

B.TECH.-III (CIVIL) (With Effect from August 2008)

FIFTH SEMESTER

Sr. No.	Course	Course Code	Teaching Scheme			Credits	Examination Scheme				
			Hours per Week				Theory	TU	TW	Pract	Total Marks
			L	TU	PR		Marks	Marks	Marks	Marks	
1	Water Resources Engineering-I	CE301	3	1	2	5	100	25	20	30	175
2	Building Planning	CE303	3	1	2	5	100	25	20	30	175
3	Building Materials and Construction	CE305	3	1	2	5	100	25	20	30	175
4	Geotechnical Engineering	AM307	3	1	2	5	100	25	20	30	175
5	EIS I	-	3	-	-	3	100	-	-	-	100
Total contact hours per week = 27			Total Credit = 23				Total Marks =800				

SIXTH SEMESTER

Sr. No.	Course	Course Code	Teaching Scheme			Credits	Examination Scheme				
			Hours per Week				Theory	TU	TW	Pract	Total Marks
			L	TU	PR		Marks	Marks	Marks	Marks	
1	Estimation & Cost Analysis	CE302	3	1	2	5	100	25	20	30	175
2	Water Treatment And Distribution System	CE304	3	1	2	5	100	25	20	30	175
3	Structural Analysis - II	AM306	3	1	2	5	100	25	20	30	175
4	Design of Steel Structures	AM308	3	1	2	5	100	25	20	30	175
5	EIS II	-	3	-	-	3	100	-	-	-	100
Total contact hours per week = 27			Total Credit = 23				Total Marks =800				

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- **INTRODUCTION TO WATER RESOURCES ENGINEERING** (02Hours)
 Need Of water resources projects, Preliminary aspects of Environmental Impact Assessment of Water Resources Projects, Hydrologic cycle, scope and application, hydro-metrology, hydrologic equation, hydrologic models, water resources engineering
 - **PRECIPITATION AND ABSTRACTIONS** (08Hours)
 Mechanism of precipitation, types and forms of precipitation, measurement techniques, rain gauge network, variability in precipitation, estimation of missing data, test for consistency of rainfall record, rainfall hyetograph, rainfall mass curve, areal average rainfall, intensity duration curves, evaporation, factors affecting evaporation, evaporimeters, estimation of evaporation, evapotranspiration, measurement of evapotranspiration, initial loss, infiltration and infiltration indices.
 - **RUN OFF AND HYDROGRAPH** (08Hours)
 Direct runoff and base flow; run off characteristics of streams, computation of runoff, rainfall-runoff relationships, components of hydrograph and factors affecting shape of hydrograph, base flow separation, effective rainfall hyetograph, unit hydrograph theory, derivation of unit hydrograph of different duration, synthetic unit hydrograph, IUH
 - **STREAM GAUGING AND DESIGN FLOOD** (06Hours)
 Site selection for stream gauging, direct methods of discharge measurements, computation of design flood using rational, empirical, unit hydrograph and flood frequency methods.
 - **FLOOD ROUTING** (03Hours)
 Reservoir and channel flood routing methods
 - **GROUND WATER HYDROLOGY** (06Hours)
 Occurrence, distribution of ground water, specific yield of aquifers, movement of groundwater, Darcy's law, permeability, safe yield of a basin, compressibility of aquifer, storage coefficient, specific storage, hydraulics of wells under steady & introduction to unsteady condition in confined and unconfined aquifers, yield of wells, pumping and recuperation tests, types of tube wells.
 - **IRRIGATION ENGINEERING** (03Hours)
 Definition of irrigation, necessity, drainage problems of irrigation , advantages and disadvantages of irrigation, types of irrigation, quality of irrigation water, various methods of irrigation, suitability of various methods of irrigation, bandhara irrigation
 - **WATER REQUIREMENTS OF CROPS** (05Hours)
 Classes and availability of soil water, available moisture depth, frequency of irrigation, relationship between duty a delta and base period, factors affecting duty, methods of improving duty, irrigation efficiencies, command areas, kharif, rabi and perennial crops, crop rotation, irrigation water requirement, design discharge of canal and storage capacity of reservoir based on irrigation requirement.
 - **WATER LOGGING AND DRAINAGE** (04Hours)
 Definition, effects, causes and remedial measures of water logging, types of land drains, layout and spacing of tile drains.

PRACTICALS:

1. Study of recording and non-recording rain gauges.
2. Study of pan evaporimeter.
3. Study of infiltrometer.
4. Study of rainfall runoff relationship for given duration of storm
5. Study of effect of rainfall intensity on runoff due to specific duration of storm.
6. Preparation of run off hydrograph using rainfall simulator.
7. Study of rate of ground water recharge.
8. Study of Hele-Shaw apparatus.

BOOKS RECOMMENDED

1. Chow V T, Maidment D R and Mays L W, "Applied Hydrology", McGraw-Hill Book Company, New York, 1988.
2. Raghunath H. M., "Hydrology, Principles, Analysis and Design", New Age International (P) Ltd, New Delhi, 2000.
3. K. Subramanya, " Engineering Hydrology", Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi, 1990.
4. Asawa G.L., "Irrigation and water resources Engineering", New Age International Publishers, New Delhi, 2005.
5. Garg S. K., "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi, 1996.
6. V.P.Singh, "Elementary Hydrology", Prentice Hall Publication, New Delhi, 1994.

B. Tech. III (CIVIL) SEMESTER – V**L T P C****CE 303 : BUILDING PLANNING****3 1 2 5**

- **PLANNING APPROACH** **(08 Hours)**
Basic areas in residential buildings - Process of planning - Family requirements and analysis - Conceptual plan outlines - Principles and techniques of functional planning -Planning for services and landscaping. Architects role in changing urban area
- **BUILDING SYSTEMS** **(03 Hours)**
Concept of art and creativity - Role of architect and engineer- Structural system and functional classification of buildings – Residential building forms.
- **PLANNING FOR RESIDENTIAL BUILDING** **(10 Hours)**
Plan preparation for residential units - Structure, space forms and analysis- Activity space - Elements of human scale - Size and dimension decisions - Furniture layouts
- **PLANNING FOR NON-RESIDENTIAL BUILDINGS** **(08 Hours)**
Approach of activity analysis for public buildings, hostels, schools, offices, primary health centers - Space norms, basic areas, functional setting areas
- **ARCHITECTURAL COMPOSITION** **(05 Hours)**
Mass Composition - Principles of elevation development-techniques - Impacts of colour and structure character
- **BUILDING REGULATIONS** **(03 Hours)**
Building byelaws - Provisions in developed and developing urban areas – Plan approval process
- **BUILDING DRAWING** **(08 Hours)**
Key plan - Site plan and working drawings - Perspective drawings - Foundation and plumbing layouts - Building drawing softwares

PRACTICALS:

1. Plan sketches on site visits.
2. Building forms
3. Planning of residential building, Bungalow, apartment / Duplex / Raw House etc.
4. Planning of public building
5. Foundation and plumbing layout for ¾
6. Perspective drawings

BOOKS RECOMMENDED:

