

**B-TECH CIVIL ENGINEERING  
VIII SEMESTER**

Code	Subjects
	<b>Theory</b>
<b>CE510</b>	<b>Construction Management</b>
<b>CE511</b>	<b>Disaster Mitigation and Management</b>
-	<b>ELECTIVE</b>
-	<b>ELECTIVE</b>
-	<b>ELECTIVE</b>
	<b>Practical</b>
<b>CE515</b>	<b>Design and Drawing –II</b>
<b>CE516</b>	<b>Comprehensive Viva Voce</b>
<b>CE517</b>	<b>Professional Ethical practice</b>
<b>CE518</b>	<b>Project Work Phase-II</b>

**Elective**

- CE 20 Advanced Structural Design - Steel
- CE 21 Optimization Techniques for Civil Engineering
- CE 22 Advanced Open Channel Flow
- CE 23 Ground Water Hydrology
- CE 24 Water Resources System Engineering
- CE 25 Machine Foundations
- CE 26 Earth Retaining Structures
- CE 27 Air and Noise Pollution
- CE 28 Environmental Impact Assessment
- CE 29 Dock and Harbour Engineering

CE 30 Traffic Engineering and Management  
CE 31 Photogrammetry and Remote Sensing  
CE 32 Prefabrication and Construction Techniques  
CE 33 Earthquake Resistant Design of Structures.  
CE 34 Structural Dynamics  
CE35 Theory of Elasticity and Plasticity  
CE36 Design of Industrial Structures

## **CE 510 CONSTRUCTION MANAGEMENT**

### **Unit – I**

Management process- Roles – management theories – Social responsibilities – planning and strategic management – strategy implementation – Decision making: tools and techniques – Organizational structure – Human resource management- motivation performance- leadership.

### **Unit-II**

Classification of Construction projects, Construction stages, Resources- Functions of Construction Management and its Applications –Preliminary Planning- Collection of Data- Contract Planning – Scientific Methods of Management: Network Techniques in construction management - Bar chart, Gant chart, CPM, PERT- Cost & Time optimization.

### **Unit-III**

Resource planning - planning for manpower, materials, costs, equipment. Labour, -Scheduling – Forms of scheduling - Resource allocation – budget and budgetary control methods

### **Unit-IV**

Contract - types of contract, contract document, specification, important conditions of contract – tender and tender document - Deposits by the contractor - Arbitration – negotiation - M.Book - Muster roll - stores.

### **Unit-V**

Management Information System - Labour Regulations: Social Security - welfare Legislation - Laws relating to Wages, Bonus and Industrial disputes, Labour Administration - Insurance and Safety Regulations - Workmen's Compensation Act -other labour Laws - Safety in construction : legal and financial aspects of accidents in construction – occupational and safety hazard assessment. Human factors in safety – legal and financial aspects of accidents in construction – occupational and safety hazard assessment

### **Text Books**

1. Ghalot, P.S., Dhir,D.M., Construction Planning and Management, Wiley Eastern Limited,1992.
2. Chitkara,K.K., Construction Project Management , Tata McGraw Hill Publishing Co, Ltd., New Delhi,998.
3. Punmia,B.C., Project Planning and Control with PERT and CPM, Laxmi Publications, New Delhi,1987.

## **CE 511 DISASTER MITIGATION AND MANAGEMENT**

### **Unit-I**

Introduction to Disaster Management- Natural and Man made Disasters- International Year of Disaster Reduction

### **Unit-II**

Natural Disasters- Hydro-meteorological based disasters- Tropical Cyclones, Floods, droughts and Desertification Zones- Forest Fires-Geological based disasters- Earthquake, Tsunamis, Landslides, and Avalanches.

### **Unit-III**

Man made Disasters- Chemical Industrial hazards, major power break downs, traffic accidents, Fire hazards etc.

### **Unit –IV**

Use of remote sensing and GIS in disaster mitigation and management.

### **Unit- V**

Risk and Vulnerability to disaster mitigation and management options- Warning and Forecasting.

