane shear, Plate load test	6	
5	**Shallow foundations** : Safe bearing capacity, Terzaghi's bearing capacity theory, effect of depth of embedment, water table, eccentricity of load, foundation shape on bearing capacity, Bearing capacity as per 1S 6403.	6	
6	**Settlement analysis of shallow foundation**: Immediate and consolidation settlement, correction for rigidity and dimensional effects, settlement in various types of soil, IS-1904and 8009 recommendations, Allowable bearing capacity	4	

7	**Deep foundations**: Pile: Types, load transfer mechanism, Determination of load carrying capacities of piles by static and Dynamic formulae, Recommendations of IS 2911, Pile group: Group efficiency, Negative skin friction, pile load test	6	

Text & References

SI No.	Name	Author	Publishers
1	Principles of Geotechnical Engineering	B.M. Das	Thomson
2	Principles of soil Mechanics & Foundation Engineering	VNS Moorthy	UBS Publication
3	Principles of Foundation Engineering	B.M. Das	Thomson
4	Foundation Analysis & Design	J.E. Bowels	Mc Graw Hill
5	Basic & Applied Soil Mechanics	Gopal Ranjan & A.S.R. Rao	Wiley Eastern Ltd
6	SP-36 (Part-I & Part-II)		
7	Relevant latest IS Codes (IS 6403, IS 1904, IS 8009, IS 2911)	Bureau of Indian Standard	

DESIGN OF RC STRUCTURES
Code: CE502
Contact: 3L + 1T
Credits: 4

SI No.	**Details of Course Content**	Hours	Total
1	Introduction: Principles of design of reinforced concrete members - Working stress and Limit State method of design	2	36 + 12 for tutorial
2	Working stress method of design: Basic concepts and IS code provisions (IS: 456 2000)for design against bending moment and shear forces - Balanced, under reinforced and over reinforced beam/ slab sections; design of singly and doubly reinforced sections	5	
3	Limit state method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment and shear forces; concepts of bond stress and development length; Use of 'design aids for reinforced concrete' (SP:16).	5	
4	Analysis, design and detailing of singly reinforced rectangular, 'T', 'L' and doubly reinforced beam sections by limit state method.	5	

5	Design and detailing of one-way and two-way slab panels as per IS code provisions	6	
6	Design and detailing of continuous beams and slabs as per IS code provisions	3	
7	Staircases: Types; Design and detailing of reinforced concrete doglegged staircase	3	
8	Design and detailing of reinforced concrete short columns of rectangular and circular cross sections under axial load. Design of short columns subjected to axial load with moments (uniaxial and biaxial bending) – using SP 16.	3	
9	Shallow foundations: Types; Design and detailing of reinforced concrete isolated square and rectangular footing for columns as per IS code provisions by limit state method	4	

- **Limit state method should be followed for serial number 4 to 9 as above as per IS 456 – 2000**

Text & References

SI No.	Name	Author	Publishers
1	IS: 456- 2000 "Indian Standard for Plain and reinforced concrete – code of practice"	Bureau of Indian Standard	
2	SP:16 Design Aid to IS 456		
3	Reinforced Concrete Design by	Pillai and Menon	TMH
4	Reinforced concrete Limit state design	Ashok K. Jain	
5	Reinforced concrete	S.N.Sinha	TMH
6	Fundamentals of reinforced concrete	N.C.Sinha and S.K. Roy	S.Chand &Co
7	Limit State Design of Reinforced Concrete	P. C. Varghese	PHI
8	Reinforced Concrete	S. K. Mallick and A. P. Gupta	Oxford IBH

CONCRETE TECHNOLOGY
Code: CE503
Contact: 3L
Credits: 3

SI No.	Details of Course Content	Hours	Total
1	Concrete as a Structural Material, Chemical Composition of Cement, Hydration of Cement, Heat of Hydration and Strength, Tests on Cement and Cement Paste – fineness, consistency, setting time, soundness, strength Quality of Water – Mixing Water, Curing Water, Harmful Contents	6	36
2	Types of Portland Cement – ordinary, Rapid hardening, low-heat, sulphate resisting, Portland slag, Portland pozzolana, super sulphated cement, white cement	4	
3	Aggregates – Classification, Mechanical and Physical Properties, Deleterious Substances, Alkali-Aggregate Reaction, Sieve Analysis, Grading Curves, Fineness modules, Grading Requirements. Testing of Aggregates – Flakiness, Elongation Tests, Aggregate Crushing Value, Ten Percent Fines Value, Impact Value, Abrasion Value	8	
4	Properties of Fresh Concrete – Workability, Factors Affecting Workability, Slump Test Compacting Factor Test, Flow Table Test, Segregation, Bleeding, Setting Time, Mixing and Vibration of Concrete, Mixers and Vibrators, Curing methods, Maturity.	6	
5	Strength of Concrete – Water/Cement ratio, Gel/Space ratio, Strength in Tension, Compression, Effect of Age on Strength, Relation between Compressive and Tensile Strength, Fatigue Strength, Stress Strain Relation and Modulus of Elasticity, Poisson's Ratio, Shrinkage and Creep, Compression Test on Cubes, Cylinders, Introduction to Non-Destructive Tests (Rebound hammer & Ultrasonic pulse velocity)	6	
6	Admixtures – different types, effects, uses, Retarders and Super plasticizers. Mix Design by I.S. 20262 (2009). Light-weight, Polymer and Fibre-reinforced concrete	6	

Text & References

SI No.	Name	Author	Publishers
1	Concrete Technology	Neville	Pearson Education
2	Concrete Technology	M.S. Shetty	S.Chand
3	Concrete Technology	A. R. Santakumar	OXFORD University Press
4	Concrete Technology	OXFORD University Press	Tata McGraw Hill
5	Text book of Concrete Technology	P.D. Kulkarni	Tata McGraw Hill

Engineering Geology
CE-504
Contracts: 3L
Credits- 3

SI No.	Details of Course Content	Hours
1	Geology and its importance in Civil Engineering.	2
2	Mineralogy: Definition, internal and external structure of minerals, study of crystals, Classification and physical properties of minerals.	3
3	Classification of rocks: Igneous rocks: Origin, mode of occurrence, forms & texture, classification and engineering importance. Sedimentary rocks: Process of sedimentation, classification and engineering importance. Metamorphic rocks: Agents and types of metamorphism, classification and engineering importance.	4
4	Weathering of rocks: Agents and kinds of weathering, soil formation & classification based on origin.	3
5	Geological work of rivers: Origin and stages in the system, erosion, transportation and deposition.	1
6	Structural geology: Introduction to structural elements of rocks, dip & strike, definition, description, classification of folds, faults and joints, importance of geological structures in Civil Engineering.	4
7	Earthquakes and seismic hazards: Causes and effects, seismic waves and seismographs, Mercelli's intensity scale and Richter's scale of magnitude.	3
8	Engineering properties of rocks: Porosity, permeability, compressive strength, tensile strength and abrasive resistance.	3
9	Rocks as construction materials: Qualities required for building and ornamental stones, foundations, concrete aggregate, railway ballast, road metal, pavement, flooring and roofing.	4
10	Geophysical exploration: Methods of Geophysical Exploration, electrical resistivity method field procedure – sounding and profiling, electrode configuration, and interpretation of resistivity data. Geophysical surveys in ground water and other Civil Engg. Projects.	4
11	Applied Geology: Surface and subsurface geological and geophysical investigations in major Civil Engg. Projects. Geological studies of Dams and reservoir sites, Geological studies for selection of tunnels and underground excavations.	4
12	Landslides: Types of landslides, causes, effects and prevention of landslides.	3

Text & References

SI No.	Name	Author	Publishers
1	Engineering and General Geology	Parvin Singh	Katson publishing house Delhi 1987
2	Engineering Geology for Civil Engineers	D. Venkat Reddy,	Oxford, IBH, 1995.
3	Principles of petrology	Tyrell	Asia, Bombay
4	Structural Geology	Marland P. Billings	Wiley eastern Prentice-Hall, U.S.A.
5	Ground Water hydrology	Todd D.K.	John Wiley & Sons, Second edition, 1980.

Practical

Soil Mechanics Lab.-II
Code-CE591
Contact: 3P
Credit –2

Determination of compressibility characteristics of soil by Oedometer test (co-efficient of consolidation & compression
Index)
Determination of unconfined compressive strength of soil
Determination of Shear parameter of soil by Direct shear test
Determination of undrained shear strength of soil by Vane shear test.
Determination of shear parameter of soil by Triaxial test (UU)
Standard Penetration Test
Expt No. 6 by large groups in the field.

References
1. Soil testing by T.W. Lamb (John Willey)
2. SP-36 (Part-I & Part –II)
3. Soil Mechanics Laboratory Manual by B. M. Das, OXFORD UNIVERSITY PRESS
4. Measurement of engineering properties of soil by E.Jaibaba Reddy & K. Ramasastri.

CONCRETE LABORATORY
Code CE 592
Contact: 3P

Credits: 2

1. Tests on cement – specific gravity, fineness, soundness, normal consistency, setting time, compressive strength on cement mortar cubes
2. Tests on fine aggregate – specific gravity, bulking, sieve analysis, fineness modules, moisture content , bulk density and deleterious materials.
3. Tests on coarse aggregate - specific gravity, sieve analysis, fineness modulus, bulk density.
4. Tests on Fresh Concrete: Workability: Slump, Vee-Bee, Compaction factor tests
5. Hardened Concrete: Compressive strength on Cubes, Split tensile strength, Static modulus of elasticity, Flexure tests, Non destructive testing (Rebound hammer & Ultrasonic pulse velocity)
6. Mix Design of Concrete.

