

19CE4111: DESIGN OF STEEL STRUCTURES

B.Tech IV Year I Semester

Pre-requisite: SM-I, SM-II, SA

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Course Objectives:

- To impart the knowledge of mechanical properties, loads and load combinations, design philosophies and design of general and eccentric connections in steel structures.
- To comprehend design of tension members and compression members of steel structures.
- To perceive knowledge on design of flexural members of steel structures.
- To apprehend the knowledge on design of plate girders.
- To acquire knowledge on design of roof trusses, purlins and gantry girders.

Course outcomes: After the completion of the course student should be able to

- Understand material behavior, recognize various design philosophies in Steel structures and use limit state concepts to design general and eccentric connections in steel structures.
- Use limit state method to design tension members, compression members with battened and laced column and base plates.
- Understand plastic theory and analysis of structure and use limit state method to design beams in steel structures.
- Use limit state method to design the various components of welded plate girder including end and bearing stiffeners.
- Use limit state method to design the industrial structures and welded gantry girder.

UNIT - I

Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel.

Concepts of limit State Design –Different Limit States – Load combinations for different Limit states - Design Strengths - deflection limits– serviceability – stability check.

Design of Connections– Different types of connections – Bolted connections – Design strength –efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements- Design of Beam-column connections - Eccentric connections - Type I and Type II connection – Framed connection– stiffened / seated connection.

UNIT-II

Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle.

Design of compression members – Buckling class – slenderness ratio – Design of simple compression members - laced – battened columns – splice – column base – slab base.

UNIT - III

Plastic Analysis- Plastic moment – Plastic section modulus - Plastic analysis of continuous beams

Design of Flexural Members – Laterally supported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beam splice

UNIT – IV

Design of welded plate girders – Elements – Economical depth – Design of main section – Connections between web and flange – Design of stiffeners - Bearing stiffener– Intermediate stiffeners – Design of web splice and flange splice.

UNIT – V

Design of Industrial Structures- Types of roof trusses - Loads on trusses – Wind loads - Purlin design –Truss design. Design of welded Gantry girder, (Introduction to Pre-engineered metal buildings)

TEXT BOOKS:

1. Design of Steel Structures, Subramanian N, Oxford University Press, New Delhi 2008.
2. Design of Steel Structures, Dayaratnam P, S. Chand & Co., New Delhi, 2003.

REFERENCES:

1. Limit state Design of steel structures, S.K. Duggal, Tata McGrawhill
2. Design of Steel Structures, Arya, A.S and Ajmani, A.L., Nemchand and brothers, Roorkee, 1992..
3. Comprehensive Design of Steel Structures, Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain. Laxmi Publications Pvt. Ltd., New Delhi 2000.
4. IS 800-2007, Code of practice for general construction in steel, Bureau of Indian Standards, New Delhi.

19CE4112: ESTIMATION QUANTITY SURVEYING AND VALUATION

B.Tech IV Year I Semester

Pre-requisite: Surveying and Geomatics, RCC

L	T	P	C
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Course Objectives: To

- Introduce general items of works in building construction and different types of estimates.
- Provide knowledge of detailed estimation of Building and preparation of Bar bending schedules.
- Introduce the concept of calculating earthwork for roads and canal constructions.
- Deal with the prices of various material used In building construction.
- To provide awareness regarding contracts, valuation of building and standard specifications.

Course outcomes: After the completion of the course student should be able to

- Explain various items of building and methods of estimation.
- Prepare detailed Estimate & Bar bending schedule for residential buildings.
- Prepare Earth work quantity for Roads and Canals.
- Prepare the rates of work quantities and labor.
- Classify different types of contracts and use standard specifications for valuation.

UNIT - I

General items of work in Building –Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

UNIT - II

Detailed Estimates of Buildings -Reinforcement bar bending and bar requirement schedules

UNIT - III:

Earthwork for roads and Canals

UNIT - IV:

Rate Analysis –Working out data for various items of work over head and contingency charges

UNIT - V:

Contracts –Types of contracts –Contract Documents –Conditions of contract, Valuation - Standard specifications for different items of building construction.

