B.E. Civil Engineering, VII Sem

COURSE CODE: CE -701 COURSE: IRRIGATION ENGINEERING

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
I	GENERAL: Necessity and importance of Irrigation Engineering, Benefits & effects of Irrigation, Classification of Irrigation, General principles of flow, lift, perennial, inundation Irrigation systems, Comparative study of sprinkler and drip Irrigation systems. WATER REQUIREMENT OF CROPS: Suitability of soils for Irrigation, Standards of irrigation water, PET-R method of crop water requirements, Depth and frequency of Irrigation, definitions of field capacity wilting point, available moisture, duty, delta, GCA, CCA, or depth, base period outlet factor capacity factor, time factor, root zone depth: Relation between duty and delta; Factors affecting duty, Principal crops in India, Crop rotation; Methods of assessment of Irrigation water..	**9**
II	RESERVOIR PLANNING : Selection of site for Reservoirs; Engineering surveys, Geological and Hydrological Investigations; Fixing of LWL, FTL, TBL, HFL; Diriment storage zones in reservoir, Determination of storage capacity by mass curve method; Reservoir sedimentation; Life estimation of reservoir by Burn's method; Organization & Administration of Irrigation Projects WATER LOGGING AND LAND DRAINAGE : Causes, effects, preventive measures of water logging, types of drains, layout of tile drains systems, flow of ground water to drains. RIVER TRAINING WORKS : Definition, classification, theoretical aspects of river training works like as Guide banks, Groynes and Spurs, Bank protection.	**9**
III	DAMS Classification of dams as per use, Hydraulic design and materials; Factors governing selection of type of dams. GRAVITY DAM: Definition; forces acting on gravity dam; stability	**9**

	requirements; Theoretical & practical profile of gravity dam; low & High dam; Galleries. EARTHEN DAMS: Types of earthen dam; Description of component part of earthen dams foundation, cut off trench, rock toe, hearting, central impervious core, pitching and chipping, turfing; seepage through body of earthen dam and drainage arrangements; Failure of earthen dams; Plotting of phreatic line for homogeneous earthen dams with horizontal filters; Stability of foundation against shear. SPILLWAYS : Types of spillway with their working operations; General principle of design of ogee spillway; Spillway gates-vertical lift radial, rolling and drum; Energy dissipation methods d/s of spillways.	
IV	CANALS: GENERAL: Types of canal; Alignments of canal; Cross section of Irrigation canals; Blanching depth; Schedule of area statistics; Losses in canals. CANALS IN ALLUVIAL SOILS: Kennedy's silt theory – Design procedure ' silt supporting capacity, drawbacks; Lacey's silt theory – Definition of initial final and permanent regime channels, Lacey's Regime equation, channel design procedure, drawbacks; Garret's diagram for channel design. LINED CANALS: Design procedure; Types of lining; relative merits and demerits of canal lining; Economics of canalling	**9**
V	CANAL STRUCTURES CANAL REGULATION WORKS: Only theoretical aspects of location, objects, classification, component and schematic section of head regulator, cross regulators, canal escapes, canal falls and canal outlets. CROSS DRAINAGE WORKS Only theoretical aspects of location, object, classification, components and schematic section of aqueduct, siphon, super passage, canal siphon, inlets, outlets and level crossings. DIVERSION HEAD WORKS:Component parts of diversion headwork's – Fish ladder guide wall' divide all silt excluder and silt ejector; Causes of failure of weirs on permeable foundation; Blight's creep theory; dr. Khosla's theory for design of weirs on permeable foundation. .	**9**

Recommended Books:-

1. Irrigation Engineering and Hydraulic Structures- Santosh Kumar Garg- khanna publication

2. Irrigation Engineering and Hydraulic Structures- S. R. Sahastrabudhe- katson publication

3. Irrigation Engineering and Water Power Engineering – B. C. Punmia-laxmi publication

4. Irrigation Engineering and Hydraulic Structures- K. R. Arora- jain year of publication

5. Irrigation Engineering- N. N. Basak- jain year of publication

6. Irrigation Engineering and Hydraulic Structures- R. K. Sharma- S. Chand publication

7. Water Resources and Irrigation Engineering – P. N. Modi

Course Code: CE -714 **Course: IRRIGATION ENGINEERING PRACTICAL**

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

A. Detailed Design and Drawing on full sheet (A1)should be included (Minimum Five) as term work.

1. Reservoir Planning – Capacity of reservoir.
2. Life of Reservoir
3. Gravity Dam – Checking of various modes.
4. Earthen Dam – Phreatic Line, Checking of foundation against shear
5. Design of canals (Lined and Unlined)
6. Design of Lift Irrigation Scheme.
7. Drawing of various canal structures.