References:
1. Relevant latest IS codes on Aggregates, Cement & Concrete [269, 383, 2386, 10262(2009), SP23]
2. Laboratory manual of concrete testing by V.V. Sastry and M. L. Gambhir

Quantity Surveying, Specification and Valuation
Code-CE 593
Contact: 3P
Credits- 2

Quantity Surveying: Types of estimates, approximate estimates, items of work, unit of measurement, unit rate of payment.
Quantity estimate of a single storied building
Bar bending schedule.
Details of measurement and calculation of quantities with cost, bill of quantities, abstract of quantities.
Estimate of quantities of road, Underground reservoir, Surface drain, Septic tank.
Analysis and schedule of rates: Earthwork, brick flat soling, DPC, PCC and RCC, brick work, plastering, flooring and finishing, Specification of materials: Brick, cement, fine and coarse aggregates
Specification of works: Plain cement concrete, reinforced cement concrete, first class brickwork, cement plastering, pointing, white washing, colour washing, distempering, lime punning, painting and varnishing
Valuation: Values and cost, gross income, outgoing, net income, scrap value, salvage value, market value, Book Value, sinking fund, capitalised value, Y. P., depreciation, obsolescence, deferred income, freehold and leasehold property, mortgage, rent fixation, valuation table .

References:
1. Estimating, costing, Specification and Valuation in Civil Engineering by M..Chakroborty
2. Estimating and Costing in Civil Engineering" by B.N.Dutta, USB Publishers & Distributers
3. Civil Estimating, Costing and Valuation by Agarwal / Upadhay

Engineering Geology Lab
Code-CE 593
Contact: 3P
Credits- 2

Serial No	Experiment on
1	Study of crystals with the help of crystal models
2	Identification of Rocks and Minerals [Hand Specimens]
3	Microscopic study of Rocks and minerals
4	Study of Geological maps, interpretation of geological structures Thickness problems, Bore-hole Problems

CIVIL ENGINEERING SEMESTER –VI

A. THEORY							
Sl.No.	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	TOTAL	
1.	HU601	Principles of Management	2	0	0	2	2
2.	CE601	Highway & Transportation Engineering	3	0	0	3	3
3.	CE602	Design of Steel Structure	3	0	0	3	3
4.	CE603	Construction Planning and Management	3	0	0	3	3
5.	CE604	Professional Elective – I	3	0	0	3	3
6.	CE605	Free Elective – I	3	0	0	3	3
TOTAL THEORY			17	0	0	17	17
B. PRACTICAL / SESSIONAL							
Sl.No.	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	TOTAL	
7.	CE691	Highway & Transportation Engg Lab	0	0	3	3	2
8.	CE692	Detailing of RC and Steel Structures	0	0	3	3	2
9.	CE693	CAD Laboratory	0	0	3	3	2
10.	CE681	Seminar	0	0	3	3	2
Total Practical			0	0	12	12	8
Total Semester			17	0	0	29	25

Professional Elective – I

1. CE604A : Bridge Engineering
2. CE604B : Prestressed Concrete
3. CE604C : Structural Dynamics and Earthquake Engineering

Free Elective – I

1. CE605A : Operations Research(M)
2. CE605B : Human Resource Management(HSS)
3. CE6505C : Materials Handling(ME)

Principles of Management
Code: HU601
Contact: 2L
Credits: 2

Module-I
1. Basic concepts of management: Definition – Essence, Functions, Roles, Level.
2. Functions of Management: Planning – Concept, Nature, Types, Analysis, Management by objectives; Organisation Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management; Organisational Effectiveness.

Module-II
3. Management and Society – Concept, External Environment, CSR, Corporate Governance, Ethical Standards.
4. People Management – Overview, Job design, Recruitment & Selection, Training & Development, Stress Management.
5. Managerial Competencies – Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurship.

Module-III
6. Leadership: Concept, Nature, Styles.
7. Decision making: Concept, Nature, Process, Tools & techniques.
8. Economic, Financial & Quantitative Analysis – Production, Markets, National Income Accounting, Financial Function & Goals, Financial Statement & Ratio Analysis, Quantitative Methods – Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control.

Module-IV
9. Customer Management – Market Planning & Research, Marketing Mix, Advertising & Brand Management.
10. Operations & Technology Management – Production & Operations Management, Logistics & Supply Chain Management, TQM, Kaizen & Six Sigma, MIS.

Readings:
1. Management: Principles, Processes & Practices – Bhat, A & Kumar, A (OUP).
2. Essentials for Management – Koontz, Revised edition, Tata McGraw Hill (TMH)
3. Management – Stoner, James A. F. (Pearson)
4.Management - Ghuman, Tata McGraw Hill(TMH)

Highway & Transportation Engineering
Code: CE601
Contact: 3L
Credits: 3

1.**Introduction to Highway Engineering**: Scope of highway engineering; Jayakar CommitteeReport; saturation system; highway financing ('pay as you go method and credit financing method) and highway economicsm (quantifiable and non quantifiable benefits to highway users, cost ofvehicle operation, annual cost method, and benefit-cost ratio method)……..2L

2 **Highway Alignment: Requirements**: factors controlling alignment; engineering surveys forhighway alignment and location…….2L

3 **Highway Geometric Design**: Cross-sectional elements; design speed, passing and non-passing sight distances; PIEV theory, requirements and design principles of horizontal alignment including radius of curvature, super elevation, extra-widening, design of transition curves, curve resistance, set back distance, grade compensation and vertical alignment. ……12L

4 **Pavement design**: Evaluation of soil subgrade, sub-base, base and wearing courses; design factors for pavement thickness (including design wheel load and ESWL, strength of pavement materials and plate load tests, and effect of climatic variations) Group Index and CBR, IRC method of flexible pavement design; Westergaards analysis of wheel load stresses in rigid pavements; frictional stresses and warping stresses; IRC recommendations for design of rigid pavements design of expansion and contraction joints. Benkelmen Beam Test, Fialure of flexible and rigid pavements……8L

5 **Pavement construction Technique**: Types of pavement; construction of earth roads, gravel roads, WBM, bitumen and cement concrete roads; joints in cement concrete pavements…….4L

6 **Traffic Engineering**: Traffic characteristics, theory of traffic flow, intersection design, traffic sign and signal design, highway capacity…….8L

7 **Road Materials and Testing**: Soil, Stone Aggregate, Bitumen, Marshal Stability Test **
**** To be covered in CE 691 (Highway and Transportation Engineering Lab)**

Text & References

1 High Way Engineering Khanna& Justo Nemchand& Brothers, Roorkee
2 Principles of Transportation Engineering P. Chakraborty & A. Das
3 Transportation Engineering- C.J Khisty & B.K Lal
4 I.S Specifications on Concrete, Aggregate & Bitumen, Bureau of Indian Standard
5 Relevant latest IRC Codes (IRC-37 – 2001, IRC 58 – 2002, IRC 73 -1980, IRC 86 - - 1983, IRC 106 – 1990, IRC 64 – 1990,IRC 15-2002Indian Road Congress

Design of Steel structure

Code: CE602
Contact: 3L
Credits: 3

1 Materials and Specification :-Rolled steel section, types of structural steel , specifications……2l

2 Structure connections: Riveted, welded and bolted including High strength friction grip bolted joints. – types of riveted & bolted joints, assumptions, failure of joints ,efficiency of joints, design of bolted ,riveted & welded joints for axial load.
ii) Eccentric connection:- Riveted & bolted joints subjected to torsion & shear, tension & shear, design of riveted, bolte & welde dconnection……..8l

3 Tension members: Design of tension members, I.S code provisions. Permissible stresses, Design rules, Examples…….3l

4 Compression members: Effective lengths about major & minor principal axes, I.S code provisions.Permissible stresses, Design rules, Design of one component, two components and built up compression members under axial load. Examples. Built up columns under eccentric loading: Design of lacing and batten plates, Different types of Column Bases- Slab Base , Gusseted Base, Connection details……8l

5 Beams: Permissible stresses in bending, compression and tension. Design of rolled steel sections, plated beams. simple Beam end connections, beam -Column connections. I.S code provisions……4l

6 Plate girders: Design of webs & flanges, Concepts of curtailment of flanges – Riveted & welded web stiffeners, web flange splices - Riveted, welded& bolted……..6l

7 Gantry Girder: Design gantry girder considering lateral buckling – I.S code provisions. ……..5l

Text & References

1 Design of Steel structures N. Subramanian Oxford University Press
2 Design Of Steel Structures - S.K.Duggal Tata Mc-Graw Hill , New Delhi
3 Design of steel structures A.S.Arya and J.L.Ajmani Nemchand& Bros.,
4 Design of steel structures, Vol. I & II Ramachandra
5 Design of steel structures PasalaDayaratnam – A.H.Wheeler& Co Ltd. 1990
6 Design of steel structures B.S.Krishnamachar and D.AjithaSinha –Tata McGraw – Hill publishing Co.Delhi.

7 Design of steel structures Ramamurtham 8 IS 800 – 2007(Latest Revised code) Bureau of Indian Standard9 S.P.: 6(1) – 1964 Structural SteelSections Bureau of Indian Standard.