TEXT BOOKS:

1. Estimating and Costing in Civil Engineering (Theory & Practice), B. N. Dutta, 28th, 2016, UBS Publishers, 2000.
2. Text Book of Estimating and Costing (Civil Engineering), G. S. Birdie, 6th , 2014, Dhanpat Rai Books

REFERENCES:

1. Estimating, Costing, Specification & Valuation In Civil Engineering, M Chakraborti, 2006, Laxmi Publications

**19CE4171: REHABILITATION AND RETROFITTING OF STRUCTURES
(Professional Elective-III)**

B.Tech IV Year I Semester

Pre-requisite: CT, RCC

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Course Objectives: To

- Give idea of various damage mechanisms in structures.
- Make the student identify the causes of corrosion, and damages due to fire.
- Describe various methods available for inspection and testing of damage.
- Strengthen the student to suggest suitable repair method based on the type of damage.
- Give an idea to student how to work with health monitoring of structures by understanding use of sensors and building instrumentation.

Course outcomes: After the completion of the course student should be able to

- Describe various damage mechanisms in structures.
- Identify the causes of corrosion, and damages due to fire.
- Describe various methods available for inspection and testing of damage.
- Suggest suitable repair method based on the type of damage.
- Work with health monitoring of structures by understanding use of sensors and building instrumentation.

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention.
Mechanism of Damage – Types of Damages.

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment –NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures –Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santa kumar, Oxford University press

REFERENCES:

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

19CE4172: PRESTRESSED CONCRETE
(Professional Elective-III)

B.Tech IV Year I Semester

L	T	P	C
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Pre-requisite: CT, RCC

Course Objectives: The objectives of the course are to make the students

- Understand the importance of PSC evolution of pre-stressing to overcome the shortcoming of RCC.
- Estimate the losses in PSC members.
- Analyse sections of PSC beams with different types tendons and design PSC beams.
- Understand transmission mechanism of pre-stressing force by bond.
- Understand the types of composite sections compute deflections of beams under loads.

Course Outcomes: After the completion of the course student should be able to

- Distinguish between reinforced concrete structures and prestress concrete.
- Estimate losses of pre-stressing using IS 1343:2012.
- Analyse and Design pre-tensioned and post tensioned girders based on IS 1343:2012.
- Analyse and Design end block for Pretensioned member using is 1343:2012.
- Estimate total deflections of PSC members using IS 1343:2012.

UNIT I:

Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

UNIT II:

Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system

Losses of Prestress: Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT III:

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of beams of rectangular and I sections- Kern line – Cable profile and cable layout.

Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

UNIT IV:

Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by Guyon, Magnel,– Anchorage zone reinforcement- IS Provisions

UNIT V:

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long-time deflections- IS code requirements.

Text Books:

1. Prestressed concrete by Krishna Raju, Tata Mc Graw Hill Book – Co. New Delhi., 6th ed. 2018

Reference Books:

1. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
2. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.
3. Prestressed Concrete by N. Rajagopalan Narosa Publishing House

19CE4173: WASTE MANAGEMENT
(Professional Elective-III)

B.Tech IV Year I Semester

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Pre-requisite: EE, WRE

Course Objectives: To

- Learn the characteristics of various industrial effluents.
- Understand the theories of waste water management.
- Understand concept of treatment methods of industrial waste water.
- Characteristics of waste water of various industries.
- Learn about the various effluent treatment methods.

Course outcomes: After the completion of the course student should be able to

- Predict the quality requirements of waste water for processing industries.
- Identify the combine treatments of domestic and industrial sewage.
- Identify the necessity of recirculation of industrial wastes.
- Identify the special characteristics and treatment methods of various industries.
- Formulate the common effluent treatment and Disposal methods.

UNIT - I:

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and cooling water treatment methods.

UNIT - II:

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems, Industrial waste water discharges into streams. Lakes and oceans and problems.

UNIT - III:

Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries, Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods. Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

UNIT - IV:

Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects, and treatment methods.