B. Detailed report of one Site visit to irrigation project in spiral binding form must be submitted with above five practical.

B.E. Civil Engineering, VII Sem

COURSE CODE: CE -702 COURSE: STRUCTURAL ANALYSIS -III

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

COURSE OUTCOMES:

The students shall be able to

1. Formulation of stiffness matrix, transformation matrix, load matrix for various structural components for analysis purposes and understanding of structural software.
2. Apply the different methods of analysis of frames in practical problems.
3. Understand the concepts related to structural dynamics.
4. Understand the basics of finite element method in the analysis of structural components.

Unit	Topics	Hours
I	Formulation of element/local stiffness matrix and global stiffness matrix for beam members (with and without axial deformation). Continuous beams with/without sinking of support, Assembly of global/ structural stiffness matrix, Member load matrix due to concentrated load, uniformly distributed Load varying load and moment. Assembly of global/ structure load matrix up to Three Elements. Solution to problems with maximum degree of freedom Three and formulation of stiffness matrix upto DOF 6.	**(10)**
II	Formulation of element/ local stiffness matrix and global stiffness matrix for Plane frame members (with and without axial deformation), Transformation matrix, Assembly of global/ structural stiffness matrix, Member load matrix due to concentrated loads, uniformly distributed Loads, varying load, Moments. Assembly of global/ structural load matrix. Plane frame problems with maximum degree of freedom six and Solution to problems with maximum degree of freedom Three. Inclined member problems, Analysis of plane frame upto 3 DOF with support displacement.	**(12)**

III	Basic concept, Degree of Freedom, Basic concept of Direct Stiffness Method. Formulation of elemental/local stiffness matrix and global stiffness matrix for plane truss. Transformation Matrix, Assembly of Global/ Structural stiffness matrix up to (8x8). Member load matrix including lack of fit, Support displacement and temperature. Assembly of Global/ Structure load matrix, Solution to problems with maximum degree of freedom four.	**(12)**
IV	Introduction to structural dynamics, D'Alembert principle, inertia force, equation of motion (free vibration), SDOF system, Damping, natural frequency. MDOF, vibrations of undamped systems up to 2 DOF.	**(8)**
V	Introduction to finite Element method, basic concepts, discretization of structures, Minimum potential energy theorem and Rayleigh Ritz method for bar elements (prismatic/Non-prismatic), Displacement based bar elements (Prismatic/Non-prismatic). Storage techniques, Half band storage, half band width, Sky line storage.	**(8)**

REFERENCE BOOKS:

1. Gere and Weaver, Matrix Method of Structural Analysis, Third Edition, Von Nostrand Reinhold; New York 1990.
2. Meghre A. S. and Deshmukh S. K., Matrix Method of Structural Analysis, First Edition, Charotar Publishing House, Anand 2003.
3. Chandrupatala T.R., Belegundu A. D., Introduction to Finite Element in Engineering, Prentice Hall India, 1991.
4. Chopra A. K., Dynamics of Structure, Theory and Application of Earthquake Engineering, Third Edition, Pearson.
5. Krishnamurthy C. S., Finite Element Method, TATA McGRAW HILL.

B.E. Civil Engineering, VII Sem

COURSE CODE: CE -703 **COURSE: Design of RCC structure II**

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

UNIT	TOPICS	HOURS
I	Limit state of collapse in flexure : Analysis and design of doubly reinforced rectangular, Tee and L-sections. Limit state of collapse in torsion: Concept of interaction of torsion , shear and flexure . Analysis and design of rectangular section for torsion , shear and flexure. Limit state of serviceability: Deflection calculations for beams and one way slabs.	(9)
II	Analysis and design of columns subjected to biaxial moments . Design of long columns. Design of long columns. Design of isolated footing, for uniaxial and biaxial bending, for square , rectangular and circular.	(9)
III	Moment redistribution Analysis and Design of Fixed beam , propped Cantilever , two –span Symmetric continuous beam.	(9)
IV	(with LSM) Analysis and design of portal frames (single bay single storey) hinged or fixed at base. Design of hinge and design of foundation. Design of combined footing 1) rectangular footing 2) strap beam footing 3)Trapezoidal footing . 4) Raft footing.	(9)
V	(with LSM) Design of RCC Two way slab with various end conditions using with is code coefficient. Design of RCC Cantilever and Counter fort Retaining wall.	(9)

Recommended books:

1. Reinforced Concrete Structures, Volume 2 ,Dr. B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, Dr. B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain-Firewall Media
2. Reinforced Concrete Design, (3rd edition) by Unni Krishna Pillai S. and Devdas Menon, Tata McGraw-Hill, 2012.
3. Reinforced Concrete (Limit State Method) Ashok Jain K., Nemchand & Bros., Roorkee, 2007.
4. Limit State theory and Design of reinforced concrete by Karve, S. R. and Dr. Shah V. L., Pune Vidyarthi Griha Prakasan, Pune, 2012.
5. Limit State Design of Foundations, (2nd edition) by Varghese P.C., PHI Learning Pvt. Ltd., New Delhi., 2008.