1. Shah M. G. Kale C. M., and S. Y. Patki, "Building Drawing", Tata Mc-Graw Hill Pub. Co. Ltd, New Delhi. (1997)
2. Sane Y. S., "Planning & Designing of Building ", Allies Book Stall, Poona 4. (1990)
3. "General Development Control Regulations", SUDA, Surat. (2006)
4. Ernest Pickering, "Architectural Design", John Wiley & Sons. (1993)
5. National Building Code.(2002)

B. Tech. III (Civil) Semester – V**L T P C****CE-305 BUILDING MATERIALS & CONSTRUCTION****3 1 2 5**

PART-I BUILDING MATERIALS:**(16 Hours)**

- **GEOLOGICAL ASPECTS:** (02 Hours)
Classification of minerals and rocks, geological structures, fold, faults, joints, dip and strike relation, Civil Engineering investigations.
- **STONES AND BRICKS:** (03 Hours)
Types of building stones and bricks, I.S. specification for bricks, bricks manufacturing process, tiles, stone ware pipes and terra cotta production
- **LIME AND CEMENT:** (05 Hours)
Types of limes and cements, and their usages,
- **MORTAR AND CONCRETE:** (04 Hours)
Mortars-different type of mix proportions and their uses, concrete in construction, different concrete mixes and usage's, placing compacting and curing of concrete, reinforced concrete, reinforcement details of foundations, columns, beams and slabs, formworks.
- **MISCELLANEOUS BUILDING MATERIALS:** (02 Hours)
Timber-usages in buildings, polymers and plastics, composites and smart materials, iron and structural steel, aluminum, glass, plastics, asphalts, varnishes, distempers, paints and cement paints.

PART-II BUILDING CONSTRUCTION**(29 Hours)**

- **FOUNDATIONS:** (04 Hours)
Objectives and techniques of site investigation, decision process for choosing foundation, general failures, classifications
- **MASONRY:** (04 Hours)
Brick and stone, selection criteria, bonding, masonry in building components, cavity brick masonry, composite walls, types and construction of partition walls, lintels and arches.
- **CONCRETE CONSTRUCTIONS:** (06 Hours)
Plain, R.C.C., Prestressed and Precast concrete, concrete slabs, beams, columns, chajjas, cantilever, Formwork, norms for curing, ready mix concrete plant, batching, mixing, testing transporting, laying and curing
- **TEMPORARY TIMBERING:** (02 Hours)
Scaffolding, Shoring, Underpinning
- **FLOORING:** (04 Hours)
Types of floors, construction of conventional flooring, terrazzo, mosaic tiles, IPS floor, timber and jack arch floors, tiles, rubber, PVC covering, modern flooring techniques, leak proof techniques.
- **BUILDING OPENINGS & STAIRCASE:** (03 Hours)
Doors, windows and ventilators types, nomenclature, fixtures and choices, Staircase terminology, types, structural forms, principles and selection criteria

- **ROOFING:** **(04 Hours)**
Types, terminology, steel truss roofs, special type concrete roofs, roof coverings, ACC and GI sheets.
- **FINISHES:** **(02 Hours)**
Different types of plastering, pointing, mortar proportions, choices, white and colour washing, distemping, cement painting, varnishing and painting of woodwork and steel, weathering effects.

PRACTICALS / STUDIO

- (1) Foundation Construction.
- (2) Masonry Construction and wall finishes
- (3) Scaffolding, formwork and temporary timbering
- (4) Concrete Construction.
- (5) Flooring
- (6) Roof Construction.
- (7) Doors, Windows & Staircases
- (8) Staircase Structural forms

TECHNICAL REPORT:

- (1) Properties and economic aspects of modern Building materials.
- (2) Site visit of various building construction.
- (3) Model studies.

BOOKS RECOMMENDED:

- (1) Arora D. S., "Geology for Engineers ", Mohindra Capital Publishers, Chandigarh. (1992)
- (2) Arora and Bindra , " A Textbook of Building Construction " , Dhanpat Rai & Sons, New Delhi. (1993)
- (3) Barry , " Building Constructions", Vol. I , II & III , ELBS Publications. (1989)
- (4) Ghosh D. N., " Materials of Construction ", Tata McGraw Hill Publication, New Delhi. (1991)
- (5) McCay , " Building Construction " , Vol. I , II & III , ELBS Publications. (1986)

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- **INTRODUCTION**
Need for Soil Engineering Studies - Soil as an Engineering Material -Scope of Geotechnical Engineering.
 - **BASIC PROPERTIES OF SOIL**
Elementary properties and their measurements - Constituents of soil - Phase diagram - Definitions Interrelationship – Insitu determination of density - Relative density
 - **SOIL CLASSIFICATION & CONSISTENCY LIMITS**
Classification of soil based on particle size - Soil consistency limits - Soil indices
 - **COMPACTION**
Definition - objectives - Factors affecting compaction - Laboratory tests - Zero air void Line - Field compaction control - Relative compaction
 - **PERMEABILITY AND SEEPAGE**
Permeability - Darcy's law - Laboratory tests - Field tests - Permeability of stratified deposits – Seepage - Flow net - Quick sand condition
 - **CONSOLIDATION**
Consolidation test – Significance - Consolidation Parameters - Consolidation Settlement
 - **SHEARING RESISTANCE**
Shear parameters - Coulomb's law of shear strength – various laboratory methods to evaluate strength parameters - Drainage conditions
 - **SOIL EXPLORATION**
Purpose – Information - Objectives and Methods – Sampling - concept of stress distribution –
 - **SHALLOW AND DEEP FOUNDATION**
Types of foundation Bearing capacity and settlement of foundations - Total settlement - Computation of settlement components - Pile foundation - Suitability of deep foundations - Load carrying capacity of pile - Static and dynamic formuii - Pile load test - Concept of group effect of piles for load carrying capacity.
 - **EARTH PRESSURE**
Definition,- Active - Passive and Earth pressure at rest conditions Coulomb's - Rankine's theories of earth pressure
 - **STABILITY OF SLOPE**
Infinite slope - Finite slope - Swedish method - Taylors stability number-Applications to design of earth dam, choice of shear parameters - Total and effective stress analysis and concept of factors of safety.
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PRACTICAL

1. Determination of moisture content density of soil
2. Grain size analysis
3. Consistency limits of soil.
4. Compaction test on soil
5. Determination of coefficient of permeability of soil..
6. Estimation of shear resistance of noncohesive by direct shear test.
7. Estimation of shear resistance of cohesive by vane and UCc tests.
8. Computation of consolidation parameters
9. Demonstration of triaxial shear test and computation of C & ϕ
10. Demonstration of Exploration program and study different field tests.