### **Text Books**

1. Thomas D. Schneid., Disaster Management and Preparedness, CRC Publication, USA, 2001
2. Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002
3. Ben Wisner., At Risk: Natural Hazards, People vulnerability and Disaster, Amazon Publications, 2001
4. Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., “Geo-information for Disaster Management”, Springer Publications, 2005

### **Reference Books**

1. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

## **CE 515 DESIGN AND DRAWING – II**

Detailed design and drawing of the following steel elements/structures.

1. Built-up columns with lacing and batten plates.
2. Column bases for columns subjected to axial force and bending moment
3. Beams and beam column joints.

4. Welded plate girder.
5. Gantry girder.
6. Roof trusses and joints including purlins.

#### **Reference Books**

1. Subramanian.P , Design of steel structures , Oxford Publishers , New Delhi, 2007
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, Comprehensive design of steel structures, 2000
3. Arya, A.S. And Ajmani, A.L., Design of Steel Structures, Nemchand and Brothers, Roorkee, 1986.
5. Ramchandra, Design of Steel Structures, Vol I and Vol II, Standard Book House, New Delhi, 1991.

#### **CE 516 COMPREHENSIVE VIVA-VOCE**

The student will be tested for his understanding of basic principles of the core Civil Engineering subjects. The internal assessment for a total of 50 marks will be made by an internal assessment committee. The committee will conduct two written examinations of objective or short questions type from the all the core subjects. The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

#### **CE 517 PROFESSIONAL ETHICAL PRACTICE**

The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

Engineering Ethics – Moral issues, Ethical theories and their uses

Engineering as Experimentation – Code of Ethics

Engineer's responsibility for safety

Responsibilities and rights

Global issues of engineering ethics,

Constitution of India

#### **Reference Book**

1. Charles D.Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999

## **CE 518 PROJECT WORK (PHASE II)**

Project work phase II will be an extension of the project work started in the seventh semester. On completion of the work, a project report should be prepared and submitted to the department. The project work and the report will be evaluated by an internal assessment committee for 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

## **ELECTIVES**

### **CE 20 ADVANCED STRUCTURAL DESIGN - STEEL**

#### Unit-I

Design of Portal Frames and Gable Frames

#### UNIT-II

Chimneys: Design of Self Supporting Chimney- Design principles of Guyed Chimney

#### Unit-III

Microwave and Transmission Towers: Introduction – Loads- Analysis of Microwave & Transmission Towers- Design of members- Design of Foundations- Design of Connections.

#### Unit – IV

Design of steel storage structures – pressed steel tank – tanks with hemispherical bottom and supporting structures.

#### Unit – V

Introduction to design of semi rigid connections – cold formed steel structures – Pre-Engineered buildings- Construction: Tolerances: Fabrication tolerances- Erection Tolerances, Erection methods and stresses.

### **Text Books**

1. Ram Chandra, “ Design of Steel Structures”, Vol.II, Standard Book House, New Delhi.
2. Ramamrutham S., “ Design of Steel Structures”, Dhanpat Rai Publishing Co., New Delhi, 2001
3. Edwin H., Gaylord, Jr., Charles N. Gaylord, “Design of Steel Structures”, Mc Graw Hill, Inc., Singapore, ISBN 0 -07-112623-6

4. Arya A.S.& Ajmani A.L.,” Design of Steel Structures”, Nemchand and Brothers , Roorkee

### **Reference**

1. Steel Structures- Design and Behaviour - C.G. Salmon & J.E.Johnso- Harper and Row, Cambridge, 1980

## **CE 21 OPTIMIZATION TECHNIQUES FOR CIVIL ENGINEERING**

### **Unit-I**

Introduction: Introduction to optimization Techniques - problem formulation and merit function.

Linear Optimization: simplex Algorithm duality in Linear Programming.

### **Unit-II**

Non-Linear Optimization-I: Single and multiple variable optimization algorithms, Search methods, gradient methods.

### **Unit-III**

Non-Linear Optimization-II: Multi variable optimization Algorithms, constrained and unconstrained problems - search methods, gradient methods, Kuhntucker conditions.