6. Advanced design of R.C. Structures, (2nd edition) by Bhavikatti S.S., 2009.
7. Design of concrete structures, (13th edition) by Arther Nilson H., Tata Mc Graw-Hill, 2010. Web Reference books: NPTEL
8. IS CODE: IS 456 – 2000 and 15875-1987 is permitted in the examination.
   Question Paper Pattern – 1) One question of 13 Marks each from Unit I,II & III
   2) One question of 20 Marks each from Unit V & VI

COURSE CODE: 715 COURSE: DESIGN OF RCC STRUCTURE II (PRACTICAL)

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

LIST OF EXPERIMENTS

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

Elective I - B.E. Civil Engineering, VII Sem

COURSE CODE: CE -704 **COURSE: FINITE ELEMENT METHODS**

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
I	**Introduction to Finite Element Analysis**: Introduction , Basic Concepts of Finite Element Analysis , Introduction to Elasticity ,Steps in Finite Element Analysis.	7
II	**Finite Element Formulation Techniques:** Virtual Work and Variational principle, Galerkin Method, Finite Element Method: Displacement Approach, Stiffness Matrix and Boundary Conditions.	8
III	Element Properties: Natural Coordinates,Triangular Elements ,Rectangular Elements, Lagrange and Serendipity Elements , Solid Elements ,Isoparametric Formulation, Stiffness Matrix of Isoparametric Elements , Numerical Integration: One Dimensional , Numerical Integration: Two and Three Dimensional, Worked out Examples	10
IV	**Analysis of Frame Structures:** Stiffness of Truss Members , Analysis of Truss, Stiffness of Beam Members, Finite Element Analysis of Continuous Beam, Plane Frame Analysis, Analysis of Grid and Space Frame.	10
V	**FEM for Two and Three Dimensional Solids:** Constant Strain Triangle , Linear Strain Triangle , Rectangular Elements, Numerical Evaluation of Element Stiffness, Computation of Stresses, Geometric Nonlinearity and Static Condensation , Axisymmetric Element , Finite Element Formulation of Axisymmetric Element, Finite Element Formulation for 3 Dimensional Elements, Worked out Examples.	10

REFERENCES:

- C. S. Krishnamoorty, *Finite Element Analysis,* Tata McGraw-Hill
- David V. Hutton, *Fundamentals of Finite Element Analysis,* McGraw Hill
- D. Maity, *Computer Analysis of Framed Structures,* I. K. International Pvt. Ltd. New Delhi
- Erik G. Thompson, *Introduction to the Finite Element Method: Theory, Programming and Applications,* John Wiley
- H. C. Martin and G. F. Carey, *Introduction to Finite Element Analysis - Theory and Application,*NewYork, McGraw-Hill
- Irving H. Shames, Clive L. Dym, *Energy and Finite Element Methods in Structural Mechanics;*New Age International
- K. J. Bathe, *Finite Element Procedures,* Prentice-Hall of India, New Delhi, India
- M. Mukhopadhyay, *Matrix, Finite Element, Computer and Structural Analysis,* Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India
- O. C. Zienkiewicz and Y. K. Cheung, *The Finite Element Method in Structural and Soild Mechanics,* McGraw Hill, London
- P. E. Ceruzzi, *A History of Modern Computing,* The MIT Press, Cambridge, MA, 1998.

ELECTIVE I -B.E. Civil Engineering-VII Sem

Course Code: CE - 705 **Course: AIR POLLUTION AND SOLID WASTE MANAGEMENT**

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	TOPICS	HOURS
I	Introduction to air pollution, air pollution episodes, atmosphere and its zone, classification of air pollutants with their sources, effects of air pollutants on man, animals, plants and materials.	7
II	Meteorological parameters affecting air pollution, lapse rate and atmospheric stability, plume behavior, wind rose, pollution rose, estimation of stack height, greenhouse effect, atmospheric ozone depletion. Ambient air sampling, stack sampling, collection of particulate and gaseous pollutants, methods of estimation.	10
III	Air pollution control: Principles of control methods for particulates and gaseous pollutants control of air pollutants by using various equipments. Automobile exhaust: pollutions due to diesel and petrol engines exhaust treatment and abatement. Noise pollution: Sources, ill effects, control measures.	8
IV	Introduction to solid waste management. Classification, sources, components, quantity and per capita contribution of solid waste. Physical and chemical characteristics, sampling and analysis of solid waste. Collection and transportation of solid waste: methods of collection, equipments used for collection and transportation of solid waste. Transfer stations and its economic use. Solid waste processing: methods of processing, choice of methods, merits and demerits of various methods.	10
V	Solid waste disposal by composting: Principles, methods of composting, factors affecting composting. Solid waste disposal by sanitary land filling: site requirement, methods, leachate management. Solid waste disposal by incineration: Principles, types, merits and demerits.	10

Books:.