BOOKS RECOMMENDED

1. K R Arora., "Soil Mechanics & Foundation Engineering", Standard Publishers, Ltd 2002
2. Terzaghi , Peck .and Mesri " Soil Mechanics in Engineering Practice " 1996
3. Bowles J E, "Foundation Analysis & Design", McGraw Hill Inc., New York, 1988
4. A V Shroff " Soil Mechanics and Geotechnical Engineering

5. Das B M, "Principles of Geotechnical Engineering", PWS Publishing Co., Boston, 1 990
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LIST OF ELECTIVE INTER DISCIPLINARY SUBJECTS OFFERED BY CED

B.Tech. – III FIFTH SEMESTER

Sr. No.	Code	Subject
1	CE309	Industrial Safety & Environment
2	CE311	Geospatial Technologies
3	CE317	Hydropower Engineering

LIST OF ELECTIVE INTER DISCIPLINARY SUBJECTS OFFERED BY AMD

B.Tech. – III FIFTH SEMESTER

Sr. No.	Code	Subject
1	AM309	Introduction to Earthquake Engg
2	AM311	Introduction to Structural Engineering
3	AM313	Applications of ANN in Engineering
4	AM315	Design of Vessels
5	AM317	Introduction to Soil & Rock Mechanics

B.TECH. III (CIVIL) SEMESTER - V**L T P C****CE 309 : INDUSTRIAL SAFETY & ENVIRONMENT (EIS-I)****3 0 0 3**

- **INTRODUCTION (04 Hours)**
Safety – Safety and Productivity – Role of Government – National Safety Council – National Safety Awards – House keeping
- **SAFETY STANDARDS AND LEGISLATION (05 Hours)**
Standards – ILO Model code of safety regulation / legislation – Factory Act – Boiler Act – Electricity Act – Workman’s compensation act
- **BASICS OF ENVIRONMENT (10 Hours)**
Working environment – Types of working environment – Need of environment control – Effects of environmental factors on human body & mind – Basics of environment design - Improved efficiency and accuracy at work
- **PLANNING FOR SAFETY (06 Hours)**
Purpose for planning – planning procedure – Range of plans – Safety policies – Elements of safety policy – Implementation
- **ENVIRONMENTAL STANDARDS (04 Hours)**
ISO 14000 introduction – General description of ISO 14001 – Environment Management System (EMS) – Key elements of ISO 14001 and EMS
- **OCCUPATIONAL ERGONOMICS (06 Hours)**
Ergonomics – Human-body – Health – Posture – Workplace or office ergonomics – Ergonomics for women at work – physical work and environment – Anthropometry
- **OCCUPATIONAL STRESS AND HEATH (10 Hours)**
Work related stress – Causes of stress – Signs of stress – Measurement of stress – Stress management systems – Prevention – Stress health and productivity – Occupational safety and health Act – Health program – First Aid

(Total Contact Time: 45 Hours)**BOOKS RECOMMENDED:**

1. Anupama Prashar & Bansal, “Industrial Safety and Environment”, S.K. Kataria & sons, New Delhi, 2005.
2. S.K. Agrawal, “Industrial Environment Assessment and Strategy”, APH Publishing Corporation, New Delhi, 1996.
3. Safety- Health and working conditions: Training Manual, National Safety Council, Mumbai, 2000.
4. Guiding Principles for chemical accident Prevention, preparedness and response: Manual prepared by organization for economic co-operation and development, 1992.
5. “Major safety control: A practical Manual” National safety council, India, 1993.

B. TECH. III SEMESTER - V**L T P C****CE 311: GEOSPATIAL TECHNIQUES (EIS-I)****3 - - 3**

- **INTRODUCTION** **(06 Hours)**
Introduction to remote sensing - Geographical information systems and global positioning systems - Benefits and applications of remote sensing - GIS and GPS.
- **REMOTE SENSING** **(07 Hours)**
Fundamentals of remote sensing - Energy interactions - Ideal remote sensing systems, - Fundamentals of interpretation - Basic equipments used for interpretation - Elements of air photo interpretation - Interpretation keys - Different types of sensors - Platforms and remote sensing images
- **DIGITAL IMAGE PROCESSING** **(06 Hours)**
Characteristics of a digital image - Image enhancement - Contrast manipulation – Image registration – Digital image interpretation techniques
- **GEOGRAPHICAL INFORMATION SYSTEMS** **(08 Hours)**
Introduction - Geo referenced data - Data input & output - Data quality and management - GIS analysis functions - Implementation of GIS - Airborne Laser Thematic Mapper (ALTM) LIDAR, Principles and methods of data collection – Digital Elevation Models
- **GLOBAL POSITIONING SYSTEM** **(07 Hours)**
Earth Surface, datum – Co-ordinate systems - Segments of GPS System - GPS receivers and its components - Different methods of observation
- **ENGINEERING APPLICATIONS** **(11 Hours)**
Landuse / Landcover mapping - Water resources mapping - Utility mapping - Urban and regional planning and environmental and other engineering applications

(Total Contact Time: 45 Hours)**BOOKS RECOMMENDED:**

1. Agrawal N.K., "Essentials of GPS ", Spatial Network Pvt. Ltd., Hyderabad, 2004.
2. Anderle R, "The Global Positioning System", Royal Society of London, U.K., 1988.
3. Lillesand T.M. and Kiefer R. W., "Remote Sensing and Image Interpretation", John Willey & Sons, New York, 2002).
4. Lueder D.A., "Aerial photographic Interpretation principles and applications", McGraw Hill Book Company, New York, 1959).
5. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.

- **INTRODUCTION** (2 Hours)
Sources of energy, Classification of energy, Thermal power, Nuclear power, Tidal power, Wind power, Solar power, Gas turbine generation, Geothermal power, Biogas, Energy conservation.
- **ENVIRONMENT AND WATER POWER DEVELOPMENT** (2 Hours)
Introduction, Concern about environment, Environmental planning and management, Environment and hydropower development, Conventional environmental concerns and new environmental concerns, Small hydropower schemes.
- **PRECIPITATION, RUNOFF AND STREAM FLOW** (4 Hours)
Hydrologic cycle, Hydrologic equation, Measurement of rain fall, Interpretation of Rain gauge data, Graphical representation of rain fall, Runoff process, Stream flow analysis, Hydrograph, Mass curve, Flow duration curve, Rainfall – Runoff relationship, Interpretation of rain-gauge data, Factors affecting runoff, Methods of runoff estimation, Flood runoff, Unit hydrograph method.
- **PLANNING FOR WATER POWER DEVELOPMENT** (5 Hours)
Introduction, Objectives of planning, Planning for water power development, Investigations and studies for water power development, Institutional framework, Definitions, Estimation of available water power, Power duration curve, Storage and pondage, Load studies, Load factor, Load duration curve, Variations in load factor, Power system load, Capacity factor, Utilization factor, Diversity factor, Firm power, Secondary power, System integrated operational studies, Load prediction, Market requirements of power, Installed capacity, Benefits evaluation for installed capacities, Size and number of units.
- **WATER POWER DEVELOPMENT** (4 Hours)
Introduction, History of water power development, Advantages of hydropower, Hydro Vs thermal power, Hydropower potential and its development, Projected installed capacity, Hydro thermal mix, Constraints in hydropower development, Accelerated hydropower development, Classification of hydropower development, Water requirement for hydropower development, Economics of hydropower development, Economic value of hydropower, Cost of water power, Total annual cost of a hydro project, Operation and maintenance of hydro plants.
- **STORAGE POWER DEVELOPMENT** (4 Hours)
Introduction, Components of storage power development, Economic aspects.
- **RUN-OFF-RIVER POWER DEVELOPMENT** (4 Hours)
Introduction, Types of plants, Components of run-off-river power development, Run-of-power development on canal falls,
- **PUMPED STORAGE POWER DEVELOPMENT** (4 Hours)
Essential requirements of PSPP, Necessity for pumped storage power development, Advantages of PSP development, History of PSP development, Power potential PSP development, Classification of PSP development, Development plan for PSP development, Components of PSP development, Layout of PSP development, PSP plants and power system, Economics of PSPP, Cost of power generated.
- **SMALL HYDRO POWER DEVELOPMENT** (2 Hours)
Introduction, Advantages of small hydropower, Classification of small hydropower, Small hydropower potential, Components of small hydropower development, Formulation of development schemes, Choice of units, Classification of turbines, Selection of turbines, Economics of small hydropower
- **POWER HOUSE PLANNING** (6 Hours)
General layout of the power house and arrangement of hydropower units, Number and sizes of units, Substructure-spacing of the hydro-electric units, Shallow or deep setting of turbines, Super structure, Abbreviated power house, Semi-outdoor power house, Outdoor powerhouse, Advantages and disadvantages of abbreviated super-structure.