### **Unit-IV**

Dynamic programming Concepts: Backward recursion method - genetic programming, principle and concepts, simulated ANN, genetic Algorithms

### **Unit-V**

Computer application in optimization: Optimization software for various Civil Engineering problems.

### **Text Books**

1. Ossenbruggen, P.J., Systems analysis for Civil Engineering, John Wiley & Sons, 1984.
2. Rao., S.S Optimization theory and applications, Wiley Eastern Ltd., New Delhi, 1985.
3. Majid,K.I., Optimum Design of Structures, Butter-Worth and Co., Ltd., London, 1974.

### **Reference Books**

1. Kalyanmoy Deb, Optimization for Engineering Design, Prentice Hall of India, Private Ltd., New Delhi, 1996.

## **CE 22 ADVANCED OPEN CHANNEL FLOW**

### **Unit-I**

Introduction: Geometrical Elements of open channel - Velocity distribution, Coefficients and their determination - Pressure distribution. Uniform Flow: Energy and momentum Principles applied to prismatic and non-Prismatic channels – Critical flow - Computation and applications. Uniform flow-Manning's and Chezy's equations, Determination of Manning's and Chezy's constants - Computation of uniform flow - Applications of uniform flow concepts, Design of channels for uniform flow - Non-Erodable channels.

### **Unit-II**

Gradually Varied Flow: Theory and analysis, methods of computation,, graphical integration, direct integration, direct step and standard step methods - Computer applications.

### **Unit-III**

Spatially varied flow: Spatially varied flow - Dynamic equation, analysis flow profile, Numerical integration and isoclinal method.

### **Unit-IV**

Rapidly Varied Flow: Rapidly varied flow - characteristics - Flow over spillways.

### **Unit-V**

Unsteady Flow: Unsteady flow – Dynamic equation for unsteady gradually varied flow, uniformly progressive flow - Wave propagation. Rapidly varied unsteady flow - Moving hydraulic pump – positive and negative surges - Surges in power canals, Navigation canals, transitions & Canal junctions. Flood Routing: Introduction to Flood routing.

### **Text Books**

1. Subramanya, K., Flow in Open channels, TMH, 2007.
2. Ranga Raju, K.G., Flow through open channels, TMH, 2007.

### **Reference Books**

1. Chow, V.T., Open Channel Hydraulics, ISE, McGraw Hill, 1986.
2. French,R.H., Open Channel Hydraulics, ISE, McGraw Hill, 1986.
3. Das, M.M., Open Channel Flow, Prentice Hall of India (P) Ltd, 2008.



## **CE 23 GROUND WATER HYDROLOGY**

### **Unit-I**

Introduction: Utilization of Groundwater - need for ground water, advantages of Groundwater and Groundwater in Hydrological cycle - types of aquifers, Groundwater Movement: Porosity - Specific yield - Storage coefficient - Permeability and transmissibility - Laboratory and field measurement of permeability. Basic Principles and Fundamental Equation of continuity - Darcy's law - General differential equation governing groundwater flow for steady and unsteady flows - Application to aquifers - Flow nets.

### **Unit-II**

Well Hydraulics: Steady flow to a well in a confined aquifer, unconfined aquifer and a leaky confined aquifer - Unsteady flow to a well in a confined aquifer, an unconfined and a leaky confined aquifer-Effect of storage in a well of finite diameter - Partially penetrating wells - Method of images - Analysis of pump test data for the above aquifers - Problems.

### **Unit-III**

Water wells: Types of wells - well design - construction - well development - Testing of wells for well yield - well completion and sanitary protection of wells.

### **Unit-IV**

Model studies of Groundwater: Sand models - Electrical analog models -Viscous models - Membrane - Digital computer models, application of F.D. and F.E. methods (Elementary Treatment only).

### **Unit-V**

Exploration Techniques: Different methods of Groundwater exploration. Artificial Recharge: Necessity - Different methods of artificial recharge - Selection of method - Examples of artificial recharge schemes adopted in India and abroad.