1. Air pollution by M. N. Rao and H. V. N. Rao, (Tata McGraw Hill publications)
2. Environmental Pollution Control Engineering by C. S. Rao, (Wiley Estern Ltd.)
3. Solid waste management in developing countries by A.D. Shinde and B.B. Sundersan (INSDOC,NewDelhi)
4. Air Pollution, NEERI Manual

Elective I- B.E. Civil Engineering, VIIth Sem

COURSE CODE: CE -706 **COURSE: TRAFFIC ENGINEERING**

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

Unit	CONTENTS	Hours
I	Traffic Engineering & Studies: Definition, Scope, Various organization working in traffic research, Elements of traffic , characteristics of vehicle, road user and road; traffic studies-speed & delay, traffic volume, O & D, parking and accidents, sample size, study methodology, data collection & presentation,	7
II	Traffic Control & Safety and Enforcement & Education: Traffic signs, road markings, traffic signals-design of signalized intersections and signaling systems, conflict points, traffic manoeuvres, different intersections, queuing Theory, Traffic control aids, and street furniture. Driver error, vehicle & road surface. Traffic accident scenario in India. Collection and interpretation of accident data and recording in Std. forms skidding, speed and weather effects on accidents, Analysis of Accidents, Pedestration cyclists & auto vehicle drivers safety. Traffic 3R and 5E's of traffic management. Motor Vehicle act and Rules, Education, Need and Methods, Air pollution & Noise Pollution by Traffic, Pollution standards for auto vehicles, PUC	9
III	Traffic Capacity analysis : Speed, volume, parking & accident data analysis, statistical approach, , , traffic stream characteristics-relationship between speed, flow and density, level of service & capacity analysis, traffic forecasting.	11
IV	Traffic Design: Channelisation of islands for different traffic situations, design of rotaries & at-grade intersections, grade separated intersections, their warrants; facilities for pedestrian & bicycle ways, bus stop location and bus bay design, transport terminals, parking parcels, design of road lighting at different road sections & intersections.	8
V	Traffic Control Devices: Traffic signs, markings and signals; principles of signal design, Webster's method, signal coordination. Traffic Regulation & Management: Speed, vehicle, parking, enforcement regulations, mixed traffic regulation, management techniques-one-way, tidal flow, turning restrictions etc., road safety measures Traffic Flow theory Introduction	10

Recommended Books:

1. Traffic and Highway Engineering, Author Garber N.J. & Lester A. Hoel Publisher West Publishing Co. New York.

2. Traffic Engineering, Author Roger P. Roess, Elena S. Prassas & William R. Mcshane Publisher John Willey & Sons.

3. Decision Making on Mega Project: Cost Benefit Analysis, Planning and Innovation (Transport Economics, Management and Policies), Author Priemm H., Bentt F. & Bert Van Bee Publisher Edward Elgar Publishing Limited

4. An Introduction to Transportation Engineering, Author William W. Hay Publisher John Willey & Sons

5. Fundamentals of Transportation Engineering, Robert G. Hennes and Martin Eske Publisher McGraw Hill Book Co. New York

6. Fundamentals of traffic Engineering , Norman Kennedy Publisher Institute of Transportation and Traffic Engineering, University of California

7. Traffic Flow Theory and Control, Donald R. Drew Publisher Institute of Transportation and Traffic Engineering, University of California

8. Highway Engineering, Justo and Khanna.

Elective I- B.E. Civil Engineering, VIIth Sem

COURSE CODE: CE -707 **COURSE: River Engineering**

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
I	**ORIGIN AND PROPERTIES OF SEDIMENTS:** Nature of sediment problems, origin and formation of sediments, properties of sediments , incipient motion of sediment particles , tractive force approach, cohesive materials.	9
II	**REGIMES OF FLOW:** Description of regimes of flow, ripple, dune, antidune , prediction of regimes of flow. Resistance to flow & velocity distribution in alluvial streams: velocity distribution in turbulent flow over rough boundaries, resistance and velocity distribution in alluvial streams.	9
III	**BED LOAD TRANSPORT & SALTATION:** Bed load equations, bed load equations based upon dimensional considerations and semi-theoretical equations, general comments on bed load equations, saltation..	9
IV	**SUSPENDED LOAD TRANSPORT :** Mechanism of suspension, equation of diffusion, sediment distribution equation , relations for suspended load, wash load , transport of suspended sediment.	9
V	**TOTAL LOAD TRANSPORT :** sediment samplers design of canals carrying sediment laiden water Types of sediment samplers Design of channels carrying sediment laiden water Sediment transport through pipes	9