Construction Planning &Management

Code :–CE603
Contact : 3L
Credits : 3

1 **Planning**: General consideration, Definition of aspect, prospect, roominess, grouping, circulation privacy, acclusion……2l

2 **Regulation and Bye laws** : Bye Laws in respect of side space, Back and front space, Covered areas, height of building etc., Lavatory blocks , ventilation, Requirements for stairs, lifts in public assembly building, offices…..4l

3 **Fire Protection**: Fire fighting arrangements in public assembly buildings, planning , offices, auditorium…..2l

4 **Construction plants & Equipment**: Plants & equipment for earth moving, road constructions, excavators, dozers, scrapers, spreaders, rollers, their uses. Plants &Equipment for concrete construction: Batching plants, Ready Mix Concrete, concrete mixers, Vibrators etc., quality control ……..8l

5 **Planning &Scheduling of constructions Projects:** Planning by CPM &PERT,Preparation of network, Determination of slacks or floats. Critical activities. Critical path, project duration .expected mean time , probability of completion of project, Estimation of critical path, problems…**……**8l

6 Management: Professional practice, Defination, Rights and responsibilities of owner, engineer, Contractors, types of contract……4l

7 **Departmental Procedures:** Administration, Technical and financial sanction, operation of PWD, Tenders and its notification, EMD and SD, Acceptance of tenders, Arbritation……8l

*** Serial 1, 2, 3 are as per National Building Code**

Text & References:

1 Construction Planning, Equipments and methods Puerifoy, R.L. McGraw Hill.
2 Management in construction industry P.P.Dharwadkar Oxford and IBH Publishing company New Delhi
3 Construction Management, Critical path Methods in Construction, J.O.Brien Wiley Interscience
4 PERT and CPM L.S. Srinath
5 Project planning and control with PERT and CPM' Construction equipments and its management B.C.Punmia and K.K.Kandelwal S.C.Sharma
6 National Building code BIS

Bridge Engineering Bridge — Professional Elective

Code : CE 604A
Contact : 3L
Credits :3

1 **Introduction, -** Definition and Basic Forms, Component of bridge, classification of bridge, short history of bridge development. I.R.C Loads. Analysis of IRC Loads, Impact factors, Other loads to be considered, Importance of Hydraulic factors in Bridge Design……4l

2 **Reinforced concrete solid slab bridge**: Introduction, General design features, Effective width method. Simply supported and cantilever Slab Bridge, analysis and design …….8l
3 **Box Culvert:** Introduction, Design method and Design example……. 2l

4 **Beam and Slab Bridges** Introduction, Design of interior panel of slab. Pigeauds method, Design of longitudinal girder, Calculation of longitudinal moment, design example…….6l

5 **Balanced Cantilever Bridges:** General Features, Arrangement of supports, design features Articulation, Design example……5l

6 **Steel Bridges:** General features, types of stress, Design example……. 3l

7 **Plate Girder Bridge**: Elements, design, lateral bracing, Box- girder Bridges…….. 3l

8 **Composite Bridges:** General aspects, method of construction, analysis of composite section, shear connectors, design of composite beam…….3l

9 **Cable Stayed Bridge:** General features, Philosophy of design. ……...2l

References:
1 Principle & Practice of Bridge Engineering S.P. Bindra– DhanpatRai Pub
2 Essentials of bridge engineering D.J. Victor
3 Bridge engineering Ponnuswamy
4 Design of Bridge Structures T.R. Jagadesh, M.A. Jayaram
5 Bridge engineering by Krishnaraju
6 Design of concrete bridges by Aswani, Vizirani , Ratwani
7 Design of steel structures Arya&Ajmani
8 Concrete Structures Vaziram&Ratwani
9 Structures design and drawing Krishnamurthy
10 Relevant IS & IRC codes

Prestressed Concrete
Code : CE604B
Contact :– 3L
Credits :3

1 **Introduction of Prestressed concrete**: Materials, prestressing system, analysis of prestress and bending stress, losses Shear and torsional resistance: design of shear reinforcement, design of reinforcement for torsion shear and bending. Deflections of prestressed concrete members: Importance, factors, short term and long term deflection …….7l

2 **Limit state design criteria**: Inadequacy of elasticand ultimate load method, criteria for limit states, strength and serviceability. Design of sections for flexure: methods by Lin and Magnel……6l
3 **Anchorage Zone stresses in post tensioned members**: Stress distribution in end block, anchorage zone reinforcement……..5l
4 **Composite construction of prestressed and in-situ concrete**: Types, analysis of stresses **Statically Indeterminate structures**: advantages of continuous member, effect of prestressing, methods of achieving continuity and method of analysis of secondary moments…….l8
5 **Prestressed concrete poles and sleepers**: Design of sections for compression and bending……5l

6 **Partial prestressing and non prestressed reinforcement……** 5l

References:

1 Prestressed Concrete, Fourth Edition, N Krishna Raju McGraw Hill
2 Design of Prestressed Structures, T.Y.Lin and N.H.Burns, Wiley Eastern Ltd
3 Fundamentals of Prestressed Concrete, N.C.Sinha and S.K.Roy
4 Prestressed Concrete, S.Ramamurthan

Structural Dynamics & Earthquake Engineering

Code :CE 604C
Contact : 3L
Credits : 3

1 **Theory of vibrations**: Degrees of freedom, Undamped single degree freedom system, Damped single degree freedom system, Natural frequency, modes of vibration, Introduction to multiple degreefreedom system……..6l

2 **Response of single degree freedom system due to harmonic loading**: Undamped harmonic excitation, Damped Harmonic excitation …….8l

3 **Response due to Transient loading**: Duhamel's Integral, Response due to constant force, Rectangular load, Introduction to numerical evaluation of Duhamel's integral of undamped system…… 6l

4 **Elements of seismology**: Fundamentals: Elastic rebound theory, Plate tectonics, Definitions of magnitude, Intensity, Epicenter etc., Seismographs, Seismic zoning, Response of Simple Structural Systems……4l

5 **Principles of earthquake resistant design**: Terminology, General principles and Design criteria, Methods of Analysis, Equivalent lateral force method of Analysis for multistoried building as per Indian Standard Code of Practice, Introduction to Response Spectrum Method, Fundamental concepts of Ductile detailing……12l

References:

1 Structural Dynamics (Theory and Computation) Mario Paz. CBS Publishers and Distributor
2 Dynamics of Structure (Theory and Application to Earthquake Engineering) A.K.Chopra Pearson Education
3 Elements of Eathquake Engineering Jai Krishna, A. R. Chandrashekhar and Brijesh Chandra South Asian Publishers
4 Earthquake Resistant Design D. J. Dowrick John Willey & Sons
5 IS 1893 (Part 1): 2002, IS 3920, IS 4326 -------- Bureau of Indian Standard

Free Elective

Operation Research

CE605A
Contact: 3L
Credits: 3

Module I

Linear Programming Problems (LPP):

Basic LPP and Applications; Various Components of LP Problem Formulation. **Solution of Linear Programming Problems**: Solution of LPP: Using Simultaneous Equations and Graphical Method; Definitions: Feasible Solution, Basic and non-basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and explanation with examples. **5L**

Solution of LPP by Simplex Method; Charnes' Big-M Method; Duality Theory.Transportation Problems and Assignment

Problems…… **12L**

Module II

Network Analysis:

Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded). ……..**6L**

Inventory Control: Introduction to EOQ Models of Deterministic and Probabilistic ; Safety Stock; Buffer Stock…**……..3L**

Module III

Game Theory:

Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance……**5L**

Module IV

Queuing Theory:

Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1): (∞ / FIFO) and (M/M/1: N / FIFO) and problems…….**5L**

Text Books:

1. H. A. Taha, "Operations Research", Pearson
2. P. M. Karak – "Linear Programming and Theory of Games", ABS Publishing House
3. Ghosh and Chakraborty, "Linear Programming and Theory of Games", Central Book Agency
4. Ravindran, Philips and Solberg - "Operations Research", WILEY INDIA

References:

1. KantiSwaroop — "Operations Research", Sultan Chand & Sons
2. Rathindra P. Sen—"Operations Research: Algorithms and Applications", PHI
3. R. Panneerselvam - "Operations Research", PHI
4. A.M. Natarajan, P. Balasubramani and A. Tamilarasi - "Operations Research", Pearson
5. M. V. Durga Prasad – "Operations Research", CENGAGE Learning
6. J. K. Sharma - "Operations Research", Macmillan Publishing Company

Human Resource Management (HSS)

CE605B
Contact: 3L
Credits: 3

Introduction : HR Role and Functions, Concept and Significance of HR, Changing role of HR managers - HR functions and Global Environment, role of a HR Manager.

Human Resources Planning : HR Planning and Recruitment: Planning Process - planning at different levels – Job Analysis - Recruitment and selection processes - Restructuring strategies - Recruitment-Sources of Recruitment-Selection Process- Placement and Induction-Retention of Employees.

Training and Development : need for skill upgradation - Assessment of training needs - Retraining and Redeployment methods and techniques of training employees and executives - performance appraisal systems.

Performance Management System : Definition, Concepts and Ethics-Different methods of Performance Appraisal-Rating Errors-Competency management.

Industrial Relations : Factors influencing industrial relations - State Interventions and Legal Framework - Role of Trade unions - Collective Bargaining - Workers' participation in management.

Case study.

Books :

1. Gary Dessler, Human Resource Management - (8th ed.,) Pearson Education, Delhi
2.Decenzo& Robbins, Personnel / Human Resource Management, 3rd ed., John Wiley & Sons (Pvt.) Ltd.
3. BiswajeetPatanayak, Human Resource Management, PHI, New Delhi
4. Luis R. Gomez, Mejia, Balkin and Cardy, Managing Human Resources PHI, New Delhi.