Surface Power Station : power house structure, power house dimensions, Lighting and Ventilation, Variation in design of power house.

Under Ground power Station : Types of underground power plants, Alignment and layout of cavities, Investigations and studies, Safety requirements, Sizing of a power house, Joints of hydropower plants,

Submersible power house: Approximate dimensions of the power house, Tailrace.

• **WATER CONVEYANCE** **(8 Hours)**

INTAKES : Types, Location and Alignment of intakes, Losses in Intakes, Air- Entrainment at Intakes, Inlet aeration, Trashracks.

PENSTOCKS AND PRESSURE SHAFTS: Introduction, Classification of penstocks, Layout of penstocks, Hydraulic design of penstocks, Branches and wyes, Bends, Anchor blocks.

HYDRAULIC VALVES AND GATES: Introduction, Hydraulic valves, Types of hydraulic valves, Gates, Spillway gates, Gate installation in penstocks.

HYDRAULIC TRANSIENTS AND SURGE TANKS: Introduction, Hydraulic transient, Control of hydraulic transients, Water hammer, Water hammer theory, Surges in power tunnels and penstocks, Surge in open channel, Surge tank, Necessity of surge tank, Location of surge tank, Types of surge tanks, Design of surge tank, Tailrace surge tank.

BOOKS RECOMMENDED

1. Dandekar and Sharma," Water Power Engineering", Vikas Publishing House, New Delhi,1996.
 2. Varshney R.S," Hydropower Structures", Nem chand and Bros., Roorkee (U.P.), 1992.
 3. Deshmukh M.M.," Water Power Engineering", Dhanpat Rai Publications, New Delhi, 1998.
 4. Barrows H. K., "Water Power Engineering", McGraw Hill Book Co., New York.,1943
 5. R.K.SHARMA AND T.K.SHARMA, "Water Power Engineering" S.CHAND & Company, New Delhi, 2003.
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B. Tech. – III (All branches) Semester - V	L	T	P	C
AM 309 : Introduction to Earthquake Engg (EIS-I)	3	-	-	3

- **Introduction** (Hours -4)
Inner & Outer core of earth plate tectonics & its circulation – Earthquake types – Types of faults – Different types of seismic waves – Measuring instruments of earthquake – Strong ground motion & it's characteristics - Magnitudes intensity of earthquake
- **Seism tectonic / Seismic Environment of Indian Region** (Hours -4)
Seismic Geography and tectonic features of India – Seismic zones earthquake in India
- **Seismic effect on Structures** (Hours -4)
Inertia force in structures & its foundation deformations in structure – Horizontal & vertical movement of structures - Drift - Twisting of structures during earthquake – Building codes – Importance of Architectural features – Building layout & its configuration., Crumple joints, IS: 4326
- **Seismic Design Philosophy** (Hours -4)
Earthquake Design philosophy – Acceptance damage & ductility of building & capacity design concept – Quality control – Importance of Flexibility of structures – Indian seismic codes.
- **Seismic Effects on Masonry Structures** (Hours -5)
Behaviour of Brick Masonry & stone masonry under earthquake engineering – Construction aspects to improve the behaviour of masonry wall – selection of building materials – Structure configuration of masonry buildings – Earthquake resistant features of masonry work, Earthquake Structure
- **Seismic effect on Reinforced Concrete Building** (Hours -5)
Reinforced concrete buildings – Role of slab & masonry works – Behaviour R C Beams under seismic loadings, infill wall effect, shear wall position & effect.
- **Behaviour of Beam & Column Joints.** (Hours -5)
Behaviour of RC Beams column joints – Seismic effect on Open – Ground storey building – Behaviour of short column – Energy absorption of FRC joint under cyclic loading
- **Base Isolation System** (Hours -5)
Introduction to seismic dampers – viscous damper – Friction dampers – Yielding devices, active isolation method, snubber for power reactor pipe lines.

BOOKS RECOMMENDED:

1. Pankaj Agrawal & Manish Sprikhande, (2004) "Earthquake Resistant Design of Structures" 1st edition, Prentice Hall of India Pvt Ltd, New Delhi.
2. Skinner R I & Robinson W H, (1999) "An Introduction to seismic Isolation Jonn wiley & sons, New Yourk.
3. Ambrose J S Vergun D, (1999), "Design for Earthquakes" John Wiley & Sons INC, New York \.

4. *Paulay T & Priestley M J N, (1999) "Seismic Design of reinforced Concrete & Masonry buildings, John Wiley & Sons, New York.*
5. *Penelis G G & Kappos A J, (1997) "Earthquake Resistant Concrete Structures", E & FN Son, UK*
6. *Relevant Indian Standard Earthquake coded (IS: 1893-2000, 13920-1993, 13828- 1993, 4326 -1996)*

B. Tech. – III (All Branches), Semester – VI	L	T	P	C
AM 311 : Introduction to Structural Engineering (EIS-I)	3	-	-	3

- **Structure forces , Moment & Equilibrium** **(Hours – 8)**
 Review of forces, moment, couples, loads – Equilibrium conditions – Supports – Simple beam – Cantilever beam – Trusses – Cables.
 - **Stress & Strain** **(Hours – 8)**
 Axial (tension & Compression) – Bending – Shear – Torsion – Shear force & bending moment diagrams – Failure Criteria
 - **Strength through mass** **(Hours – 10)**
 Approximate analysis & Conceptual design of slabs – Plates – Beams – Columns – Case studies – towers – frames
 - **Strength through form** **(Hours – 10)**
 Various types of shells – Folded Plates – Tensigrity Structures – Introduction to 3-dimension space structures – Innovative case studies
 - **Materials for design** **(Hours – 6)**
 Steel - Concrete – Composite – Fibre Reinforced Plastic Composite – Innovative materials
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BOOKS RECOMMENDED:

1. J P Parikh, (2000) "Understanding concept of Structural Analysis & Design", Charotar Publishing House,
2. Beer & Johnston "Strength of Materials", Tata Mc Graw Hill Publication Inc.
3. Subramanian N,(1999) " Principles of Space Structures", 2nd Edition, Wheeler Publishing, New Delhi.
4. Gladius Levis (1989) "Selection of Engineering Materials" Prentice Hall college division.
5. Ramaswamy G.S., Eekhout, M and Suresh G R (2002) "Analysis, Design & Construction of Steel Space Frames" Thoma Telford, London.