REFERENCES:

1. L Chang H.H.,Fluvial Processes in River Engineering, John Wiley 1988.
2. Simons D.B. and Senturk F., Sediment Transport Technology, Water Resources Publications, Fort Collins, Colorado, 1977
3. Garde R J and Ranga Raju K G, Fundamentals Mechanics of Sediment Transportation and Alluvial Stream Problems, Wiley Eastern Ltd 1985.
4. Yang C.T., Sediment Transport- Theory and Practice, The McGraw Hill Companies Inc ,1996.

Elective I- B.E. Civil Engineering, VIIth Sem

COURSE CODE: CE -708 COURSE: GROUND IMPROVEMENT TECHNIQUES

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
I	**INTRODUCTION AND CONCEPTS:** Different types of problematic soils, their geological formations, selection of ground improvement techniques based on soil conditions, objectives of ground improvement techniques, diff. types of stabilizations. DRAINAGE & DEWATERING- Well point system, vaccum dewatering system, Deep well drainage, electro-osmosis.	9
II	**TREATMENT OF LOOSE SAND-** Compaction pile,vibroflotation, dynamic Compaction. **TREATMENT OF EXPANSIVE SOIL**- Lime & cement stabilization, chemical Analysis. **TREATMENT OF SOFT CLAY SOILS**- Sand drains & its design criteria, Stone columns, preloading & surcharge fill dynamic consolidation.	9
III	**GROUTING TECHNIQUES & MATERIALS –** Permeation grouting, jet grouting, grouting equipments, diff. types of grouting materials Bentonite- cement mixes, asphalt etc., grout monitoring system, grouting in different conditions.	9
IV	**GEOSYNTHESITIC APPLICATIONS-** Geotextiles& geomembanes, reinforced soil structures, base isolations, temporary supporting systems etc.	9
V	**GROUND IMPROVEMENT FOR SLOPES-** Soil nailing, anchoring, prestessed anchors, design methods & construction techniques. **CASE STUDIES**- Case studies of different ground improvement project in India.	9

REFERENCES:

1. Dr.B.C.Punmia- Soil Mechanics & Foundation- Laxmi Publication Pvt. Ltd. Delhi.
2. Dr.K.R.Arora-Soil Mechanics & Foundation Engineering-Standard Publisher Distributor Delhi.
3. Hausmann H.R.- Principles of ground modification- Mcgraw Hill book co.
4. Shashi K.Gulati & Manoj Dutt- Geotechnical Engg- Tata Mcgraw Hill Education pvt.ltd. New Delhi.
5. Koemer R.M.- Construction & geotechnical methods in foundation Engineering- Tata Mcgraw Hill New Delhi.
6. P. Purushottam Raj-Ground improvement techniques- Laxmi Publication Pvt. Ltd. Delhi.

Elective II- B.E. Civil Engineering, VIIth Sem

COURSE CODE: CE -709 COURSE: ADVANCED RCC DESIGN

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
I	Analysis and design of Multistoried buildings up to three bays, calculation of loads, Approximate analysis, Preliminary sizing, IS:875, IS:1893 recommendations, Ductile detailing.	9
II	Analysis and Design of Elevated service Reservoirs, IS Recommendations for wind & earthquake, Ductile detailing.	9
III	Analysis and Design of bridges and Culverts. IRC Recommendations.	9
IV	Analysis and design of Silos and Bunkers. IS recommendations.	9
V	Analysis and Design of raft foundations, Pile foundations, single pile, group of piles, Pile cap.	9

REFERENCES:

1. Bhavikatti S. S., Advanced R. C. C. Design Volume-I & II, New age international publisher, New Delhi.

2. Krishna Raju N, Advanced R. C. C. Design, CSB Publisher and Distributor, New Delhi.

3. B.C. Punmia, Ashok K. Jain, Arun K. Jain – Reinforced Concrete Structures Vol. II, Laxmi Publications, New Delhi

4. N.C. Sinha, S.K. Roy – Fundamentals of Reinforced Concrete, S. Chand & Co. Ltd, New Delhi

5. P.C. Varghese – Advanced Reinforced Concrete Design, Prentice Hall of India Pvt. Ltd., New Delhi.

6. P. C. Varghese, Design of Reinforced concrete Foundation. PHI Learning Pvt. Ltd.

7. Ramachandra, Design of Concrete Structures Vol. I & II. Standard Book House.

8. Reinforced Concrete design ---Dr.H.J.Shah—Charotar publishing house

9. Design of R.C.C—S.Ramaamruthum -- Dhanpat Rai publications

10. Ramakrishnan and P.D.Arthur, "Ultimate Strength design for structural concrete", Wheeler Publishing Co.

11. Karve S.R. and Shah V.C, "Design of reinforced cement concrete structures using Limit State Approach", Structures Publishers.