Materials Handling

CE605C
Contacts: 3L
Credits- 3

Module 1

Introduction: Definition, importance and scope of materials handling (MH); classification ofmaterials; codification of bulk materials ; utility of following principles of MH – (i) materials flow,(ii) simplification, (iii) gravity, (iv) space utilization, (v) unit size, (vi) safety, (vii) standardization, (viii) dead-weight, (ix) idle time,(x) motion……..4l

Module 2

Unit load: Definition; advantages & disadvantages of unitization; unitization by use of platform, container, rack, sheet, bag and self contained unit load; descriptive specification and use of pallets,skids, containers, boxes, crates and cartons; shrink and stretch wrapping. **Classification of MH Equipment :** Types of equipment – (i) industrial trucks & vehicles, (ii) conveyors, (iii) hoisting equipment, (iv) robotic handling systemand (v) auxiliary equipment; Independent equipment wise sub classification of each of abovetype of equipment……..6l

module 3

Industrial trucks & vehicles : Constructional features and use of the following equipment – (i) wheeled hand truck, (ii) hand pallet truck, (iii) fork lift truck; Major specifications, capacity rating and attachments of fork lift truck…….5l

Module 4

Conveyors : Use and characteristics of belt conveyor, constructional features of flat and troughed belt conveyor; Use and constructional features of Flg. types of chain conveyors – (i) apron, car and trolley type; Construction of link-plate chains; Dynamic phenomena in chain drive; Use and constructional features of roller conveyors; Gravity and powered roller conveyor; Pneumatic conveyor-use and advantages; Positive, negative and combination system of pneumatic conveyors; constructional feature, application and conveying capacity of screw conveyor…….8l

Module 5

Hoisting Equipment : Advantage of using steel wire rope over chain; constructional features of wire ropes; Rope drum design; Pulley system-simple vs. multiple pulley; Load handling attachments : hooks, grabs, tongs, grab bucket; Arrangement of hook suspension with cross piece and pulleys (sheaves); Use and constructional features of (i) hand operated trolley hoist , (ii) winch; (iii) bucket elevator, (iv) Jib crane, (v) overhead traveling crane and (vi) wharf crane; Level luffing system of a wharf crane; Utility of truck mounted and crawler crane……..8l

Module 6

Robotic handling : Materials handling at workplace; Major components of a robot; Applications of robotic handling.
Auxiliary Equipment : Descriptive specification and use of – (i) Slide and trough gates, (ii) belt, screw and vibratory feeders, (iii) Chutes, (iv) positioners like elevating platform, ramps, universal vise; (v) ball table…….5l

Books Recommended :

1. S. Ray, Introduction to Materials Handling, New Age Int. Pub.
2. T. K. Ray, Mechanical Handling of Materials, Asian Books Pvt. Ltd.
3. T.H. Allegri, Materials Handling: Principles and Practices, CBS Publishers and Distributors.
4. J.A. Apple, Material Handling System Design, John Wiley & Sons.

Practical

Highway Engineering Lab.
Code :CE691
Contact: 3P
Credits :2

Tests on highway materials – Aggregates- Impact value, Los-Angeles Abrasion value water absorption , Elongation & Flakiness Index.
Bitumen & bituminous materials: Specific gravity, penetration value, softening point, loss on heating, Flash & Fire point test. Stripping value test Design of B.C. & S.D.B.C. Mix CBR Test Marshal Stability Test Benkelman beam Test.

References:
BIS codes on Aggregates & Bituminous materials Highway material testing(Laboratory Manual)by S.K. Khanna and CE.G. Justo Relevant IS & I.R.C. codes.

Detailing of RCC & steel structures

Code : CE692
Contact :3P
Credits: 2

RCC structures
General considerations: Design principle of R.C.C. sections. Limit state method of design Loads and stresses to be considered in the design as per I.S. code provision. Design & detailing of a i) simply supported R.C.C Beam ii) Continuous T- Beam.
Design & Detailing of columns, isolated and combined footing Design & detailing of a i) simply supported one way slabii) One way Continuous slab. Design of different units: Slab, beam column, roofing and staircase from floor plan of a multistoried frame building, typical detailing of a two way floor slab.

Steel structures
Problems on general consideration and basic concepts Discussion on different loads (i.e. wind load, Dead load, live load and others) as per IS875 Design & drawing of the following components of a roof truss:
1. Members of the roof truss.
2. Joints of the roof truss members
3. Purlins
4. Gable bracings
5. Column with bracings
6. Column base plate
7. Column foundation

References:
I.S- 456-2000, SP 34, SP 16,I.S. 875, I.S. Code 800 – 2007, Standard text books on RCC & Steel Design

CAD Laboratory

Code CE: 693
Contact 3P
Credits: – 2

Introduction and important features ofa software dealing with analysis and design of structures Analysis and design of a multistoried building using software, Preparation of detailed drawings of different structural elements including ductility detailing RCC Slab, beam, column and footing design.

Syllabus to be implemented from the Academic Year 2014

CIVIL ENGINEERING SEMESTER – VII

SI No.	CODE	THEORY	Contacts periods Per week			Total	Credits
			L	T	P		
1	CE701	Environmental Engineering	3	0	0	3	3
2	CE702	Water Resource Engineering	3	0	0	3	3
3	CE703	Professional Elective II	3	0	0	3	3
4	CE704	Professional Elective III	3	0	0	3	3
5	CE705	Free Elective II	3	0	0	3	3
TOTAL OF THEORY						**15**	**15**

A. THEORY:

B. PRACTICAL:

SI No.	CODE	THEORY	Contacts periods Per week			Total	Credits
			L	T	P		
6	HU781	Group Discussion	0	0	3	3	2
7	CE791.	Environmental Engg Lab	0	0	3	3	2
8	CE792	Civil Engineering Practice Sessional	0	0	3	3	2
9	CE793	Free Elective Laboratory	0	0	3	3	2
10	CE782	Industrial Training	4 weeks duration during 6th-7th Semester break				2

11	CE783	Project Part I				6	2
TOTAL OF PRACTICAL						**18**	**12**
TOTAL OF SEMESTER						**33**	**27**

Free Elective II

CE705A Engineering Materials (ME303)

CE705B Electrical and Electronic Measurement (EE402)

Free Elective Lab

CE793A Material Testing Lab (ME493)

CE793B Electrical and Electronic Measurement Laboratory (EE492)

List of Electives:

Professional Elective – II

1. CE703A Advanced Foundation Engineering
2. CE703B Soil Stabilization and Ground Improvement Techniques
3. CE703C Advanced Highway and Transportation Engineering

Professional Elective – III

1. CE704A Advanced Structural Analysis
2. CE704B Hydraulic Structures

Environmental Engineering
Code – CE 701
Contact – 3L
Credits- 3

Module	**Broad Topic**	**Details of Course Content**	Hours	Total
1	Water Demand	Water demands; Per capita demand; Variations in demand; Factors affecting demand;Design period; Population forecasting	3	36
2	Sources of Water	Surface water sources; ground water sources	2	
3	Water Quality	Impurities in water; Water quality parameters; Standards for potable water	2	
4	Conveyance of water	Hydraulic design of pressurepipes	2	
5	Water Treatment	Typical flow chart for surface and ground water treatments; Aeration, Plain sedimentation, Sedimentation with coagulation, Water Softening, Filtration,Disinfection.	8	
6	Water Distribution	Analysis of distribution network;Storage and distribution reservoirs; Capacity of reservoirs	4	
7	Sewage and Drainage	Definition of Common Terms, Quantity estimation for sanitary sewage and storm sewage	3	
8	Sewer Design	Hydraulic design of sewers, Partial flow diagrams and Nomograms	3	
9	Wastewater Characteristics	Physical, chemical and biological characteristics, DO, BOD and COD	3	
10	Wastewater Treatment	Typical flow chart for wastewater treatment; Primary Treatments; Secondary Treatments: Activated Sludge Process, Trickling Filter Process, Septic Tank	6	

References:

SI No.	Name	Author	Publishers
1	Environmental Engineering,	S.K .Garg,	Khanna Publishers
2	Water Supply, Waste Disposal and Environmental Pollution Engineering, ,	A.K.Chatterjee	Khanna Publishers
3	Environmental Engineering, Vol.II	P. N. Modi,	
4	Environmental Modelling, ,	Rajagopalan	Oxford University Press.
5	Environmental Engineering	P. V. Rowe	TMH

Water Resource Engineering
Code – CE 702
Contact – 3L
Credits- 3

Module	Details of Course Content	Hours	Total
1	Catchment area and Hydrologic cycle, Measurement of rainfall – Rain gauges, Estimation of missing rainfall data, checking of consistency, Optimum number of Rain gauges. Calculation of average rainfall over area – different methods, Frequency analysis of rainfall intensity duration curve. Rainfall mass curve, hyetograph, Examples	4	36
2	Evaporation, evapo-transpiration and infiltration: Processes, Factors affecting run off, estimation of run-off, rainfall run off relationship	4	
3	Stream flow measurement: Direct and indirect methods, Examples. Stage discharge relationships	4	
4	Hydrographs; characteristics: Base flow separation. Unit Hydrographs. Derivation of unit hydrographs, S-curve, flood routing.	4	
5	Types of Irrigation systems, methods of irrigation: Water requirements of crops: Crop period or Base period, Duty & Delta of a crop, relation between Duty & Delta, Duty at various places, flow Duty & quantity Duty, factors affecting Duty, measures for improving Duty of water, crop seasons	4	
6	Canal Irrigation: Introduction, classification of irrigation canals, Efficient section, certain important definitions, Time factor, Capacity factor, full supply coefficient, Nominal duty, Channel losses, Examples.	2	
7	Design of unlined alluvial channels by silt Theories: Introduction, Kennedy's theory, procedure for design of channel by Kennedy's method, Lacey's theory, concept of True regime Initial regime and final regime, design procedure using Lacey's theory, examples	4	
8	Water logging and drainage: Causes, effects and prevention of waterlogging. Type of drains-open drains and closed drains (introduction only), Discharge and spacing of closed drains. Examples. Lining of Irrigation Canals : Objectives, advantages and disadvantages of canal lining, economics and requirements of canal lining, Design of lined Canals examples	6	
9	Introduction to ground water flow, Darcy law; Wells: Definition, Types-open well or Dug well, Tube well, open well-shallow open well, deep open well, cavity formation in open wells, construction of open wells, Yield of an open well – Equilibrium pumping test, Recuperating test, examples, Tube wells – Strainer type, cavity type, slotted type. Examples.	4	

References:

SI No.	Name	Author	Publishers
1	Engineering Hydrology	K. Subramanya	Tata McGraw-Hill
2	A Text Book of Hydrology- P.	Jaya Ram Reddy	Laxmi Publications-New Delhi
3	Hydrology & Water Resource Engineering-	S.K Garg	Khanna Publishers.
4	Hydrology Principles, Analysis and Design	H. M. Raghunath	
5	Hydraulics of Groundwater	J. Bear	McGraw-Hill
6	Water Resources Engineering Through Objective Questions	K. Subramanya	Tata McGraw-Hill
7	Irrigation & Water Power Engineering-	B.C Purnia, S Pande-	Standard Publication-New Delhi.
8	Irrigation Engineering	G.L Aswa	Wiley Eastern-New Delhi
9	Irrigation, Water Resource & Water Power Enginee ring-.	Dr. P.N Modi-	Standard Book House-New Delhi