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- **ARTIFICIAL NEURAL SYSTEMS : PRELIMINARIES** (Hours -2)
Neural processing – Historical development of Neural Networks – Some examples and applications.
 - **NEURAL NETWORKS: CONCEPTS AND FUNDAMENTALS** (Hours -4)
Biological Neural Networks – Basic building blocks of Artificial Neural Networks (ANNs) – Artificial Neural Network Terminologies
 - **FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS** (Hours -6)
Network models – Learning and recall – Features of ANNs
 - **FEED FORWARD NEURAL NETWORKS AND SUPERVISED LEARNING** (Hours -10)
McCulloch – Pitts Neuron model – Widrow – Hoff Learning Rule – Multilayer Perceptrons (MLPs) – Error Back Propagation (BP) algorithm – Training with BP algorithm – Practical consideration in implementing the BP algorithm
 - **RADIAL BASIS FUNCTION NETWORKS** (Hours -8)
Radial basis functions – Radial Basis Function (RBF) architecture, RBF network training, Comparison between RBF and BP Networks, An application example.
 - **PRACTICAL ASPECTS OF USING NEURAL NETWORKS** (Hours -12)
Selection of Neural Networks for solution to a problem - Design of Neural Networks – Data sources and processing of Neural Networks – Data Representation – Application of Neural Networks in Engineering
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BOOKS RECOMMENDED:

1. Kumar Satish (2004) "Neural Networks: A classroom Approach", Tata McGraw Hill, New Delhi
2. Tsoukalas, L H and Uhrig R E (1997) "Fuzzy and Neural approaches in engineering", John Willey & Sons, NY, USA.
3. Callan, Robert (1999) "The essence of Neural Networks", Prentice Hall, UK
4. Kartam, M, Flood, I and Garrate J K (1997) "Artificial Neural Networks for Civil Engineers: Fundamentals and Applications", ASCE Publication, NY, USA.
5. Rajesekaran S and Pia, G A V (2003) "Neural Networks, Fuzy logic and Genetic algorithms: Synthesis and applications", Prentice Hall of India, New Delhi..

B. Tech. –III (All branches) 5th Semester	L	T	P	C
AM 315 : Design of Vessels (EIS-I)	3	-	-	3

- **Introduction to Pressure vessels** **(Hours -9)**
Introduction to Pressure vessels – Stresses in Pressure vessels – General design criteria in vessel design
- **Design of Tall Vertical vessels** **(Hours -9)**
Stresses in the shell – Axial & circumferential pressure stresses – Gayed Vessels – Checking shell comp. stresses for elastic stability. Buckling & stability of vessels. Earthquake & wind effect calculations.
- **Design of Supports for vertical vessels** **(Hours -9)**
Skirt supports for vertical vessels – Lug supports for vertical vessels
- **Design of Horizontal vessels with saddle supports** **(Hours -9)**
Longitudinal bending stresses – Tangential shear stress at horn of saddle – Additional stress in head used as stiffener – Design of ring stiffness.

Design must be done by relevant Codes: ASME – VIII, Division-1, IS code:2914

BOOKS RECOMMENDED:

1. Moss D. R (2003). "Pressure Vessel Design Manual" 3rd edition, Gulf Professional Publication,
2. Harvey J F (1991), " Theory & Design of Pressure Vessels", 2nd edition, Van Nostrand Publication.
3. Brownell Young (2001), "Process Equipment Design", 2nd edition, Wiley – Intersciences
4. M H Jawad & J R Farr,(1989) "Structural Analysis & Design of Process equipment, 2nd edition, Willey Interscience.
5. S. Timoshenko, (1959), "Theory of Plate & Shells, 2nd edition, Tata McGraw Hill Publication Inc.

B. Tech. – III (All branches) 5th Semester
AM317 : Introduction to Soil & Rock Mechanics (EIS-I)

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- **Introduction** (Hours -4)
Soil Engineering – Origin of Soils – Formation of Soils – Major Soil deposits in India – Different type of soils
 - **Basic Definitions** (Hours -4)
Weight – volume relationships – Definitions – Phase diagram of soil – field tests
 - **Particle Size Analysis** (Hours -4)
Introduction – Mechanical analysis – Sieve analysis – Stoke’s law – Hydrometer method – Uses of particle size distribution curves
 - **Plasticity Characteristics of Soil** (Hours -4)
Atterberg limits – Soil indices - sensitivity – Thixotropy – Activity of Soils
 - **Soil Classification & Mineralogy** (Hours -4)
Classification of fine grained and coarse grained soils – General characteristics of soils of different groups – Indian standard classification system – clay mineralogy and soil structure.
 - **Permeability of Soil** (Hours -4)
Introduction – Laboratory and Field tests to determine coefficient of permeability.
 - **Compressibility & Strength** (Hours -4)
Consolidation test – consolidation parameters – Shear strength of soil – Mohr Coulomb theory - shear parameters
 - **Compaction of Soils** (Hours -4)
Introduction – Factors affecting compaction – Laboratory and field compaction – Soil stabilization – Compaction control – Dynamic compaction of soil
 - **Stresses due to Applied load** (Hours -4)
Introduction – Stress-strain parameters – Vertical stressed due to concentrated loads – Stress distribution methods – Contact pressure distribution methods.
 - **Rock Mechanics** (Hours -6)
Types of rocks – Mode of formation and their engineering properties – Geotechnical agents and their influence in various engineering projects – Engineering classification of intact rock and insitu rock masses – Index properties of rocks – Rock strength and failure criteria – Interpretation of geological map – Outcrop map – determination of dip and strike.
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BOOKS RECOMMENDED :

1. Arora K R, “Soil Mechanics & Foundation Engineering” Standard Publishers Ltd.2002
2. D P Coduto (1998), “Geotechnical Engineering Principles and Practices” Prentice Hall of India Pvt Ltd, New Delhi
3. A V Shroff, (2003) “Soil Mechanics and Geotechnical Engineering
4. B M Das, (2005) Principles of Geotechnical Engineering” PWS publishing company New Delhi
5. Alam Singh “Soil Engineering in theory and practice “ part -1

B. Tech III (Civil) Semester – VI**L T P C****CE-302 ESTIMATION AND COST ANALYSIS****3 1 2 5**

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- **GENERAL:** (04 Hours)
Significance of estimation and specification, role of civil surveyors, types of estimates, working drawing details, BS codes for measurements, Cost Indices.
 - **QUANTITY ANALYSIS OF BUILDINGS:** (12 Hours)
Estimation of earthwork and masonry, flooring, walls, openings, RCC components, staircase, timber and steel work, load bearing and framed structures.
 - **QUANTITY ANALYSIS OF SPECIAL STRUCTURES:** (10 Hours)
Estimation of roads and CD works, earthen dams, irrigation channels, urban services estimation, electrical fixtures, approximate estimation of infrastructural elements.
 - **BRIEF SPECIFICATIONS:** (05 Hours)
Basic principles and purpose, types and details.
 - **RATE ANALYSIS:** (10 Hours)
Factors affecting rates of building items, output of work force, building and typical civil engineering items, schedule of rates.
 - **ABSTRACTING:** (04 Hours)
BS methods of abstracts, abstract statements, cost analysis, BOQ and tenders.