12. Jain O.P and Jaikrishna, “Plain and reinforced concrete”, Vol-II, Nemchand and Bros

13. IS: 456-2000 Indian Standard code of practice for plain and reinforced concrete, Bureau of 24/44 Indian Standards, New Delhi.

14. IS: 1893:-2002 Indian Standard Code of practice for criteria for Earthquake resistant design of Structures, Bureau of Indian Standards, New Delhi.

15. IS: 3370-Indian Standard code of practice for concrete structures for storage of liquids, Bureau of Indian Standards, New Delhi

Elective II- B.E. Civil Engineering, VIIth Sem

COURSE CODE: CE -710 **COURSE: REMOTE SENSING & GIS**

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
I	**INTRODUCTION AND CONCEPTS:** Introduction of Remote Sensing –Definition, stages of remote sensing, Energy sources and Radiation principles, Energy equation, EMR and Spectrum, EMR interaction with Atmosphere scattering, Absorption, EMR interaction with earth surface features reflection, absorption, emission and transmission, Spectral response pattern , vegetation, soil, water bodies- Spectral reflectance. Active, Passive, Optical Remote sensing, visible, infrared, thermal, sensors and characters. Ideal remote sensing system – Characters of real and successful remote sensing system.	9
II	**AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY** Introduction-Terrestrial and Aerial photographs, vertical and oblique photographs, height determination contouring, photographic interpretations, stereoscopy, parallax bar, Flight Planning, Photo Interpretation, Applications of aerial Photos.	9
III	**SATELLITE REMOTE SENSING PRINCIPLES AND IMAGE ACQUISITION AND DATA FORMAT:** Data acquisition–Procedure, Reflectance and Digital numbers- Intensity, Reference data, Ground truth, Analog to digital conversion, Detector mechanism, Spectro- radiometer. Platforms and sensors- orbits types – Resolution. Satellite data acquisition, DN characters-kernels- storage devices, CC, CDisk, Optical disk. Data retrieval. Export and import, Data formats, BSQ, BIL, BIP, Run length encoding, Image Compression Data products.	9
IV	**REMOTE SENSING SATELLITES:** Land observation satellites, characters and applications, IRS series, LANDSAT series, SPOT series, High resolution satellites, character and applications, CARTOSAT series, IKONOS Series, QUICKBIRD series, Weather/Meteorological satellites, INSAT series, NOAA, GOES, NIMBUS Applications, Marine observation satellites OCEANSAT. Microwave remote sensing Sensors, Concept of Microwave remote sensing, SLAR, SAR Scattrometers, Altimeter, Characteristics, Image interpretation characters.	9

V	**BASICS OF GIS** Introduction, concepts , Information system , components of GIS, History, Geospatial data architecture, Operations, Geographic co ordinate systems, Map projections, concepts, Input data for GIS , display ,types of output products. GIS categories, Level and scale of Measurement, importance of data quality.	**9**

REFERENCES:

1. A.M. Chandra and S.K. Gosh, Remote Sensing and GIS, Narosa Publishing Home, New Delhi 2009.

2. Burrogh P.A., Principles of Geographical Information System, Oxford Publications, 1986.

3. George Joseph, Fundamentals of Remote Sensing Universities Press, Hyderabad 2005.

4. Kang tsung Chang, Introduction to Geographical Information System, Tata McGraw Hill, 7^{th} edition, 2010.

5. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011.

6. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman Remote sensing and image interpretation John Wiley & Sons, 2008.

Elective II- B.E. Civil Engineering, VII Sem

COURSE CODE: CE - 711 COURSE:ADVANCED SOIL MECHANICS

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
I	**Clay minerology** : Concept of composition classification and nomenclature, structure of clay minerals, Kaolinite Illite, Montmorillonite groups physical properties, clay water relation thixotrophy electrical effects, electrosmossis, streaming potential Zeta potential. **Drainage and Dewatering** : Various systems of and there Graded filters and design Criteria applications of Geomembranes	7
II	**Expansive Soils** : Identification and classification Measurement of swelling pressure (vertical) and potential Foundation problems, different types of foundation design principles Latest technique to tackle expansive nature.	9
III	Compaction & field compaction and controls : Mechanics, Lab & Fd. Tests, Fd. Compaction equipments & these choice and suitability, quality control, Deep compaction, Vibro floatation.	11
IV	Consolidation : Terxaghi's theory for two & three dimensional consolidation field and laboratory tests. Consolidation settlements and drains.	8
V	Soil stabilization, Mechanical and Chemical stabilization, Lab. & Investigations, Field Techniques, Advanced Techniques in Geotextile 89 applications, Stone columns and Gabions. Case studies of Applications	10