Professional Elective II

Advanced Foundation Engineering
Code – CE 703A
Contact – 3L
Credits- 3

Module	Details of Course Content	Hours	Total
1	**Soil Exploration and Site Investigation** Planning of soil exploration programme, Field testing, Preparation of bore-log and soil investigation report Geo-physical exploration: Seismic refraction survey electrical resistively method	4	
2	**Shallow Foundations** Bearing Capacity from SPT and SCPT and Plate load Test data, Proportioning of footing based on settlement criteria. Beams on elastic foundation: Infinite beam, Finite beam, Modulus of sub-grade reaction and effecting parameters.	10	

	Raft Foundation: Settlement and Bearing Capacity analysis, Analysis of flexible and rigid raft as per IS 2950.		36
3	**Deep Foundations** Pile: Tension piles, Laterally loaded piles: Elastic continuum approach, Ultimate load Analysis, Deflection and maximum moment as per IS 2911, Pile load test Drilled Shaft: Construction procedures, Design Considerations, Load Carrying Capacity and settlement analysis Caissons: Types, Sinking and control.	8	
4	**Retaining walls and sheet pile structures** Gravity, cantilever and counter fort retaining walls: Stability checks and design Sheet Pile Structures: Cantilever sheet piling, Anchored sheet piling: Free and fixed earth support methods of Analysis, Braced Excavation	8	
5	**Design of foundation for vibration control** Elements of vibration theory, Soil- springs and damping constants, dynamic soil parameters, Types of Machine foundations, General consideration in designing dynamic bases.	4	
6	**Foundations on expansive soils**: Problems and Remedies	2	

References:

SI No.	Name	Author	Publishers
1	Foundation Analysis & Design	J.E. Bowels	McGraw Hill
2	Principles of Foundation Engineering	B.M. Das	Thomson Book
3	Foundation Design Manual	N. V. Nayak	Dhanpat Rai Publication Pvt. Ltd
4	Foundations for Machines: Analysis and design	ShamsherPrakash, Vijay K Puri	Wiley Series in Geotechnical Engineering
5	Advance Foundation Engineering	N. Som& S. C. Das	
6	Hand Book of Machine Foundation	P. Sirinivashalu& C.V. Vaiddyanathan	Tata McGraw Hill
7	IS –1904, 6403, 8009, 2950, 2911 etc		Bureau of Indian Standard

Soil Stabilisation & Ground Improvement Technique
Code – CE 703B

Contact – 3L
Credits- 3

Module	Details of Course Content	Hours	Total
1	**Soil Stabilization**: Introduction, Stabilization of soil with granular skeleton and soil without granular skeleton, common nomenclature of stabilized soil systems and stabilization methods, specific methods of soil stabilization: Stabilization with cement, lime fly-ash	8	36
2	**Insitu densification**: Introduction, Compaction: methods and controls Densification of granular soil**:** Vibration at ground surface, Impact at ground surface, Vibration at depth (Vibroflotation), Impact at depth. Densification of Cohesive Soils: Preloading and dewatering, Design of Sand drains and Stone columns, Electrical and thermal methods.	12	
3	**Geo-textiles**: Over view: Geotextiles as separators, reinforcement. Geotextiles in filtration and drainage, geotextiles in erosion control.	6	
4	**Grouting**: Over view: Suspension and Solution grout, Grouting equipment and methods, Grout design and layout, Grout monitoring schemes.	6	
5	**Soil stability**: Reinforced earth fundamentals, Soil nailing, Soil and Rock Anchors, Underpinning	4	

References:

SI No.	Name	Author	Publishers
1	Foundation Analysis & Design	J.E. Bowels	McGraw Hill
2	Principles of Foundation Engineering	B.M. Das	Thomson Book
3	Foundation Design Manual	N. V. Nayak	Dhanpat Rai Publication Pvt. Ltd
4	Construction and Geotechnical methods in foundation engineering	R.M. Koener	McGraw Hill
5	Technology in tunnelling and dam construction	A.V. Shroff. & D.L. Shah	Oxford and IBH Publishing Co.Pvt.Ltd
6	Reinforced Earth	T S Ingold	Thoam Telford
7	Designing with Geosynthetics	R M Koerner	Prentice Hall

Advanced Highway &Transportation Engineering
Code – CE 703C

Contact – 3L
Credits- 3

Module	Details of Course Content	Hours	Total
1	Traffic Engineering : Road user and vehicle characteristics; Traffic flow characteristics – Traffic Volume, Speed, Headway, Concentration and Delay; Traffic surveys & studies; Traffic estimation; Statistical applications in traffic engineering analysis; Parking; Road intersections – Basic traffic conflicts, classification of at-grade intersections, channelization, rotaries, traffic signals, signs and marking; Road Safety; Traffic System Management...	12	36
2	Transportation planning : Transportation planning at different levels; Transport Project planning – Planning studies and investigation; Elements of Urban Transportation Planning; Transport Demand Analysis; Preparation of Project Report	8	
3	Railway Engineering : Location surveys & alignment, Permanent way components, Gauges, Geometric Design, Points & crossings, Stations & Yards, Signalling, Track Maintenance	8	
4	Airport Engineering : Functional areas of airports: Runways, Taxiways, , Aprons, Terminal buildings; Classification of Airports; Airport site selection; Design of Runway, Runway orientation, Wind Rose diagram; Design of Taxiway and Terminal Building	8	

References:

SI No.	Name	Author	Publishers
1	Transportation Engineering	Khisty and Lal	PHI
2	A Text Book of Railway Engineering	S.P. Arora& S.C. Saxena	
3	Railway Engineering	Satish Chandra	Oxford University press
4	Transportation Engineering	Vazirani&Chandola	
5	Airport planning and Design	S.K.Khanna&M.G.Arora	
6	Airport Transportation Planning & Design-.	Virendra Kumar &Satish Chandra	Galgotia Publication Pvt. Ltd. New Delhi

Professional Elective III

Advanced Structural Analysis
Code – CE 704A
Contact – 3L
Credits- 3

Module	Details of Course Content	Hours	Total
1	Review of analysis of indeterminate structures; Force methods: Statically indeterminate structures (method of consistent deformations; theorem of least work) Displacement Methods: Kinematically indeterminate structures (slope-deflection method; moment distribution method). Matrix concepts and Matrix analysis of structures: Introduction; coordinate systems; displacement and force transformation matrices; Contra-gradient principle; element and structure stiffness matrices; Element and structure flexibility matrices; equivalent joint loads; stiffness and flexibility approaches. Matrix analysis of structures with axial elements: Plane Truss; Analysis by flexibility method Space trusses: Matrix analysis of beams and grids: Flexibility method for fixed and continuous beams: Stiffness method for grids: Matrix analysis of plane and space frames: Flexibility method for plane frames: Stiffness method for space frames:	18	36
2	Theory of Elasticity : Three dimensional stress and strain analysis, stress - strain transformation, stress invariants; equilibrium and compatibility equations, boundary conditions; Two dimensional problems in Cartesian, polar and curvilinear co-ordinates, bending of a beam, thick cylinder under pressure, complex variable, harmonic and bi-harmonic functions; Torsion of rectangular bars including hollow sections, bending problems; Energy principles, variational methods and numerical methods.	18	

References:

SI No.	Name	Author	Publishers
1	Matrix Methods of Structural Analysis	M.B. Kanchi.	
2	Analysis of Structures	T.S. Thandavamoorthy	Oxford University Press
3	Intermediate Structural Analysis	C.K. Wang	Mc Graw Hil
4	Theory of Elasticity	Timoshenko & Goodier	McGraw-Hill

Hydraulic Structures
Code – CE 704B
Contact – 3L

Credits- 3

Module	**Details of Course Content**	Hours	Total
1	Diversion Head works: Necessity, Difference between weir and Barrage, Type of Weirs, Selection of site, layout and description of each part, Effects of construction of a weir on the river regime, causes of failure of weirs on permeable foundation and their remedies	4	36
2	Theories of seepage and Design of weirs and Barrages: Failure of Hydraulic Structures Founded on Pervious foundations: i) By piping ii) By Direct uplift, Bligh's creep theory of seepage flow, Khosla's theory & concept of flownets, concept of exit gradient and critical exit gradient, Khosla's method of independent variable for determination of pressures and exit gradient for seepage below a weir or a barrage, necessary corrections, examples.	6	
3	Hydraulic structures for canals: Canal falls – necessity, locations, types and description of Ogee fall, Trapezoidal-notch fall, Syphon well drop. Examples.	4	
4	Cross-Drainage Works: Necessity, types, selection of a suitable type (Introduction only)	4	
5	Dam (General): Definition, classification of Dams, factors governing selection of type of dam, selection of suitable site for a dam.	2	
6	Earthen Dams: Introduction, Types of Earthen Dams, Methods of Construction, Causes of failure, Design Criteria, Determination of line of seepage or phreatic line in Earthen Dam, seepage control in Earthen Dam, Examples.	6	
7	Gravity Dam: Definition, Typical cross- section, Forces acting on Gravity Dam, Combination of forces for design, Mode of failure and criteria for structural stability of Gravity Dams, Principal and shear stresses. Elementary profile of a Gravity Dam, Concept of High and low Gravity Dam, Examples.	6	
8	Spillways: Types, Location, Essential requirements, spillway capacity. Components of spillway, Energy Dissipators, Stilling basins (Indian standard).	4	

References:

SI No.	Name	Author	Publishers
1	Irrigation Engineering and hydraulic structures.	Santosh Kumar Garg	Khanna Publishers.
2	Irrigation, water Resources and Water Power Engg.	Dr.P.N. Modi,	Standard Book House, Delhi-6