UNIT - V:

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

TEXT BOOKS:

1. Waste water treatment by M.N.Rao,AK Dutta ,edition 3 , Oxford Publisher
2. Water and Waste water technology by Mark J. Hammer and Mark J. Hammer (Jr). edition 3 ,Mc.Graw Hill

REFERENCES:

1. Wastewater Treatment – Concepts and Design Approach by G L Karia and R A, edition 3 , PHI learning
2. Solid Waste Engineering by WA. Worrell, P.A Vesilind Cengage Learning 2012 edition
3. PHI learning.

**19CE4174-RAILWAY AND AIRPORT ENGINEERING
(Professional Elective-III)**

B.Tech IV Year I Semester

L	T	P	C
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Pre-requisite: TE

Course Objectives:

- To understand Railway planning and development based on important /essential criteria.
- To attain knowledge about geometric elements and components of Railway track.
- To acquire knowledge on Airport and Aircraft Characteristics.
- To acquire knowledge on Runway Design.
- To apprehend knowledge on airfield pavements.

Course outcomes: After the completion of the course student should be able to

- Understand various Permanent way components functions and requirements.
- Apply various standards & specifications to design Geometric elements of Railway track.
- Understand various aero plane components and characteristics
- Plan various components of airport as per the prevailing standards.
- Design air filed pavements

UNIT - I:

Introduction to Railways: Comparison of railway and highways transportation; Classification of Indian railways. Gauges in Railway Track, Coning of Wheels, Permanent way-Rails-Types, Rail failures, Creep of Rails, Rail Joints-Types of Joints, Sleepers-Types, Comparison of sleepers.

UNIT - II:

Ballast and formation-Types of Ballast materials- Specifications of Indian Railways, Ballast Profile, Blanket or Sub Ballast, Specification for Blanket Material, Formation, Compaction of Formation.

Geometric Design Of Track-Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

UNIT - III:

Airport Engineering: Introduction: Aero plane components; Air-craft characteristics - Factors Affecting Selection of site for Airport. Layout of Airports, Airport Obstructions-Zoning laws; Classification of obstructions; Imaginary surfaces.

UNIT-IV:

Airport Runway Design: Runway orientation; Wind rose diagrams, Types and numerical problems. Basic runway length; Corrections for elevation; Temperature and gradient; Numerical Problems; Runway geometric design. Runway Markings.

UNIT - V:

AIRFIELD PAVEMENT DESIGN: Design Of Airport Pavements- Design methods for flexible pavements-CBR Method, Mcleod Method, Burmister Method- Numerical Problems; Design methods for Rigid pavements- PCA Method; LCN Method of pavement design- Rigid, Flexible and Composite.

TEXT BOOKS:

1. Railway Engineering by S.C.Saxena and S. Arora Dhanpat Rai & sons
2. Railway Track Engineering by J. S. Mundrey, Tata McGraw-Hill Education, New Delhi.
3. Airport Planning and Design by S. K. Khanna & M. G. Arora; Nemchand & Bros, Roorkee

REFERENCE BOOKS:

1. Railway Engineering by M.M.Agarwal; Prabha & Co, New Delhi
2. Airport Engineering by G.V.Rao; Tata Mc Graw Hill, New Delhi.

**19CE4175: TRAFFIC ENGINEERING
(Professional Elective-IV)**

B.Tech IV Year I Semester

L	T	P	C
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Pre-requisite: TE, P&S

Course Objectives: To learn

- The Traffic characteristics and relationships
- The methods of traffic surveys.
- The concepts of traffic capacity and level of service
- The Concept of Traffic and Environment
- Features of Traffic System Management

Course Outcomes: After the completion of the course student should be able to

- Understand the human factors and vehicular factors in traffic engineering design
- Conduct different types of traffic surveys and analysis of collected data using statistical concepts.
- Evaluate the highway capacity and level of service.
- Illustrate the measures to improve traffic and environment quality.
- Understand the basic knowledge on Traffic System Management

UNIT-I

Traffic Planning and Characteristics: Road user characteristics, PIEV theory, Vehicle Performance characteristics, Fundamentals of Traffic Flow-Some definitions, Relationship between the variables, Fundamental diagram of traffic flow, Linear relationship between speed and concentration, Urban Traffic problems in India, Measures to meet the traffic problems in urban areas.