Recommended Books:

1.Soil Mechanics in Theory & Practice, Author Alam Singh, Publisher Asia Publishing House Edition 1975 & later

2. Geotechnical Engineering Author S. K. Gulhati & Manoj Dutta Publisher Tata McGraw-Hill Edition 2005

3. Geotechnical Engineering Author Purushothama Raj Publisher Tata McGraw Hill Publishing Co. Ltd. Edition 1995

4. Soil Mechanics & Foundation Engg Author Punmia B.C. Publisher Laxmi Publication Pvt. Ltd, New Delhi, Edition 1994

5. Geotechnical Engineering Author C. Venkatramaiah Publisher New Age International Ltd. Edition (Second Edition) 1995

6. Basic & Applied Soil Mechanics Author Gopal Ranjan & A.S. RAO;, Publisher New Age InternationalLtd, Edition 2004.

Elective II- B.E. Civil Engineering, VIIth Sem

COURSE CODE: CE -712 **COURSE: Advanced Hydraulic Structures**

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
I	**DESIGN OF WEIRS AND BARRAGES OVER PERMEABLE FOUNDATIONS :** Causes of failure, Bligh's and Lane's creep theory, Khosla's theory and method of independent variables, standard profiles, corrections, exit gradient, plotting of HGL, Design of d/s and u/s protection works, length of pucca concrete floor	9
II	**SPILLWAYS :** Necessity, components and classification, Estimation of spillway design flood, Energy dissipators and its applications **CANAL FALLS :** Types and design principles	9
III	**CANAL REGULATION WORKS** : Alignment of offtaking channels, Distributaries, head regulator, cross regulator and their design, weir type and regulator type escapes, metering flumes, types of modules, Kennedy's gauge outlet	9
IV	**DESIGN CONSIDERATIONS FOR CROSS DRAINAGE WORKS :** Fluming the canal, Hind's method for design of transition, Design of pucca canal trough	9
V	**HYDRAULICS OF OUTLET WORKS :** Sluiceways, river intakes, simple submerged intakes, trash racks Preliminary concepts of design of stepped spillways and labyrinth weirs	9

REFERENCES:

1. Garg Santosh Kumar., Irrigation Engineering and Hydraulic Structures, John Khanna Publishers, New Delhi 2004.

2 Punmia B.C. and Pande B.B. Lal Irrigation and Water Power Engineering, Laxmi Publications Pvt. Ltd 2003

3. Design of Small Dams, U.S. Bureau Reclamation, Oxford and IBH Publication Co., New Delhi 1960

Elective II- B.E. Civil Engineering, VIIth Sem

Course Code: CE -713 **Course: Advanced Prestressed concrete**

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
I	Introduction, Prestressing Systems and Material Properties . Basic concepts of pre-stressing; Historical development; Advantages and Types of Prestressing. Pre-tensioning Systems and Devices, Post-tensioning Systems and Devices, Need for High strength steel and High strength concrete; Losses Of Prestress: Nature of losses of pre-stress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.	9
II	Analysis of Prestressed Member. Analysis of Members under Axial Load: Analysis at Transfer, Analysis at Service, Analysis for Ultimate Strength, Analysis of Member under Flexure:, Analysis at Transfer and at Service, Cracking Moment, Kern Point, Pressure Line, Analysis for Ultimate Strength, design loads and strength, Calculation of Crack Width, Variation of Stress in Steel, Analysis of a Rectangular Section, Analysis of a Flanged Section.	9
III	Deflections of Prestressed Concrete Members . Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members. Long term deflection of cracked member; Transmission Of Pre-Stress: Transmission of Pre-stressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre –tensioned and post –tensioned grouted beams, stress distribution in end block, Anchorage zone reinforcements. Shear And Torsion Resistance Of Prestressed Concrete Member. Shear and Principal stresses; Ultimate shear resistance of pre-stressed concrete members; Design of shear reinforcement, pre-stressed concrete members in torsion, Design of reinforcements for torsion, shear and bending.	9
IV	Design of Pre-Stressed Members Design of sections for flexure, Design of Sections for Axial Tension, Design of Sections for compression and bending, design of pre-stressed section for shear and torsion, design of prestressed member for bond. Dimensioning of flexural member, design for pre-tensioning member, design of post-tensioning members.	9

V	Composite Construction of Prestressed Concrete. Composite structural member, types of composite construction, analysis of stresses, differential shrinkages, deflection of composite member, flexural strength of composite sections, shear strength of composite section. Design of Continuous Prestressed Concrete Member. Advantages of continuous members, ultimate load analysis of continuous pre-stressed member, design of continuous pre-stressed concrete beams.	**9**

REFERENCES:

1. Prestressed Concrete by N. Krishna Raju; Tata Mc Graw -Hill Publishing Company Limited, New Delhi.3rd edition, 1995.

2. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons, 3rd edition, 1981.