PRACTICALS:

- 1) Detailed Estimation of a residential Unit.
- 2) Market survey
- 3) Estimation of a M.D.R with C.D. works
- 4) Rate analysis.

BOOKS RECOMMENDED:

- (1) Amarjit Aggarwal and A.K.Upadhyay, ' Civil Estimating, costing and valuation', Kataria & Sons, New Delhi. (1994)
- (2) Birdie G. S., " Text /book of Estimating and Costing ", Dhanpat Rai & Sons, Delhi. (1996)
- (3) Basin P. L. "Quantity Surveying" S. Chand & Co., New Delhi. (1990)
- (4) Dutta B. N., "Estimating and Costing ", S. Dutta & Co., Lucknow-1. (1995)
- (5) Rangwala S. C. "Elements of Estimating and Costing" Charotar Publishing Pvt Ltd. Anand. (1998)

B.TECH. III (CIVIL) SEMESTER - VI**L T P C****CE 304: WATER TREATMENT AND DISTRIBUTION SYSTEM****3 1 2 5**

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- **INTRODUCTION (07 Hours)**
Scope and importance of Environmental Engineering and Management - Introduction to Environmental pollution - Impact on human health - Present environmental scenario- Pollution standards - Pollution control and methods of abatement.
 - **DEMAND AND SOURCES OF WATER (09 Hours)**
Water demand - Population forecast - Water quality requirements - Sources and its yield for water requirements- Intake structures – Water quality parameters and their significance in domestic use - Drinking water quality standards.
 - **WATER TREATMENT (15 Hours)**
Need for water treatment - Design of treatment units such as aeration, sedimentation, coagulation and flocculation, filtration, Disinfection, water softening- Advanced water treatment methods.
 - **WATER DISTRIBUTION SYSTEMS (10 Hours)**
Pumps and pumping system – Pipes - Pipe appurtenances - Testing of water main - Distribution reservoirs - Distribution methods - Pipe network analysis - Planning of water supply project – use of software WATER CAD.
 - **RURAL WATER SUPPLY AND TREATMENT (04 Hours)**
Water demand and treatment techniques for rural area, water problems and remedial measures, packaged treatment plants.

(Total Contact Time: 45 Hours)

PRACTICALS:

1. Determination of Turbidity.
2. Determination of Chloride.
3. Determination of Hardness.
4. Determination of Carbonate, Bicarbonate and Hydroxide Alkalinity.
5. Determination of Chlorine Demand and Chlorine Residual.
6. Bacteriological Analysis of water.
7. Demonstration of air pollution monitoring equipment.
8. Demonstration of noise level meter.

BOOKS RECOMMENDED:

1. B. C. Punamia, Ashok Jain, Arun Jain, "Water Supply Engineering", Laxmi Pub., New Delhi, 2003.
2. Davis and Cornwell, "Elements of Water Supply and Waste water Disposal", John Wiley & Sons, New York, 1998.
3. Manual on Water Supply & Treatment 3rd Ed. Central Public Health & Environmental. Engg. Organization, Ministry of Urban Development, Govt. of India, New Delhi, 1991.
4. Ronald L. Droste, "Theory and Practice of Water and Wastewater Treatment", John Wiley & Sons, New York, 1997.
5. McGhee, T.J., "Water Supply & Sewerage", McGraw Hill International Edition, 1991.

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- **ANALYSIS OF INDETERMINATE STRUCTURES** (Hours-10)
Concept of fixed and propped cantilever beams - Slope deflection method - Moment Distribution method for continuous beams and rigid frame with and without support settlement.
 - **MATRIX METHOD OF ANALYSIS** (Hours – 10)
Introduction to force and displacement method of analysis - Stiffness method of analysis using direct element approach
 - **ANALYSIS FOR MOVING LOADS FOR INDETERMINATE BEAMS** (Hours -5)
Construction of Influence lines for Beams - Application of Mueller Breslau's principle
 - **ANALYSIS OF THREE AND TWO HINGED ARCHES, PARABOLIC & CIRCULAR ARCH** (Hours -4)
Influence lines for Arches
 - **PLASTIC ANALYSIS OF STRUCTURES, PORTAL and SWAY MECHANISM** (Hours-4)
 - **APPROXIMATE METHODS OF ANALYSIS** (Hours – 6)
Cantilever method and Portal method.
 - **STRUCTURAL VIBRATIONS** (Hours-03)
Study of Single and Multiple degrees of freedom system, damping.
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PRACTICALS:

1. Fixed & Propped Cantilever Beam – Deflection measurement.
2. Influence Lines
3. Two and Three hinged arches
4. Application of Softwares for analysis

BOOKS RECOMMENDED

1. Reddy C S (2007) "Basic Structural Analysis" 2nd edition, Tata Mc Graw Hill, New Delhi
2. Wang C K (1989) "Intermediate Structural Analysis" International edition, McGraw Hill, Singapore.
3. Meghere A S and Deshmukh S K (2003) "Matrix method of Structural Analysis" Charotar Publishing House, Anand.
4. Negi L S and Jangid R S (1999) "Structural Analysis", Tata Mc Graw Hill, New Delhi
5. Junarkar S B and Shah H J (1996) "Mechanics of Structures", Vol-2 , Charotar Publishing House, Anand.

- **INTRODUCTION:**

Introduction to engineering structures - principles of design, loads, factor of safety, properties of steel.

- **CONNECTIONS:**

Connections with general design consideration- Introduction to riveted - Connections welded - Bolted connections introduction to flexible - Semi-rigid and rigid connections - Beam to beam, Beam to Column and Moment resistant connections for office / residential / industrial buildings.

- **DESIGN OF STRUCTURAL MEMBERS:**

Design of Tension and compression members, design of flexural members – Beams, built up beams and plate girders - Design of built-up columns with slab base/ gusseted base foundation - Introduction to (i) Plastic Design of members and (ii) Load Resistance Factored Design (LRFD) method.

- **INDUSTRIAL ROOF:**

Analysis and design of typical industrial roof trusses with gantry girder and portal frames

- **DESIGN OF STEEL TRUSSES BRIDGES:**

- Railway Bridge

Innovative ,composite,cable stayed, suspension bridges introductions.

PRACTICALS:

1. Roof Truss: – D.L, L. L. Wind Load, Load Combinations, Design of members & Joints (2 Drg. Sheet).
2. Office Building: Simple beam, Plated beam, Beam to Beam connections, Beam to Column connections (1 Drg Sheet).
3. Plate girder: Design of Complete Plate Girder (1 Drg. Sheet)

BOOKS RECOMMENDED:

1. Ram Chandra “Design of Steel Structures”. Vol – I & II Standard Book House, New Delhi.
2. Negi K S “Design of Steel Structures”. Tata Mc Graw Hill Publisher Co. Ltd., New Delhi
3. Dugal S K “Design of Steel Structure”, Tata Mc Graw Hill Publication, New Delhi, 2nd Edition (2007)
4. P Dayaratnam “ Design of Steel Structures” S. Chand of Co., Delhi 2003 edition.
5. Arya A S & Ajamani J L., “Design of Steel Structure” Nem Chand Bros, Roorkee..