UNIT-II

Traffic Surveys: Speed, journey time and delay surveys, Vehicles Volume Survey including non-motorized transports, Methods and interpretation, Origin Destination Survey, Methods and presentation, Parking Survey, Accident analyses-Methods, interpretation and presentation, Statistical Methods in traffic Engineering: mean, Standard Deviation and Variance; Linear regression and Correlation with numerical problems.

UNIT-III

Highway Capacity And Level Of Service: Basic definitions related to capacity; Level of service concept; Factors affecting capacity and level of service; Computation of capacity and level of service for two lane rural highways without access control, Multilane rural highways without access control.

UNIT-IV

Traffic and Environment: Detrimental effects of Traffic on Environment, Air pollution; Noise Pollution; Vibration, Visual intrusion and Degrading the Aesthetics, Severance and land consumption, Evaluation procedures, Environmental Areas, Situation in India.

UNIT-V

Traffic System Management (TSM): Introduction, Travel Demand Management, Traffic Management- Scope, Restrictions on turning movements, one-way streets, Tidal flow operations, Exclusive Bus lanes, Closing Side Streets

TEXT BOOK:

1. Kadiyali.L.R. "Traffic Engineering and Transport Planning ", Khanna Publishers, Delhi, 2013
2. S K Khanna and CEG Justo and a Veeraragavan, "Highway Engineering", Nem Chand and Bros.

REFERENCES:

1. Principles of Traffic and Highway Engineering – Garber & Hoel, Cengage Learning
2. Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan Press Ltd.1996.
3. Fred L. Mannering, Scott S. Washburn and Walter P. Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi, 2011
4. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010
5. SP:43-1994, IRC Specification, "Guidelines on Low-cost Traffic Management Techniques" for Urban Areas, 1994
6. John E Tyworth, "Traffic Management Planning, Operations and control", Addison Wesley Publishing Company, 1996
7. Hobbs.F.D. "Traffic Planning and Engineering", University of Brimingham, Peragamon Press Ltd, 2005

19CE4176: BRIDGE ENGINEERING
(Professional Elective-IV)

B.Tech IV Year I Semester

L	T	P	C
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Pre-requisite: CT, RCC

Course Objectives

- To develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
- To help the student develop an intuitive feeling about the sizing of bridge elements, ie. Develop a clear understanding of conceptual design.
- To carry out a design of bridge, culvert starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements.
- To carry out a design of piers, abutments, wing walls, and bearings starting from conceptual design, geometry to sizing.
- To carry out a design of well foundation starting from conceptual design, selecting suitable geometry to sizing

Course Outcomes: After the completion of the course student should be able to

- Classify various types of bridges and discuss various Indian Roads Congress specifications for the design of bridges.
- Use IRC specifications design reinforced concrete culvert and T-beam Bridge.
- Use IRC specifications design elastomeric bearings.
- Use IRC specifications design piers, abutments, wing walls and bearings.
- Classify various types of foundations and using IRC specifications illustrate design criteria for well foundation.

UNIT- I

Introduction: Definition, components of bridge, classification of bridges, selection of site, economical span, aesthetics consideration, necessary investigations and essential design data.

Standard Specifications for Roads and Railways Bridges: General, Indian Road Congress Bridge Code, width of carriage way, clearance, various loads to be considered for the design of roads bridges, detailed explanation of IRC standard live loads.

UNIT- II

Design Consideration for R. C. C. Bridges: Various types of R.C.C. bridges (brief description of each type) , design of R.C.C. culvert and T-beam bridges.

UNIT- III

Hydraulic & Structural Design: Materials used for Piers and abutments, Stability analysis and design considerations for Piers and abutments, behavior of wing-wall and approaches

UNIT- IV

Bridge Bearings: Types and functions of various types of bearings, Design of elastomeric bearings

UNIT - V

Bridge Foundation: Various types, necessary investigations and design criteria of well foundation.