### **Text Books**

- 1 Todd . D.K., Groundwater Hydrology, Johnwiley and Sons, New York.
2. Raghunath, H.M. ,Ground water, Wiely Eastern, New Delhi, 1989.

### **Reference Books**

1. Jacob Bear , Hydraulics of Groundwater, McGraw Hill, 1979.
2. Walton W.C., Groundwater Resources Evaluation, McGraw Hill Book Co., New York.
3. Abdel, Aziz Ismail Kashef, Groundwater Engineering, McGraw Hill Book Co., New York.

## **CE 24 WATER RESOURCES SYSTEM ENGINEERING**

### **Unit-I**

Introduction: Scope and steps in systems Engineering - History of systems approach to water resources planning and management - Role of optimization models.

### **Unit-II**

Optimization Techniques: Introduction to optimization - Classical optimization techniques, single and multivariable optimizations with and without constraints - Linear programming, simplex and revised simplex methods.

### **Unit-III**

Duality in linear programming - Non linear programming - Dynamic and mixed integer programming - application of simulation techniques to water resources systems - Statistical decision theory and queueing theory.

### **Unit-IV**

Application to water resources engineering: Objective and valuation criteria - input and demand analysis - System element and planning of subsystem, conveyance and storage subsystems and Irrigation system.

### **Unit-V**

Application of various optimization techniques to water resources systems.

### **Text Books**

1. Chaturvedi,M.C., Water Resources Systems Planning and Management, T.M.H., 2001.

### **Reference Books**

1. Rao, S.S., Optimization theory and applications, Wiley Eastern Ltd., New Delhi ,2002

2. Stank,R.M., Nicholls,R.L., Mathematical foundations for design, McGraw Hill Publishers Co., 1972.

3. Kottegoda.,N.T., ,Stochastic water Resources Technology, Macmillan, 1980.

4. James.L.G., Principles of Farm Irrigation System design, John Wiley and Sons, 1980.

## **CE 25 MACHINE FOUNDATIONS**

### **Unit-I**

Introduction, nature of dynamic loads free vibrations of spring mass systems, forced vibrations viscous damping, principles of vibration measuring equipments.

### **Unit-II**

Dynamic properties of soils: Elastic properties of soils, coefficient of elastic uniform and non uniform compression and shear, effect of vibration on the dissipative properties of soils , determination of dynamic properties of soils , Codal provisions.

### **Unit-III**

Analysis and design of block type machine foundations: Review of methods for dynamic analysis- modes of vibration, foundations for machines inducing periodical forces and impact type forces.

### **Unit-IV**

Design of framed foundations for high speed machinery: Special consideration in planning, principles design criteria, structural design- foundations for miscellaneous machines.

### **Unit-V**

Vibration isolation, passive and active isolation, use of springs and springs and damping materials, construction aspects of machine foundations.

### **Text Books**

1. Barkon,D.D., Dynamics of basis of foundation, MGH,1974.
2. Bowle's.J.E., Foundation Analysis and design,4th edition,MGL,1998.

### **Reference Book**

1. Arora.K.R., Soil mechanics and foundation Engineering,SPD,2001

## **CE 26 EARTH RETAINING STRUCTURES**

### **Unit-I**

Introduction, development of earth pressure theory, classical solutions, graphical techniques, active ,passive cases, earth pressure due to external loads, Empirical approaches, arching of soil pressure in soils, grain elevators and coal bunkers.

### **Unit-II**

Soil properties for retaining walls, forces on retaining walls, stability of retaining walls. Design of gravity and semi gravity , counter fort, cantilever retaining walls.

### **Unit-III**

Types of sheet pile walls, analysis of cantilever and anchored sheet pile walls, Row's theory and moment reduction, soil pressure on braced sheeting.

### **Unit-IV**

Types and uses of coffer dams- analysis and design of cofferdams and design of diaphragm cofferdam, construction methods of double wall sheet pile cofferdams and moveable cofferdams.

### **Unit-V**

Shoring and underpinning- earth pressure measuring techniques- load test on anchors prevention of slope failure.