LIST OF ELECTIVE INTER DISCIPLINARY SUBJECTS OFFERED BY CED

B.Tech. – III SIXTH SEMESTER

Sr. No.	Code	Subject
1	CE312	GIS and Applications
2	CE316	Environment and Health
3	CE322	Advanced Fluid Mechanics

LIST OF ELECTIVE INTER DISCIPLINARY SUBJECTS OFFERED BY AMD

B.Tech. – III SIXTH SEMESTER

Sr. No.	Code	Subject
1	AM310	Machine foundation
2	AM312	Repair & Maintenance of Structures
3	AM314	Foundation Engineering
4	AM316	Introduction to Finite Element Method
5	AM318	Disaster Management

- **GEOGRAPHICAL INFORMATION SYSTEMS**

Geographical concepts and terms – GIS and CAD packages - Applications and benefits of GIS
(04 Hours)

Input data to GIS – Digitization and scanning from maps – Aerial photographs – Satellite images –
Input from satellite images, input from GPS (08 Hours)

Raster & Vector Data – Conversion – Storage and compression techniques (07 Hours)

Registration and resampling of thematic layers – Projection system of layers (04 Hours)

Database creation – Spatial and non-spatial – Database retrieval and management – Query from
database (10 Hours)

- **ENGINEERING APPLICATIONS** (12 Hours)

Landuse / Landcover mapping , Utility mapping - Water resources mapping - urban and regional
planning – Hydrological modelling – digital terrain modelling - environmental and other engineering
applications – Web GIS, Decision Support System (DSS)

REFERENCES :

1. Ghosh S.K., "Geographic Information Systems", Narosa Publications, New Delhi, 1994
2. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.
3. Burrough P. A., "Principles of Geographical Information systems for Land Resources Assessment", Oxford Science Publications, U. K.,1981

B.TECH. III (CIVIL) SEMESTER - VI**L T P C****CE 316 : ENVIRONMENT AND HEALTH****3 0 0 3**

- **INTRODUCTION** (7 Hours)
Scope and importance of Environmental Health - Introduction to Environmental pollution – its impact on human health – epidemiology - agents of diseases and their pathways – chronic and communicable diseases – environmental disasters : case studies
 - **AIR POLLUTION AND HEALTH** (12 Hours)
Types of air pollutants – impacts on human health – air quality guidelines in protecting public health – global climatic changes and its impact on health – incineration of wastes: dioxins, furans and PCBs - air quality standards
 - **WATER AND HEALTH** (12 Hours)
Drinking water quality – water borne diseases – aspects of water and wastewater treatment – Fluoride and Arsenic in drinking water
 - **SOLID WASTE AND HEALTH** (06 Hours)
Solid waste collection, handling, treatment and disposal – microbial flora in waste streams – human exposure assessment and effects – bio-aerosols
 - **PESTS AND PESTICIDES** (04 Hours)
Arthropods, rodents and other pests – Fungicides, herbicides and rodenticides – pesticides – human risks - regulations
 - **RADIATION AND HEALTH** (04 Hours)
Understanding radiation – radioactivity and radiation exposure – sources of radiations – Radon and its effect on health – solar radiations: ultraviolet radiations – ozone holes
- (Total Contact Time: 45 Hours)**
-

BOOKS RECOMMENDED:

1. Cairncross and Feachem “ Environmental Health Engineering in the Tropics” John Wiley and Sons, 1993.
2. Moeller D. W.,” Environmental Health” Harward University Press, 2005.
3. Willgoose.,” Environmental Health” William C Brown, 1988
4. Katheryn Hilenkamp, “Environmental Health : Ecological Perspective. Jones and Bartlett Publishers, 2006
5. J. E. Park, “Preventive and Social Medicine”, Banarasidas Bhanot Publishers, Jabalpur, 1995.

CE 322 : ADVANCED FLUID MECHANICS

- **BASIC LAWS OF FLUID MECHANICS** (7 Hours)
Continuum fluid concept, concept of fluid particle, Lagrangian and Eulerian approaches for description of fluid motion, system control volume approaches, Reynolds transport theorem, law of conservation of mass-continuity equation, law of conservation of momentum- equation of motion, law of conservation of energy- energy equation.
- **POTENTIAL FLUID FLOW** (8 Hours)
Standard flow pattern- uniform flow, source, irrotational vortex circulation, doublet, source and sink, vortex pair; source and vortex-spiral flow; source and uniform flow-flow past a half body; doublet and uniform flow-flow past a half body; source, sink and uniform flow- flow past a Rankine body; doublet and uniform flow-flow past cylinder, doublet; Doublet, vortex and uniform flow-flow past a cylinder with circulation; Magnus effect.
- **VISCOUS FLOW AND FLOW INSTABILITY** (8 Hours)
Equation of motion – Navier-Stokes equation, Exact and approximate solutions of N-S equation, creeping motion, theory of instability of laminar flow- methods of small disturbance, stability analysis, Orr- Sommerfeld equation, solution of OSE equation- neutral stability curve, stages of transition from laminar to turbulent flow, factors affecting transition from laminar to turbulent flow.
- **BUNDARY LAYER THEORY** (9 Hours)
Factors affecting growth of boundary layer, momentum thickness, displacement thickness, energy thickness, order of magnitude analysis, Prandtl's boundary layer equation, exact solution of laminar boundary layer equation for flow on a flat plate, von Karman momentum integral equation and its application in computation of boundary shear stress, drag, local and average coefficients of friction for laminar and turbulent boundary layers, factors affecting separation of boundary layer and its control.
- **TURBULENT FLOW** (7 Hours)
Characteristics of turbulent flow, types of turbulent flow, averaging procedure, Reynolds equation for turbulent flow from N-S equation, Prandtl's mixing length theory for two-D parallel flows, Karman-Prandtl's universal velocity distribution, smooth and rough turbulent flow and their velocity distributions, Moody's diagram - friction factor and its variation with Reynolds number and relative roughness.
- **UNSTEADY FLOW IN PIPE** (6Hours)
Water hammer, Rigid and elastic water column theories, methods of analysis.

BOOKS RECOMMENDED

1. Daily J.W. and Harlaman D.R.F., " Fluid Dynamics ", Addison Weasly
2. Garde R. J., ' Turbulent flow', New Age International (P) Limited, Publishers, New Delhi, 2000.
3. Streeter V.L., Bedford K. and Wylie E. B., "Fluid Mechanics", McGraw Hill Book Company Ltd., New York, 1998.
4. Vallentine H. R., 'Applied hydrodynamics' S. L. edition, The English Language Book Society and Butter Worths London, 1969
5. Schlichting, H., 'Boundary layer theory', McGraw Hill Book Co., Inc., New York, 1955.
6. Asawa G L, "Fluid flow in pipes and channels", CBS Publishers, New Delhi, 2008.

B. Tech. – III (All Branch), Semester – VI
AM 310 : Machine foundation (EIS – II)

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- **Soil Properties & Exploration**

Soil Properties and it's applications – Bearing capacity of Soil – Determination of Dynamic Property of Soil – Soil Exploration.

- **Classification of Machine Foundation**

General design requirement – Concept of Resonance condition – Permissible amplitude limit – Fibre Reinforced and Prestressed machine foundation

- **Block Type Machine Foundation**

Degree of freedom – Horizontal and vertical vibration problem – Concept of vibrating soil – Impact type block foundation

- **Frame Type Machine Foundation**

Different method of analysis of frame foundation - Under turned and over turned framed foundation – Turbine Position.