TEXT BOOKS:

1. Essentials of Bridge Engineering, D.J.Victor, Oxford & IBH Pub, N. Delhi., 6th edition, 2019
2. Design of Bridges, N. Krishna Raju, Oxford & IBH, N. Delhi. 5th edition, 2019

REFERENCE S:

1. Bridge Deck Analysis, R. P. Pama & A. R. Cusens, John Wiley & Sons
2. Design of Bridge Structures, T. R. Jagadish & M.A.Jairam, Prentice Hall of India, New Delhi

**19CE4177: ENVIRONMENTAL IMPACT ASSESSMENT
(Professional Elective-IV)**

B.Tech IV Year I Semester

L	T	P	C
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Pre-requisite: EE

Course Objectives: The students will be able to

- Understand the basic terminologies of EIA and methodologies of EIA.
- Understand the assessment of deforestation and its impact predictions.
- Explain assessment of soil quality and its impact prediction.
- Understand environment Audits and its methods.
- Understand various Acts and case studies.

Course Outcomes: The students will be able to

- Discuss the objectives of EIA studies and identify the methodologies to prepare EIA.
- Identifies and incorporate mitigation measures of deforestation.
- Identifies and incorporate mitigation measures of soil quality.
- Executing Audit report.
- Use the knowledge of various environmental acts in the preparation of case study reports.

.UNIT – I

Basic concept of EIA: Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc method, matrix method, Network method and overlay method.

UNIT- II

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT- III

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

UNIT – IV

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

UNIT-V

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries-Water resource projects, sewage treatments plant, municipal solid waste processing plant, thermal plant and airport.

TEXT BOOKS:

1. Larry Canter – Environmental Impact Assessment, McGraw-Hill Publications
2. Environmental Impact Assessment, Barthwal, R. R. New Age International Publications
3. Anjaneyulu. Y & Manicram. V, Env. Impact Assessment methodologies, B,S Publications, Hyderabad 2017.

REFERENCES:

1. Environmental Pollution by R.K. Khitoliya S. Chand, 2014.
2. Glynn, J. and Gary, W. H. K. - Environmental Science and Engineering, Prentice Hall Publishers
3. Suresh K. Dhaneja - Environmental Science and Engineering, S.K. Kataria & Sons Publication. New Delhi.
4. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi.
5. Wathern, P. – Environmental Impact Assessment: Theory & Practice, Publishers- Rutledge, London, 1992.

19CE4178: GREEN BUILDINGS
(Professional Elective-IV)

B.Tech IV Year I Semester

L	T	P	C
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Pre-requisite: BMCP, CT

Course Objectives: To

- Provide necessary knowledge about sustainability and green building rating systems.
- Introduce diverse green materials and explain their impact on environment.
- Provide an insight into various energy efficient materials and sustainable construction technologies.
- Demonstrate how the various passive, low energy and energy saving concepts have been applied to real life buildings.
- Explain the policies and techniques of green materials and building certification.

Course Outcomes: After the completion of the course student should be able to

- Demonstrate green concepts, compare existing energy, and green building codes and green building rating systems.
- Assess the performance of various green building materials and incorporate them into design.
- Identify and make use of techniques for sustainable remodelling of existing structures
- Design sustainable energy efficient civil engineering projects.
- Explain the institutional guidelines used for development and certification of green designs.

UNIT – I

Introduction: Definition of Green Buildings - Sustainable features for green buildings - Benefits of Green Buildings – Key Requisites for Constructing a Green Building – Green building rating systems – GRIHA, IGBC and LEED, Overview of criteria as per these systems

UNIT – II

Green Building Materials: Introduction to sustainable building materials – Sustainable Concrete – Partial replacements in concrete - Natural & Bio building materials- rammed earth- Mycelium - Engineered Wood - Structural insulated panels (SIPs) - Nontoxic materials: low

VOC paints, organic paints, coating and adhesives -Reuse of waste from agriculture, industry and building demolition.