### **Text Books**

1. Das, B.M., Principles of foundation Engineering, PWS, Kent and Co,1999.
2. Arora.K.R., Soil mechanics and foundation Engineering,SPD,2001

### **Reference Books**

1. Bowle's.J.E., Foundation Analysis and design,4th edition,MGL,1998.

## **CE 27 AIR AND NOISE POLLUTION**

### **Unit-I**

Introduction: Definition of clean air –air pollutants - Sources and classification

Effects of air pollution on man, animal, vegetation and properties -Ambient Air Quality Standards, Air pollution control legislation.

### **Unit-II**

Meteorology and Air pollution – Atmospheric stability – Inversions – Mixing height –Plume behaviour – Plume rise estimation – Effluent dispersion theories –Air pollutants Modelling.

### Unit-III

Control of Air pollutants: particulates – Filters – Gravitational settling chambers – Centrifugal-multiple type cyclones – Collection efficiency - Electrostatic precipitators – Wet collectors- Centrifugal spray scrubbers - Venturi scrubbers.

### Unit IV

Gaseous pollution control – Absorption - Principles – Description of equipment, Adsorption – Principal adsorbents – Equipment descriptions – Condensation – Contact condensers Incineration –Equipment description

### Unit-V

Sound and noise - Source of noise pollution - Environmental and industrial noise -Effects of noise pollution - Fundamentals of sound - generation, propagation, etc., Sound measurement, sound level meters – Measures for prevention and control of noise -Environmental and industrial noise - Noise control legislation.

### **Text Books**

1. Rao.M.N. et al., Air Pollution, Tata Mc.Graw Hill, 1998.
2. Environmental Pollution Control Engineering By C.S. Rao, New Age International Publishers, 2006

### **Reference Books**

1. Noel de Nevers, Air Pollution Control Engineering, Mc.Graw Hill, New York. 1995.
2. Stern, A.C., Air Pollution , Vol.I, II and III, Academic Press, 1962.
3. Cunniff, P.F., Environmental Noise Pollution, John Wiley and Sons, New York, 1981.

## **CE 28 ENVIRONMENTAL IMPACT ASSESSMENT**

### Unit-I

Historical perspective of environmental protection laws and acts in India - Definition of EI, EIA, EIS - Industrial policy statement of the Government of India. Legal and Regulatory aspects in India - Types and Limitations of EIA - Minimum National Standards – Bureau of Indian Standards - WHO standards.

### Unit-II

EIA methodologies – Appropriate Methodologies, Quantification, - Cost benefit analysis - Risk assessment, Test Model format - Preliminary assessment

### Unit-III

Air quality impact: Background - Typical considerations and factors, air quality impact of industry, transport systems, mitigation methods. Water quality impact: Water quality criteria and standards, Field Surveys water quality- impacts by developmental projects –Land and soil quality impacts- Soil fertility and remediation. Noise impact: Noise and sound, the effects of noise on people, noise scales and rating methods, estimating transportation noise impact.

### Unit-IV

Energy Impact: Energy impact considerations, data sources, energy conservation data, EIA of hydro, thermal and nuclear power plants, Vegetation and Wild life impact: Biological concepts and terms, impact on flora and fauna, mitigating measures, alternatives - Types, steps in performing socio economic impact assessment, analysis of public services and facilities, impacts, social impacts

### Unit-V

Summarization of environmental impacts - Environmental Management plan, Public involvement - impacts of economic profile of the community, Exchange of information - comparison of alternatives- Training

### **References Books**

1. Canter, L.W., Environmental Impact Assessment, Mc Graw Hill, New York, 1996.
2. Petts, J., Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, London, 1999.
3. Environmental assessment of development projects, United Nations Asia and Pacific Development Centre, Kuala Lumpur, 1983.
4. John, G. Rau and David C. Wooten (Ed), Environmental Impact Analysis Hand Book, McGraw Hill Book Co., 1980.
5. Peter Wathern (ed), Environmental Impact Assessment, Theory and practice, Unwin Hyman Ltd., London,1988.
6. Munn,R.E., (ed), Environmental Impact Assessment, Principles and Procedures, Published on behalf of SCOPE, Unwin Brothers Ltd., London, 1979.