- **Vibration Isolation & Special Foundation**

Wave propagation concept – Different method of vibration isolation – Position of machine on the floor – Well type and corrective machine foundation – dampers – Vibration – measurement.

BOOKS RECOMMENDED:

1. Srinivasula & Vaidynathan, "Hand Book of Machine Foundation" by Tata Mc Graw Hill. 1976
2. C. Venkatramaiah, "Geotechnical Engineering" by new Age International Publishers, 2007
3. Boweles J E "Foundation Analysis & Design" by Mc Graw Hill Inc, New York, 1988.
4. Alexander Major, "Vibration Analysis & Design of Foundation & Trubines", Collect's Holding Limited, London.
5. D D Barken, " Dynamics of bases & foundation, "Mc Graw Hill Book Company, INC – New York, London.

B. Tech. – III (All Branch), Semester – VI
AM 312 : Repair & Maintenance of Structures (EIS-II)

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- Deterioration process in concrete structures – Construction and design defects – Diagnostic methods.
 - Load Testing and non destructive testing – cause and Prevention of crack in masonry structures.
 - Corrosion in Structures – Repair materials, Cement, aggregate, polymer and construction chemicals.
 - Methods of repair in concrete – Steel and timber structural components – Corrosion damage of reinforced concrete and its repair
 - Maintenance of Structures – Classification of Maintenance works – Surface deterioration – Efflorescence causes – Surface coating and painting - Water Proofing – Varnishing – Inspection and Planning – Budgeting and management
-

BOOKS RECOMMENDED:

1. *Peter H Emons, "Concrete repair and maintenance Illustrated", Galgotia Publication Pvt Ltd, New Delhi (2001)*
2. *R T L Allen and S C Edwards "The Repair of Concrete Structures, "Blackie & Sons Ltd, Glasgow, London (1987)*
3. *R Jagadisa, "Structural Failures – Case Histories Oxford & IBH Publishing Co. Ltd, New Delhi (1995).*
4. *R N Raikar, "Diagnosis and Treatment of Structures in Distress, R & D Centres Structural Designers & Consultation Pvt Ltd, Vashi, New Bombay, 1994.*
5. *P K Ghua "Maintenance and Repair of Buildings, new Central Book Agency (P) Ltd, Kolkatta, 1995*

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- **Soil Exploration** (Hours -7)
Soil Properties and its applications – Sub soil exploration – Objectives – Methods of exploration – Sample disturbance – Sounding tests – Geo Physical methods – Borelog – Sub soil Investigation report.
 - **Bearing capacity of Soil** (Hours -7)
Introduction – Basic definitions – Bearing capacity theories – Types of shear failure – Effect of water table – Bearing capacity from plate load test.
 - **Foundation Settlement** (Hours -7)
Settlement of Foundations – Components of Settlement – Cause of Settlement – Computation of Immediate settlement – Consolidation of Soil – Consolidation parameters – Computation of magnitude of consolidation settlement – Time rate settlement – Differential settlement.
 - **Design of Shallow and Deep Foundations** (Hours -14)
Types of Shallow Foundations – Depth of Footing – Foundation loading – Principle of design of footings – Proportioning for equal settlement – combines footings – Common types of mat foundation – Design Raft foundation – Deep foundations – Necessity of pile foundation – Classification of piles – Load carrying capacity of piles methods – Pile load test – Negative skin friction – Settlement of pile – Group efficiency , Introduction of caisson and well foundation
 - **Pavement Design** (Hours -7)
Types of pavement – Basic requirements of pavements – functions of different components of pavements – Factor's affecting pavement design – California bearing capacity ratio test – Design of flexible pavements – coefficient of sub grade reaction
-

BOOKS RECOMMENDED:

1. J E Bowles (1997) " Foundation Analysis and Design" Mc Graw Hill, New Delhi
2. Arora K R, "Soil Mechanics & Foundation Engineering" Standard Publishers Ltd.2002
3. B M Das (2005) "Principles of foundation Engineering PWS publiushing company
4. Kaniraj S R , "Design Aids in Soil Mechanics and Foundation Engineering Mc Graw Hill, New Delhi
5. A V Shroff (2003)"Soil Mechanics and Geotechnical Engineering "

B. Tech. – III (All branches) Semester - VI**AM 316 : Introduction to Finite Element Method (EIS-II)**

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- Concept & Solution procedure for finite element displacement approach. (Hours -03)
 - Principles of discretization. (Hours -05)
 - Lagrangian & Hermitian interpolation functions. (Hours -04)
 - Shape function & numerical integration technique. (Hours -04)
 - Element properties for one dimensional (bar & beam) element & two dimensional (rectangular, triangular & isoparametric elements using natural & area coordinate system. (Hours -10)
 - Introduction to plate elements – shell elements – dynamics and vibration – buckling – Galerkin method (Hours -06)
 - Pre and post processors, Solution Techniques & Software Packages. (Hours -12)
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BOOKS RECOMMENDED :

1. Cook R. D. et. al. (2003)“Concept & application of finite element analysis” by John Wiley & Sons Inc., Singapore, 4th Edition,
2. Logan D L, (2004) “ A first course in the Finite Element Method”, 3rd Edition, Thomson Asia Pvt Ltdm Bangalore.
3. J N Reddy,(2005) “An Introduction to the Finite Element Method”, 3rd edition, Tata McGraw Hill Pub.com Ltd, New Delhi
4. Chandrupatla, T. R. & Belegundu, A. D., (2002) “Introduction to Finite Elements in Engineering”, 3rd edition, , Prentice – Hall of India Pvt. Ltd., New Delhi.
5. Rao, S. S.,(2005) “The Finite Element Method in Engineering” 4th Edition, Butterworth – Heinemann, Oxford, U. K.

B. Tech. – III (All Branches), Semester – VI

L T P C

AM 318 : Disaster Management (EIS-II)

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- Types of Disasters – its dimensions – Impact of Disasters – Forecasting – Role of Remote Sensing and Geographical Information System in Disaster management – Vulnerability – Disaster Reduction Strategies – Multi Hazard Mapping – Financial Management – Losses from Global Disasters and Expenses in Reconstruction and Retrofitting of structures – Role of NGO, Government Bodies and Public, Social and Economic Development of Disaster Prone areas – Emergency Planning
 - Structure of Disaster Management in India
 - Disaster Management – Process and Main steaming
-

BOOKS RECOMMENDED:

1. *ISDR (2003), A draft framework to guide and monitor Disaster Risk Reduction.*
2. *EMI (2004), The cross cutting Capacity Development (3cd) Program: Program Definition and Implementation Plan.*
3. *Urban Agglomerations (2001), United Nations Population Division, Department of Economics and Social Affairs.*
4. *Fernandez J., Mattingly S,(2005) EMI Contribution to the World Conference on Disaster Risk Reduction*
5. *Singh S K (2004) Disaster Management in Mumbai, First Coordination workshop of EMI's 3cd programm, Seeheim, Germany, June 26-27*
6. *Mumbai Disaster Management Plan (1999), Government of Maharashtra*