UNIT – III

Design of Green Buildings: Indoor environmental quality requirement and management: Thermal comfort - HVAC - Visual perception - Illumination requirement - Auditory requirement – Energy Efficiency - Lighting and day lighting - Steady and non- steady heat transfer through the glazed window and the wall – Indoor air quality - Local climatic conditions – temperature, humidity, wind speed and direction.

UNIT – IV

Construction of Green Buildings: IoT Integrated Automated Building Systems - Synthetic Roof Underlayment - Green Roofs - Grid Hybrid System - Passive Solar - Greywater Plumbing Systems - Electrochromic Glass - Solar Thermal Cladding - Structural 3D Printing - Self-healing Concrete - Bird Friendly Design - Landscaping for Parking Lot Runoff - Proactive Maintenance – Green Cleaning.

UNIT – V

Green Building Policies and Incentives: Green products and material certification - parameters making products green - products transparency movement - Cradle to cradle certification - Product emission testing - Carbon trust - carbon credit – returns on investments savings Policies towards electrical power in India – Case study – Tax credits & Grants - Green construction guide.

TEXT BOOKS:

1. Alternative Building materials and technologies by K.S. Jagadish, B.V Venkatarama Reddy and K.S Nanjunda Rao, Second edition, New age International Publishers.
2. Green Building Hand Book: Volume 1: A Guide to Building Products and their Impact on the Environment by Woolley, T., Kimmins, S., Harrison, R., and Harrison, P., Taylor & Francis
3. Sustainable Construction: Green Building Design and Delivery, by Charles J.kibert, Wiley Publishing

REFERENCES:

1. Green Building Fundamentals: A Practical Guide to Understanding and Applying Fundamental Sustainable Construction Practices and the LEED System, Pearson, USA
2. Sustainable Construction - Green Building Design and Delivery by Charles J. Kibert, John Wiley & Sons, New York, 2008

19CE4151 -: STRUCTURAL DESIGN AND DETAILING LAB

B.Tech IV Year I Semester

L	T	P	C
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Course Objectives: The objectives of the course are to

- Learn the usage of any fundamental software for design.
- Create geometries using pre-processor.
- Analyse and Interpret the results using post processor.
- Design the structural elements.

Course outcomes: After the completion of the course student should be able to

- Model the geometry of real-world structure Represent the physical model of structural element/structure.
- Perform analysis.
- Interpret from the Post processing results.
- Design the structural elements and a system as per IS Codes.

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis & Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to dead loads and live loads
5. Analysis & Design of residential building subjected to secondary loads
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Detailing of RCC beam (Simply supported beam, continuous beam and Cantilever beam)
9. Detailing of RCC slab (One-way slab and two-way slab)
10. Detailing of Steel built up compression member

TEXT BOOKS:

1. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
2. Design of concrete structures by J.N.Bandopadhyay – PHI Publications, New Delhi.
3. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
4. Steel Structures by Subramanyam.N, Oxford Higher Education, New Delhi
5. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.
6. Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

CODE BOOKS:

1. IS 456: 2000 Plain and Reinforced Concrete-Code of Practice
2. SP-16 Design Aids for Reinforced Concrete:
3. IS - 800 – 2007 General construction in steel-code of practice
4. IS: 875(Part3): Wind Loads on Buildings and Structures
5. Steel Tables.

SOFTWARE:

1. STAAD PRO or Equivalent
2. AutoCAD

19CE4152 TRANSPORTATION ENGINEERING LAB

B.Tech IV Year I Semester

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Course Objectives: To learn

- Laboratory tests and their procedures related to coarse aggregates and bitumen.
- The Evaluation of strength properties of aggregates.
- The test procedures for characterization of bituminous mixes
- The traffic volume studies
- The traffic speed studies

Course outcomes: After the completion of the course student should be able to

- Asses for Highway construction properties of highway materials.
- Examine the tests performed for Bitumen mixes.
- Proportion bitumen mixes
- Asses the traffic volume
- Assess the speed of vehicle

I. Test on Road Aggregates

1. Aggregate Crushing Value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test (Los Angeles)
5. Shape Test (Flakiness and elongation indices)
6. Sieve Analysis and gradation charts