### **CE 29 DOCK AND HARBOUR ENGINEERING**

## Unit –I

Growth and regulation of Ports: History of Port – Classification of Harbours - Factors affecting the growth of Port. - Requirement of a Harbour - General Planning – Port capacity –traffic analysis - Berth occupancy – financial evaluation - EIA -Description of selected Indian ports.

## Unit – II

Harbour Planning (Technical) Site investigation – harbour entrance - Navigational Channel – Depth of harbour – Turning basin – Anchor basin – berthing area – Storage area - Shipping terminal facilities – Essentials of passenger terminal, dry bulk cargo terminal, Liquid bulk cargo terminals and container terminals.

## Unit-III

Introduction to ocean waves – Wave transformation – Wave and wind climate inside Harbour - Break

waters: Types – Factors determining their selection – Forces on break waters – Design of rubble mound

and vertical break waters – Physical Model Studies.

## Unit-IV

Berthing structures – Types – Loads – Selection of berthing structures – Design principles of diaphragm walls, dolphins and piles. Selection and Design principles of Dock fenders and Mooring accessories.

## Unit – V

Design principles of dock structures - Graving dry dock – Slip way – floating dry dock - Monitoring and repair of harbour structures - Dredging - Navigational aids – Light house.

## References

1. Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol – II; S. Narasimhan & S. kathiroli, NIOT- Chennai
2. Design and construction of Port and marine Structures – Alonzo Def. Quinn – McGraw – Hill book Company
3. IS: 7314 1974 - Glossary of terms relating to Port and harbour Engineering.
4. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – I) Site Investigation.
5. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – II) Earth

Pressure.

6. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – III)

Loading.

7. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – IV)

General Design Consideration.

8. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – V)

Layout and functional Requirement.

### **CE 30 TRAFFIC ENGINEERING AND MANAGEMENT**

Unit – I

Elements of Transportation Engineering : vehicle characteristics like weight , size, turning radius, concept of design vehicle. Human and Driver characteristics – PIEVE theory, comfort, concept of design driver. Road characteristics – surface conditions, slopes and curves. Control mechanisms. Terminal facilities.

Unit – II

Highway geometric design : introduction, road cross section parameters. Horizontal curves, vertical curves, channelization design. Fundamentals of traffic flow, uninterrupted traffic flow, Interrupted traffic flow, speed studies and analysis, Highway capacity studies and analysis,

Unit – III

Traffic Signal: Fixed and vehicle actuated signals - Optimum cycle length - Warrants for signals – Saturation flow - Signal co-ordination - Area traffic control - Design of signalized and un-signalized intersections. Design of interchanges, Design of roundabouts. Road signs- test of the sign. Lettering and placement of signals.

Unit-IV

Traffic Regulation and Safety: Regulation of speed - Vehicle and road users – Parking regulations – Parking and Traffic Control : Parking studies - Design of parking lots - Traffic signs - Road markings at different locations - Speed breaker Accident investigation - Accident data analysis.

Unit-V



Traffic Management: Legislation enforcement and education for traffic safety, Cost of road accidents, Measures for accident reduction Segregation of traffic, Tidal flow operation, Exclusive bus lane, oneway streets, Street lighting, Noise barrier.

### **Text Books**

1. Kadiyali,L.R., Traffic and Transportation Engineering, Khanna Technical Publications, Delhi, 2003.
2. Khanna, K and Jussto C.E.G., Highway Engineering, Khanna Publishers,Roorkee , 2006.