Elective II- B.E. Civil Engineering, VII Sem

Course Code: CE -716 COURSE: ADVANCED RCC DESIGN(PRACTICAL)

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

Any three detailed design and drawing from above five units.

Minimum three design assignments based on theory syllabus along with the detailed structural drawings on A1size sheets.

Practical Examination shall be based on the above Practical work.

Elective II- B.E. Civil Engineering, VII Sem

Course Code: CE -717 Course: REMOTE SENSING & GIS PRACTICAL

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

Any ten from the following practical to be performed:

1. Testing stereo vision.
2. Use of Lens stereoscope and Mirror stereoscope.
3. Determination of vertical exaggeration.
4. Use of Parallax Bar for height calculation from aerial photographs.
5. Calculation of scale of the photographs.
6. Marking Principal point and conjugate principal point on the stereo pairs.
7. Study of Image analysis software.
8. Study of GIS software.
9. Creating and editing a shape file from Microsoft Excel file.
10. Spatial analysis with raster data.
11. Geometric correction of raw images.
12. Mosaic of images.
13. Subset creation using ERDAS.
14. Unsupervised classification of Images.
15. Supervised classification of images.
16. GCP collection using GPS.

Elective II- B.E. Civil Engineering, VII Sem

COURSE CODE: CE - 718 **COURSE: ADVANCED SOIL MECHANICS**

Course scheme			Evaluation scheme (Theory)		
Practical	**Periods/week**	**Credits**	**Term work**	**POE**	**Total**
3	**3**	**2**	**25**	**25**	**50**

Any five practical to be performed

1. Particle size analysis by
    i. Hydrometer method
    ii. Pipette method
2. Determination of free swell value and differential swell value of a given soil.
3. Determination of swelling pressure of soil.
4. Determination of compaction characteristics of soil by modified Proctor test.
5. Determination of pre-consolidation pressure of soil.
6. Determination of Co-efficient of consolidation of given soil.
7. Chemical stabilization
    i. Soil with cement
    ii. Soil with lime.
    iii. Soil with lime plus flyash.
8. Mechanical stabilization- blending of soil.
9. Case study(any one).

Elective II- B.E. Civil Engineering, VII Sem

Course Code: CE -719 **Course: Design of Hydraulic Structures**

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

Any Three from the following practical to be performed:

1. Analysis, Design and Drawing of Spillways with All details
2. Analysis, Design and Drawing of Weir with All details
3. Analysis, Design and Drawing of Barrage with All details
4. Analysis, Design and Drawing of Canal Fall with All details
5. Analysis, Design and Drawing of Canal Regulation Work with All details

Elective II- B.E. Civil Engineering, VII Sem

Course Code: CE -720 **Course: Advance Prestressed Concrete**

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

1. Design and Experimental study of pre-tensioned concrete element in laboratory.

2. At least one Site visit and preparation of detailed report and a seminar on it.

Elective II- B.E. Civil Engineering, VII Sem

Course Code: CE -721 **Course: Industrial case study**

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

Term work should consist of any two case studies of Civil Engineering live projects and at least one seminar along with its report in spiral binding form for each case study.

Elective II- B.E. Civil Engineering, VII Sem

Course Code: CE -722 **Course: Project phase-I**

Course scheme					Evaluation scheme (Practical)		
lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
-	-	3	3	2	50	50	100

Project phase-I shall consist of

1. Finalization of topic
2. Review of literature
3. Synopsis with complete outline of thesis
4. Data collection if any
5. Analysis phase-I
6. Minimum Two seminars based on above work.

The project work will be a design project – experimental project – field surveying or computer oriented on any of the topics of Civil Engineering interest. It will allot as a group project consisting of a minimum THREE and maximum Six number of students, depending upon the depth of project work. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The term work assessment of the project will be done at the end of the semester by a committee consisting of three faculty members from the department along with Project Guide. The students will present their project work before the committee. The complete project report is not expected at the end this semester. However a Ten pages typed report based on the work done will have to be submitted by the students to the assessing committee. The project guides will award the marks to the individual students depending on the group average awarded by the committee. One Project Guide will be allotting Maximum TWO group for guidance.