3	Water Resources Engineering Principle and practice	By SatyaNarayana Murthy Challa.	New Age Internation (P) Ltd. Publishers. New delhi,
4	Design of Small Dams.	US Department of the Interior Bureau of Reclamation.	McGraw Hill
5	Concrete Danms	R.S. Varsney,	Oxford & I & H Publishing Co. New Delhi

Free Elective II

Engineering Materials
Code – CE 705A
Contact – 3L
Credits- 3

SI No.	Syllabus	Hours
1	**Introduction:** Material Science—its importance in engineering; Classification of Materials—metals, polymers, ceramics, composites; Advanced materials semiconductors, smart materials, nano-materials; Review atomic structure, Atomic bonding in solids—bonding forces and energies; ionic/covalent/metallic bonding.	2
2	**Crystal Structure:** Fundamental concepts; Unit cells; seven crystal systems; single crystal, polycrystalline and non-crystalline materials; Metallic crystal structures—FCC, atomic packing factor, BCC & HCP structures.	2
3	**Imperfections in Metals:** Point defects due to vacancy & impurities, alloys, solid solutions; Dislocations—linear defects, interfacial defects, grain boundaries.	2
4	**Phase Diagrams:** Definition and basic concepts; solubility limit; Phase equilibria, one component phase diagram, binary phase diagram, interpretation of phase diagrams.	3
5	**Iron-carbon System:** allotropy of iron, iron-iron carbide phase diagram, properties and uses of plain carbon steel	2
6	**Classification of Metals and Alloys- compositions, general properties and uses:** **6.1 Ferrous alloys:** Classification –low carbon steels, medium carbon steels, high carbon steels, stainless steels, alloy steels, tool and die steel, cast irons.	6

	6.2 Non-ferrous alloys: Copper & Copper alloys; Aluminum alloys; Zinc alloys; Nickel alloys; Lead & Tin alloys;	
7	**Mechanical Properties of Materials:** Elastic properties of materials—tensile and compressive stress and strain, stress-strain behaviour, modulus of elasticity (Young's modulus), yield strength, tensile strength, plastic deformation, true stress and strain; Ductility; Resilience; Toughness, impact tests; Hardness- Brinell, Rockwell and Vickers hardness and their testing procedures, correlation between hardness and tensile strength; Fatigue strength; Effect of temperature on tensile strength & impact properties, creep failure.	6
8	**Heat Treatment:** Definition and purposes; Heat treatment processes for steels Hardening, structural change during heating and cooling, factors affecting hardening; Tempering; Austempering; Normalizing; Annealing—full annealing, spheroidising annealing, stress–relieving, recrystallisation annealing; Preciptation or Age Hardening of non-ferrous alloys.	4
9	**Polymers & Elastomers:** Definition; How polymers are made- polymerization; Polymer molecular structures; Thermoplastics & Thermosets; Special characteristics like low sp. gravity, optical, electrical & thermal property, decorative color, easy formability, low corrosion etc; Uses of polymers and elastomers.	2
10	**Ceramic Materials:** What is ceramics; common ceramic materials and their characteristics; How ceramics are made—sintering and vitrification process; Ceramic structures; Properties and applications.	2
11	**Composite materials:** What is composites; Polymers matrix and their applications; Metal matrix and ceramic matrix composites and their applications; How composites are made.	2
12	**Corrosion and Degradation of Engineering Materials:** Definition; Types of corrosion—uniform, pitting, crevice, galvanic, stress corrosion cracking and erosion; Corrosion control — material selection, environment control, proper design.	2
13	**Materials Selection Methodology:** Selection of material based on required properties, availability and cost of material, environmental issues	1

Books Recommended

1. Materials Science and Engineering by W.D. Callister and adapted by R. Balasubramaniam, Willey India, 2010 Ed.
2. Engineering Materials: properties and selection by Budinski & Budinski, 9th Ed., Prentice Hall India
3. Engineering Materials and Metallurgy by R.Srinivasan, 2nd Ed., Tata McGraw Hill.
4. Materials & Processes in Manufacturing by E.P.Degarmo and adapted by Black & Kosher, 10th Ed., Wiley India.
5. Materials Science and Engineering by V.Raghavan, 5th Ed., Prentice Hall India.

Electrical & Electronic Measurement
Code – CE 705B
Contact – 3L
Credits-3

Topic	No of periods
Module-I	
Measurements: Method of measurement, Measurement system, Classification of instruments, Definition of accuracy, Precision, Resolution, Speed of response, Error in measurement, Classification of errors, loading effect due to shunt and series connected instruments. **Analog meters:** General features, Construction, Principle of operation and torque equation of Moving coil, Moving iron, Electrodynamometer, Induction instruments Principle of operation of the Electrostatic, Thermoelectric, Rectifier type instruments, Extension of instrument ranges and multipliers.	3 3 3
Module-II	
Instrument transformer: Disadvantage of shunt and multipliers, Advantage of Instrument transformers, Principle of operation of Current & Potential transformer, errors. **Measurement of Power:** Principle of operation of Electro dynamic & Induction type wattmeter. Wattmeter errors. **Measurement of resistance:** Measurement of medium, low and high resistances, Megger.	4 3 4
Module-III	
Measurement of Energy: Construction, theory and application of AC energy meter, testing of energy meters. **Potentiometer:** Principle of operation and application of Crompton's DC potentiometer, Polar and Coordinate type AC potentiometer. Application. **AC Bridges:** Measurement of Inductance, Capacitance and frequency by AC bridges.	3 4 4
Module-IV	
Cathode ray oscilloscope (CRO): Measurement of voltage, current, frequency & phase by oscilloscope. Frequency limitation of CRO. Sampling and storage oscilloscope, Double beam CRO. **Electronic Instruments:** Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multimeter, Digital frequency meter, Signal generator.	3 4

Sensors & Transducers: Introduction to sensors & Transducers, Strain gauge, LVDT, Temperature transducers, Flow measurement using magnetic flow measurement.	3

Numerical Problems to be solved in the tutorial classes.

Text Books:

1. A course in Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney, Dhanpat Rai & sons.
2. Electrical Measurement & Measuring Instruments, E.W. Golding & F.C. Wides, Wheeler Publishing.
3. Electronic Instruments, H.S. Kalsi, Tata Mc-Graw hill, 2nd Edition.

Reference Books:

1. Sensors & Transducers, D. Patranabis, PHI, 2nd edition.
2. Digital Instrumentation, A.J. Bouwens, Tata Mc-Graw hill.
3. Modern Electronic instrumentation & Measuring instruments, A.D. Heltric & W.C. Copper, Wheeler Publication.
4. Instrument transducers, H.K.P. Neubert, Oxford University press.

Practical

Group Discussion
Code – HU
Contact – 3L
Credits- 2

Will be implemented latter

ENVIRONMENTAL ENGINEERING LAB
CODE: CE-791
CRDIT-2

Experiment No.	Experiment Name	Type of Test
1	Determination of turbidity for a given sample of water	Physical
2	Determination of color for a given sample of water	
3	Determination of solids in a given sample of water: Total Solids, Suspended Solids and Dissolved Solids	
4	Determination of pH for a given sample of water	Chemical
5	Determination of concentration of Chlorides in a given sample of water	
6	Determination of carbonate, bi-carbonate and hydroxide alkalinity for a given sample of water	
7	Determination of hardness for a given sample of water	
8	Determination of concentration of Fluorides in a given sample of water	
9	Determination of concentration of Iron in a given sample of water	
10	Determination of the Optimum Alum Dose for a given sample of water through Jar Test	
11	Determination of the Residual Chlorine in a given sample of water	
12	Determination of the Chlorine Demand for a given sample of water	
13	Determination of the Available Chlorine Percentage in a given sample of bleaching powder	
14	Determination of amount of Dissolved Oxygen (DO) in a given sample of water	
15	Determination of the Biochemical Oxygen Demand (BOD) for a given sample of wastewater	
16	Determination of the Chemical Oxygen Demand (COD) for a given sample of wastewater	

17	Determination of bacteriological quality of water: presumptive test, confirmative test and Determination of MPN	Bacteriological

CIVIL ENGINEERING PRACTICE SESSIONAL
CE 792
CREDIT 2

Course Content
Foundation Engineering
Stability Analysis of Slopes, Preparation of typical soil test report, Estimation of bearing capacity and settlement of foundation from typical field data, Structural design and detailing of isolated rectangular footing and combined footing.
Water Resource Engineering
Estimation of runoff, Field capacity and permanent wilting point Construction of hydrograph& S curve, efficient section of canal, Design of lined canals, Determination of yield of wells, flood routing

Environmental Engineering
Population forecasting, Analysis and design of water distribution network, Hydraulic design of sewer

Transportation Engineering
Determination of highway capacity, Highway geometric design, Design of flexible and rigid pavement, Traffic Signal Design

Material Testing lab
CE 793A
CREDIT 2

Impact tests: Charpy and Izod tests;
Test for drawability of sheet metals through cupping test;
Fatigue test of a typical sample.
Sample preparation and etching of ferrous and non-ferrous metals and alloys for metallographic observation;
Experiments on heat treatment of carbon steels under different rates of cooling including quenching, and testing for the change in hardness and observing its microstructural changes through metallographic studies.
Observation of presence of surface/ sub-surface cracks using different non-destructive techniques, such as dye penetration (DP) test, magnaflux test, ultrasonic or eddy current test.