### **Reference Books**

1. Worfgang.S., Hamburger, Transportation and Traffic Engineering Hand Book, Prentice-Hallo,New Jersey, 2002.
2. Louis,J Pignataro, Traffic Engineering - Theory and Practice, Prentice-Hall Inc., New Jersey, 2003.
3. James.L. Pline, Traffic Engineering Hand Book, Prentice Hall, New Jersey, 2002.
4. Salter. S. A. Highway Traffic analysis and design, Prentice Hall, New Jersey,2003
5. Partha Chakroborthy and Animesh Das, “Principles of Transportation Engineering”, Prentice Hall of India Pvt. Ltd., New Delhi – 110001, 2003

## **CE 31 PHOTOGRAMMETRY AND REMOTE SENSING**

### **Unit-I**

Introduction: History – distinction between aerial & terrestrial photographs – comparison of map and aerial photographs.

### **Unit-II**

Aerial cameras – single vertical aerial photographs – coordinate system – comparators – scale of vertical aerial photograph – relief displacement. Stereoscopic viewing – stereoscopes – vertical exaggeration – parallax bar – height determination. Elementary method of map making – radial line triangulation – mosaics – types of mosaics and its uses. Tilted photographs, oblique photographs, rectification, ortho photographs (elementary treatment only).Fight planning-end lap and side lap – scale, flying height, season year.

### **Unit-III**

Photographic interpretation: Fundamentals of Aerial photo interpretation – photographic elements – interpretation keys.

#### Unit-IV

Introduction to Remote Sensing: Definition-history-electromagnetic radiation-reflected and emitted electromagnetic energy-interaction of EMR with atmosphere and Earth surface – platforms-sensors-types of satellites and their orbits, Image enhancement, Image classification.

#### Unit-V

Application of Photogrammetry & Remote Sensing: Application of aerial photographs and satellite imagery – merits – applications in highway engineering, environmental engineering, water resources engineering, topographic mapping and geology.

#### **Text Books**

1. Wolf,P.R., Elements of Photogrammetry, McGraw Hill Inc., 1983.
2. Lillesand,T.M., and Kiefer,R.W., Remote Sensing and Image Interpretation, John Wiley and Sons, New York, 1979.

### **CE 32 PREFABRICATION AND CONSTRUCTION TECHNIQUES**

#### Unit – I

Materials, admixtures, pigments – Modular Co-ordination and standardization, System of prefabrication- Principles of production techniques.

#### Unit – II

Precast concrete components – Precasting and Prefabrication techniques, Planning, analysis and design considerations – Handling techniques – Transportation and erection of structures.

#### Unit- III

Skeletal and large panel construction, space structures – Joints in construction – curing techniques.

#### Unit- IV

Appropriate technology for cost effective techniques for roof, wall, door, water tanks etc.

#### Unit- V

Quality control –Repairs and economical aspects in prefabrication.

#### **Text Books**

1. Livitt, H.M. Precast concrete – Materials, manufacture, Properties and usage, Applied science

publications, 1992.

2. Richardson, J.G., Precast Concrete Production, Cement and Concrete association, London, 1973.

3. Bruggeling, A.S.G., Huyghe, G.T., Prefabrication with concrete, A.A. Balkama Publishers, U.S.A., 1991.

### **Reference Books**

1. Madhava Rao, A.G., et.al. – Modern trends in housing and developing countries Oxford & I B H Publishing Co., 1985.

2. Levicki, B., Building with Large Prefabrications, Elsevier Publishers.

3. Large Panel Prefabricated Constructions, Proc. of course conducted by SERC, Chennai.

## **CE 33 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES**

### **Unit – I**

Elements of seismology - Definitions of Magnitude, Intensity, Epicenter, etc., General features of tectonics of seismic regions, Seismographs. Seismic zones as per IS 1893-2002.

### **Unit – II**

Theory of vibrations - Free vibrations of single degree, two-degree and multiple degree freedom systems, damping ratio, logarithmic decrement , Transmissibility, Response spectra

### **Unit – III**

Principles of earthquake resistant design – Methods of dynamic analysis – Choice of the method - Architectural requirements of buildings – Plan and vertical irregularities .

### **Unit – IV**

Behaviour of reinforced concrete and steel elements under cyclic loading –Confinement- Ductility and absorption of energy- Introduction to Indian Standard Codes -IS:4326 – 1993 and IS13920-1993.

### **Unit –V**

Design of RC frames for earthquake loads – calculation of loads as per IS 1893 – 2002 – Load combinations - Design of beams and columns for earthquake resistance.

### **Textbooks**

1. Pankaj Agrarwal & Manish Shrikhande “Earthquake resistant Design of Structures”

Prentice Hall of India Pvt Ltd. New Delhi, 2007.

2. Mario Paz. “Structural Dynamics – Theory & Computations” CSB Publishers & Distributors Shadhdara, Delhi 1985.

### **Reference Books**

1. Anil K.Chopra, “Dynamics of Structures Theory and Applications to Earthquake Engineering” Prentice Hall of India (P) Ltd., New Delhi 1996.
2. Pauley T and Priestley M.J.N, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons, New York, 1992.
3. Stratta, J.L “Manual of seismic Design” Prentice Hall Inc. NJ 1987.

## **CE 34 STRUCTURAL DYNAMICS**

### Unit- I

Single – Degree of Freedom Systems, Analytical Models, Equation of Motion, Free Vibration, Damping, Types of damping, Response to harmonic loading, Resonance, Support motion, Transmissibility, Vibration isolation .

### Unit- II

SDOF system subjected to periodic & impulsive loading, Fourier series loading, Rectangular pulse, Introduction to Frequency Domain analysis

### Unit- III

SDOF systems subjected to general dynamic loading, Duhamel’s integral, Application to simple loading cases, numerical evaluation of response integral.

### Unit- IV

MDOF systems, selection of DOFs, formulation of equations of motion, Structure matrices, Static condensation, Free Vibration Eigen Value problem, Frequencies and Mode Shapes, Determination of natural frequencies and mode shapes by Stodola- Vianello method, Rayleigh method Orthogonality conditions.

### Unit -V

Distributed- parameter Systems Free and forced Vibration of beams .

### **Text Books**

1. Chopra A.K. , Dynamics of Structures, Dhanapat Rai & Sons, New Delhi.
2. Structural Dynamics - Mario Paz, CBS Publications, New Delhi.

### **References**

1. Clough R. M. and Ponian, Dynamics of Structures –,McGraw Hill co.New Delhi.
2. Craig R.R , Structural Dynamics – An Introduction to Computer Methods, John Wiley and Sons, 1981.

## **CE 35 THEORY OF ELASTICITY AND PLASTICITY**

### Unit I

Analysis of stress and stain - state of strain at a point - compatibility equations - generalized Hooke's Law - plane stress and plane strain.

### Unit II

Airy's stress function - polynomials - biharmonic equations - Two dimensional problems in cartesian coordinates- Bending of a simple beam under uniform load – Triangular Gravity Wall .

### Unit III

Solution of plane problems in Polar coordinates – Differential equation in polar coordinates – Hollow cylinder subjected to uniform pressure – Pure bending of curved beams – Rotating Disks

### Unit IV

General solution of problems - Torsion of prismatic bars by displacement (warping function) force (Prandtl's stress function) torsion of shafts of circular and non circular cross sectional shapes only (Elliptic, Triangular and Rectangular) - Torsion of thin rectangular sections and hollow thin walled sections.

### Unit V

Introduction to problems in plasticity - Physical assumption - Criterion of yielding - Rankine theory - St. Venant's theory - Flow rule (Plastic stress - strain relationship - Elastic Plastic problems of beams in bending - plastic torsion - sand heap analogy.

## **References**

1. Chakrabarty, "Theory of Plasticity", Tata McGraw Hill Book Co., New Delhi, 1975
2. Wang. C.K., "Applied Elasticity", Mc Graw Hill, New Delhi, 1990
3. Timoshenko.S. and Goodier. J.N. "Theory of Elasticity" Mc Graw Hill Book Co., New York, 1988
4. Sadhu Singh "Theory of Elasticity" Khanna Publishers, New Delhi, 1988
5. Zhilun Xu , “Applied Elasticity”, Wiley Eastern Limited, New Delhi,1980