(At least six experiments must be conducted)

Electrical & Electronics Measurement lab
CE 793B
CREDIT 2

List of Experiments:

1. Instrument workshop- Observe the construction of PMMC, Dynamometer, Electrothermal and Rectifier type of instruments, Oscilloscope and Digital multimeter.
2. Calibrate moving iron and electrodynamometer type ammeter/voltmeter by potentiometer.
3. Calibrate dynamometer type wattmeter by potentiometer.
4. Calibrate AC energy meter.
5. Measurement of resistance using Kelvin double bridge.
6. Measurement of power using Instrument transformer.
7. Measurement of power in Polyphase circuits.
8. Measurement of frequency by Wien Bridge.
9. Measurement of Inductance by Anderson bridge
10. Measurement of capacitance by De Sauty Bridge.
11. Measurement of capacitance by Schering Bridge.

Syllabus to be implemented from the Academic Year 2014

CIVIL ENGINEERING SEMESTER VIII

A-THEORY							
Sl no	**Field**	**Theory**	**Contacts per week**				**Cr. points**
			L	**T**	**P**	**toatl**	
1	HU801A HU801B	Organisational Behaviour/ Project Management	**2**	**0**	**0**	**2**	**2**
2	**CE801**	**Professional Elective IV**	**3**	**0**	**0**	**3**	**3**
3	**CE802**	**Professional Elective V**	**3**	**0**	**0**	**3**	**3**
Total Theory						**8**	**8**
B-PRACTICAL							
4	**CE891**	**Structural Engineering Design Practice**	**0**	**0**	**6**	**6**	**4**
5	**CE881**	**Project Part II**	**0**	**0**	**12**	**12**	**6**
6	**CE882**	**Grand – Viva**					**3**
Total Practical						**18**	**13**
Total of Semester						**26**	**21**

VIII Semester

Organisational Behaviour
HU801A
Contracts: 2L
Credits- 2

1. Organizational Behaviour: Definition, Importance, Historical Background, Fundamental Concepts of Challenges and Opportunities for OB. [2]

2. Personality and Attitudes: Meaning of personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction. [2]
3. Perception: Definition, Nature and Importance, Factors influencing Perception, Perceptual Selectivity, Link between Perception and Decision Making. [2]
4. Motivation: Definition, Theories of Motivation - Maslow's Hierarchy of Needs Theory, McGregor's Theory X &Y, Herzberg's Motivation-Hygiene Theory, Alderfer's ERG Theory, McClelland's Theory of Needs, Vroom's
   Expectancy Theory. [4]
5. Group Behaviour: Characteristics of Group, Types of Groups, Stages of Group Development, Group DecisionMaking. [2]
6. Communication: Communication Process, Direction of Communication, Barriers to Effective Communication.[2]
7. Leadership: Definition, Importance, Theories of Leadership Styles. [2]
8. Organizational Politics: Definition, Factors contributing to Political Behaviour. [2]
9. Conflict Management: Traditional vis-a-vis Modern View of Conflict, Functional and Dysfunctional Conflict,Conflict Process, Negotiation – Bargaining Strategies, Negotiation Process. [2]
10. Organizational Design: Various Organizational Structures and their Effects on Human Behaviour, Concepts ofOrganizational Climate and Organizational Culture. [4]

References:

1. Robbins, S. P. & Judge, T.A.: Organizational Behavior, Pearson Education, 15 th Edn.
2. Luthans, Fred: Organizational Behavior, McGraw Hill, 12 th Edn.
3. Shukla, Madhukar: Understanding Organizations – Organizational Theory & Practice in India, PHI
4. Fincham, R. & Rhodes, P.: Principles of Organizational Behaviour, OUP, 4 th Edn.
5. Hersey, P., Blanchard, K.H., Johnson, D.E.- Management of Organizational Behavior Leading Human Resources, PHI,10 th Edn.

Or

Project Management

HU801B

Contracts: 2L

Credits- 2

1. Project Management Concepts: Concept and Characteristics of a Project,Importance of Project Management.[1]
2. Project Planning: Project Evaluation, Financial Sources, Feasibility Studies. [4]
3. Project Scheduling: Importance of Project Scheduling, Work Breakdown Structure and Organization BreakdownStructure, Scheduling Techniques – Gantt Chart and LOB, Network Analysis – CPM/PERT. [6]
4. Time Cost Trade-off Analysis – Optimum Project Duration. [2]
5. Resource Allocation and Leveling. [2]
6. Project Life Cycle. [2]
7. Project Cost – Capital & Operating Costs, Project Life Cycle Costing, Project Cost Reduction Methods. [2]

8. Project Quality Management: Concept of Project Quality, TQM in Projects, Project Audit. [1]
9. Software Project Charateristics and Mangement [2]
10. IT in Projects: Overview of types of Softwares for Projects, Major Features of Project Management Softwares like MS Project, Criterion for Software Selection. [2]

References

1. Gopalkrishnan P. and Rama Mmoorthy: Text Book of Project Management, Macmillan
2. Nicholas John M.: Project Management for Business and Technology – Principles and Practice, Prentice Hall India, 2nd Edn.
3. Levy Ferdinand K., Wiest Jerome D.: A Management Guide to PERT/CPM with GERT/PDM/DCPM and othernetworks, Prentice Hall India, 2 nd Edn.
4. Mantel Jr., Meredith J. R., Shafer S. M., Sutton M. M., Gopalan M. R.: Project Management: Core Text Book,Wiley India, 1st Indian Edn.
5. Maylor H.: Project Management, Pearson, 3 rd Edn.
6. Nagarajan K.: Project Management, New Age International Publishers, 5th Edn.
7. Kelkar. S.A, Sotware Project Management: A concise Study, 2nd Ed., PHI

Professional Elective IV
Environmental Pollution and Control
Code – CE 801A
Contact – 3L
Credits- 3

Sl. No	Details of Course Content	Hours	Total
1	Introduction: Environment. Pollution, Pollution control	2	36
2	Air Pollution: Air Pollutants: Types, Sources, Effects; Air Pollution Meteorology: Lapse Rate, Inversion, Plume Pattern; Air Pollution Dispersion Model: Point Source Gaussian Plume Model, Stability Classes, Stability Charts, Design of Stack Height.	8	
3	Air pollution Control: Self cleansing properties of the environment; Dilution method; Engineered Control of Air Pollutants: Control of the particulates, Control of Gaseous Pollutants, Control of Air pollution from Automobiles.	8	
4	Noise Pollution: Definition; Sound Pressure, Power and Intensity; Noise Measurement: Relationships among Pressure, Power and Intensity, Levels, Frequency Band, Decibel Addition, Measures of community Noise i.e. L_N , L_{eq} , L_{dn} ,, L_{NP} ; Sources, ; Effects; Control.	4	

5	Water pollution: Pollution Characteristics of Typical Industries, Suggested Treatments.	4	
6	Global Environmental Issues: Ozone Depletion, Acid Rain, Global Warming-Green House Effects	4	
7	Administrative Control on Environment: Functions of Central and State Pollution Control Boards; Environmental Clearance Process for Industries and Infrastructural Projects	4	
8	Environmental Laws: Water Act, Air Act, Motor Vehicle Act	2	

References:

Sl no	Name	Author	Publisher
1	Introduction to Environmental Engineering and Science	G. Masters, W. Ela	PHI
2	Environmental Engineering: A Design Approach	A. Sincero, G. Sincero	PHI
3	Environmental Engineering	P. V. Rowe	TMH
4	Environmental Engineering	S.K . Garg	Khanna Publishers
5	Air Polution	Rao and Rao	TMH
6	Water Supply, Waste Disposal and Environmental Pollution Engineering, ,	A.K.Chatterjee	Khanna Publishers
7	Environmental Engineering, Vol.II,	P. N. Modi	
8	Environmental Modelling, ,	Rajagopalan	Oxford University Press.

Water Resources Management & Planning
Code – CE 801B
Contact – 3L
Credits- 3

Module	Details of Course Content	Hours	Total
1	**Planning and analysis of Water Resource Systems**: Introduction, System Analysis, Engineers and Policymakers	**3**	
2	**Methods of Analysis**: Introduction, Evaluation of Time streams of Benefits and Costs. Plan formulation, Planning models and solution procedures, Lagranges Multipliers, Dynamic Programming, Recursive	**8**	

	equations, Bellmans' principle of optimality. Curse of dimensionality of discrete dynamic programming. Examples		36
3	**Reservoir Operation**: Sequential process, single Reservoir problem - with release as decision variable, with storage as decision variable (deterministic approach). Examples, Related Computer Programming. Multi–reservoir problems (Deterministic approach**)**	**6**	
4	**Water Resources Planning under Uncertainty**: Introduction, probability concepts and Methods – Random variable and Distributions, Univariate probability Distributions ,properties of Random variable – Moment and Expectation (Univariate Distributions) , Moment Generating Functions, Measures of Central tendency, Measures of Dispersion, Measures of symmetry (Skewness), measures of peakedness (kurtosis), examples	**10**	
5	**Stochastic River Basin Planning Model**: Introduction, Reservoir operation, Stochastic, Dynamic programming, Operating Model, Probability Distribution of Storage volumes andReleases, examples	**6**	
6	**Water quality Management**: Prediction and Simulation, Water quality Management Modeling	**3**	

References:

Sl no	Name	Author	Publisher
1	Applied Hydrology	V.T. Chow	
2	Hydrology	Raudkivi	
3	Stochastic Hydrology	Jayarami Reddy	
4	Water Resources Engg.	M.C. Chaturvedi	
5	Water Resources Systems Planning & Analysis	Ddenice P Loucks, Jery R Stedinger& Douglas A Heinth	Prentice Hall, Inc New Jersy.
6	Water Resources Engineering	Larry W Mays	John Wiley & Sons(Asia)

Remote Sensing and GIS
Code – CE 801C
Contact – 3L Credits: 3

Sl no	Details of Course Content	Hours	Total
1	**Introduction**: Definition and types of remote sensing, Tacheometry (Planimetry/ altimetry),Triangulation (Frame work / adjustment), Trilateration (EDM/ Total Station), Geodetics (physical/geometrical geodesy), Error Analysis (causes / law of weights), Numerical	**7**	

	example		36
2	**Photogrammetry:** Camera System (phototheodolite/ aircraft), Ground photograph(oblique/orthogonal streophoto), Aerial photograph (perspective scale/ flight planning), distortion (relief / tilt), Geometrix (parallax / mapping), application (topographics / interpretation), Numericalexamples	**7**	
3	**Satellite survey**: Satellite Sensing (Sensors / platforms), energy sources (electromagnetic / atmospheric interaction), visual interpretation (Band width), digital processing (imageries /enhancement), data integration (multi-approach / GIS), microwave imaging (active system / radars),applications	**7**	
4	**Astronomy**: Celestial sphere (star-coordinates / transformation), field astronomy (azimuth, solar andpolar method), 3D computation (local vs global), spherical trigonometry, Multilateration, Observation, Corrections in astronomy, Correlation of low, medium, remote objects, Global Positioning Systems	**7**	
5	**Geoinformatics**: GIS concept (Introduction/ definition), planning and management, spatial data model, database and DBMS, linking of attributes, geospatial analysis, modern trends	**8**	

References:

Sl no	**Name**	**Author**	Publisher
1	Surveying (Volume 2):	Duggal S.K.	Tata McGraw Hill
2	Remote Sensing & GIS:	Bhatta B.	Oxford Univ Press
3	Geographic Information System:	Tor Bern Herdgen	Wiley
4	Surveying	Bannister, Raymond & Baker	Pearson Education
5	Remote Sensing & Image Interpretation:	Lilesand, Kiefer and Chipman	Wiley
6	Surveying (Volume 2):	Kanetker.&Kulkarni	
7	Remote Sensing & Geographical information System	Reddy M.A.	(BS publication)
8	Advanced Surveying	Rampal K.K.	
9	Fundamantals of Geographic Information System:	Demers M.N.	(Wiley)

Professional Elective V
Finite Element Method
Code – CE 802A
Contact – 3L Credits: 3

Sl no	Details of Course Content	Hours	Total
1	**Introduction to Finite Element Analysis**: Introduction, Basic Concepts of Finite Element Analysis, Steps in Finite Element Analysis, Fundamental concepts of Elasticity	4	36
2	**Finite Element Formulation Techniques**: Virtual Work and Variational Principle, GalerkinApproach, Displacement Approach, Stiffness Matrix and Boundary Conditions	4	
3	**Element properties**: Concepts of shape functions: Natural Coordinates, one dimensional, Triangular, Rectangular Elements, Lagrange and Serendipity Elements Isoparametric Formulation: Isoparametric Elements, Stiffness Matrix of Isoparametric Elements, **Numerical Integration**: One Dimensional, Two Dimensional	8	
4	Formation of stiffness matrices and analysis of Truss, Continuous Beam and Simple Plane Frame	6	
5	**FEM for two dimensional analysis**: Constant Strain Triangle, Linear Strain Triangle, Rectangular Elements, Numerical Evaluation of Element Stiffness, Computation of Stresses	6	
6	**FEM for Plates** : Introduction to Plate Bending Problems, Finite Element Analysis of Thin Plate	4	
7	Introduction to application of standard FEM software in civil Engineering	4	

Sl no	Name	Author	Publisher
1	Finite Element Method with Applications in Engineering	Y. Desai et. al	Pearson
2	Introduction to Finite Element in Engineering	Chandrapatla&Belegundu	Pearson Education
3	A First Course in Finite Element Method	D. L. Logan	Thomson
4	Surveying:	Bannister, Raymond & Baker	Pearson Education
5	Concepts and Applications of Finite Element Analysis	R. D. Cook et. al	Wiley India
6	Finite Element Analysis – Theory and Programming	C. S. Krishnamoorthy	Tata Mcgraw Hill
7	Matrix, Finite Element,Computer and Structural Analysis	M. Mukhopadhyay	Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India
8	Finite Element Procedures	K. J. Bathe	PHI, New Delhi,

			India

Dynamics of Soils and Foundations
Code – CE 802B
Contact – 3L Credits: 3

No	Details of Course Content	Hours	Total
1	**Introduction:** Types of Machine Foundations, General requirement of Machine foundations,Dimensional criteria, Design data, Permissible amplitude, Permissible Bearing pressure	2	36
2	**Fundamental of vibrations:** Degrees of freedom, Natural frequency, Undamped single degreefreedom system, Damped single degree freedom system, Transmissibility, Response to ground motion, Introduction to multiple degree freedom system	8	
3	**Dynamic properties of Soil, Laboratory and field evaluation of soil properties as per IS codes**;	8	
4	**Analysis and design of Block type Machine Foundation**: Modes of Vibrations, Methods of Dynamic Analysis, Design considerations for dynamically loaded foundations and constructional features; Design procedures for foundations for hammers, reciprocating engines , Vibration Isolation and damping	10	
5	**Liquefaction of soils:** Definition, Causes and effects of Liquefaction, Evaluation of Liquefaction potential, Mitigation of Liquefaction Hazards	6	
6	**Propagation of elastic waves in soils**: Mechanism of wave propagation, Body waves, Surface waves,Rayleigh waves	2	

References:

Sl no	Name	Author	Publisher
1	Hand Book of Machine Foundation	Srinivasalu & Vaidyanathan	TMH
2	Dynamics of Bases and Foundations	D. D. Barkan	Mc-Graw Hill
3	Geotechnical Earthquake Engineering	S. L. Kramer	Printice Hall
4	Earthquke Resistant Design	D. J. Dorwick	Wiley
5	Fundamentals of Soil Dynamics & Earthquake Engineering	B. B. Prasad	PHI

Design of Tall Buildings

Code – CE 802C
Contact – 3L
Credits: 3

Sl no	Details of Course Content	Hours	Total
1	**Introduction** : Necessity of Tall Buildings, Design Philosophy, Strength and Stability, Creep, Shrinkage and Temperature Effects, Fire, Foundation Settlement and Soil-Structure Interaction	6	36
2	**Loadings** : Gravity loading, Wind loading, Earthquake Loading, Combination of Loadings	6	
3	**Structural Forms** : Braced-Frame Structures, Rigid Frame Structures, Infilled-Frame Structures, Shear Wall Structures, Wall Frame Structures, Tubular Structures, Core Structures, Floor Systems – Reinforced Concrete : One-Way slab, Two-way slab, Floor Systems – Steel Framing, One-way Beam System, Two-Way Beam System, Three-Way Beam System, Composite Steel-Concrete Floor Systems	12	
4	**Modelling for Analysis** : Approaches to analysis, Highrise behaviour, Modeling for approximate analysis, Modelling for Accurate Analysis	4	
5	**Stability of High**-rise buildings, Buckling analysis of Frames	4	
6	**Dynamic Analysis** : Dynamic Response to Wind Loading, Dynamic Response to Earthquake Loading	4	

*The objective of this course is to introduce basic principles and design philosophy of tall buildings. Detail analytical treatment is not required.

Sl no	Name	Author	Piublisher
1	Tall Building Structures: Analysis and Design	Bryan S. Smith and Alex Coull	John Wiley & Sons, Inc, New York, 1991
2	Designing Tall Buildings	Mark Sarkinsian,	Routledge, New York, 2012
3	Structural Frameworks	Clyde T. Morris and Samuel T. Carpenter	John Wiley

Pavement Design
Code – CE 802D
Contact – 3L
Credits: 3

Sl no	Details of Course Content	Hours	Total
1	**Principles of Pavement Design** : Types of Pavements, Concept of pavement performance, Structural and functional failure of pavement, Different types of pavement performance, Different pavement design approaches	**6**	
2	**Traffic Consideration in Pavement Design** : Vehicle types, Axle	**6**	

	configurations, Contact shapes and contact stress distribution, Concept of standard axle load, Vehicle damage factor, Axle load surveys, Estimation of design traffic		36
3	**Pavement Material Characterization** : Identification of different type of materials Field and laboratory methods for characterization of pavement materials	**8**	
4	**Analysis and Design of Flexible Pavements** : Selection of appropriate theoretical model for flexible pavements, Analysis of different layers of flexible pavements based on linear elastic theory, Different methods of design of flexible pavements, IRC guidelines(IRC-37)	**6**	
5	**Analysis and Design of Rigid Pavements** : Selection of appropriate theoretical models for rigid pavements, Analysis of wheel load stresses, curling, temperature differential, Critical stress combinations, Different methods of design of rigid pavements, IRC guidelines (IRC-58)	**6**	
6	**Pavement Overlay Designs** : Overlay design as per Indian Roads Congress guidelines (IRC-81) Overlay design as per AASHTO-1993 guidelines	**4**	

References :

Sl no	Name	Author	Publisher
1	Principles of Pavement Design	E.J.Yoder and M.W. Witczak	Wiley
2	Pavement Analysis and Design	Y. H. Huang	Prentice-Hall
3	Highway Engineering	Khanna and Justo	Nem Chand
4	IRC-37, IRC-58, IRC-73, IRC-81, IRC-106 and other relevant IRC codes	Indian Roads Congress	

Structural Engineering Design Practice
Code – CE 891
Contact – 6P Credits: 4

Sl no	Details of Course Content	Hours	Total
1	**Water Tanks** : Beams curved in plan, Domes, Circular and Intze Tanks, Rectangular Tanks, Underground Tanks	**8**	

2	**Pipes, Silos & Chimneys** : Reinforced concrete pipes, Bunkers and Silos, Chimeneys	**8**	
3	**Aqueducts and Box Culverts, Concrete Bridges** : Type of load, Impact Effect, Design of T-beam bridge	**20**	
4	**Plate Girders** : Design of Web, Design of flanges, Intermediate Vertical Stiffners, Horizontal Stiffners, Bearing Stiffners, Horizontal Stiffners	**12**	
5	**Roof trusses** : General, Roof and Side Coverings, Design Loads, Purlins, Members, End Bearings, Industrial Building Frames, Framing, Bracing, Crane Girders and Columns	**12**	72
6	**Steel Bridges** : Plate girder bridges	**12**	