II. Test on Bitumen and Bituminous Mixes

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Viscosity Test

5. Flash and fire points and specific gravity
6. Marshall's Stability (sample preparation and testing for stability and flow values)

TEXT BOOKS:

1. Highway Material Testing by Khanna S.K., Justo C.E.G, Nem Chand & Bros.
2. Road Material Testing and Pavement Evaluation by Dr. S. Krishna Rao and Dr. P. Sravana, Research India Publication, 2019
3. Highway Material Testing and Quality Control by Rao G. Venkatappa, Rao K. Ramachandra, Pahari Kausik, Rao and D.V. Bhavanna. I.K International Publisher.

IS CODES:

1. IS 1201 -1220 (1978) "Methods for Testing Tars and Bituminous Materials"
2. IRC SP 53 -2010 "Guidelines on use of Modified Bitumen"
3. MS-2 Manual for Marshalls Mix design 2002

19CE4181: MAJOR PROJECT PHASE – I

B.Tech IV Year I Semester

L	T	P	C
-	-	6	3

19CE4182: MINI PROJECT

B.Tech IV Year I Semester

L	T	P	C
-	-	-	2

19MB4212: FUNDAMENTALS OF MANAGEMENT

B.Tech IV Year II Semester

L	T	P	C
3	-	-	3

Course Objectives

- To understand the fundamentals of management, history and evolution of management theories.
- To analyze various dimensions of organizational planning and decision making.
- To understand the function of organizing, types of organizational structures and various functions of human resource management.
- To understand and analyze the concept of leadership and motivation in an organization.
- To understand the concept and the process of controlling in an organization.

Course Outcomes: After the completion of the course student should be able to

- Understand the fundamentals of management and contribution of management thinkers.
- Analyze the relevance and importance of planning and decision making in an organization.
- Understand the importance of organizing, types of organizational structures and various function of Human resource management.
- Understand, analyze the concept of leadership and motivation in an organization.
- Understand, analyze the concept and process of controlling in an organization.

UNIT - I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approach.

UNIT – II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans, Management by Objectives; Development of Business Strategy. Decision making and Problem Solving - Programmed and Non Programmed Decisions, Steps in Problem Solving and Decision Making; Bounded Rationality and Influences on Decision Making; Group Problem Solving and Decision Making, Creativity and Innovation in Managerial Work.

UNIT - III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization; Organizational Culture; Organizational Climate and Organizational Change. Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT - IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership

during adversity and Crisis; Handling Employee and Customer Complaints, Team Leadership. Motivation - Types of Motivation; Relationship between Motivation, Performance and Engagement, Content Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT - V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls, Establishing control systems, Control frequency and Methods.

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCES:

1. Essentials of Management, Koontz Kleihrich, Tata Mc — Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.

19CE4271: DISASTER MANAGEMENT
(Professional Elective-V)

B.Tech IV Year II Semester	L	T	P	C
	3	-	-	3

Pre-requisite: BMCP,EE,WRE

Course Objectives:

- To interpret the basic concepts of hazards, disasters and its vulnerability.
- To impart the knowledge of Disaster Management mechanism in preparedness and mitigation.
- To infer capacity building concepts and planning of disaster management.
- To interpret the strategies, policies and coping capacities in order to lessen the impact of hazards.
- To demonstrate the role of Government Agencies in disaster planning and policies.

Course outcomes: After the completion of the course student should be able to

- Identify various types of disaster and their vulnerability.
- Implement risk and crisis management concepts in prevention and mitigation of disaster.
- Execute capacity building concept for disaster counter measures.
- Discuss coping strategies that helps in improving safety measures or to lessen the impact of hazards.
- Identify the role of government agencies in disaster planning and policies.

UNIT - I: Understanding Disaster

Concept of Disaster, Environmental Disasters and Environmental Stress- Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards; hazard assessment; vulnerability assessment - Vulnerability and earthquake hazards, epidemics and pandemics

UNIT - II: Disaster Management Mechanism

Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief

UNIT - III: Capacity Building

Capacity Building Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management

UNIT - IV: Coping with Disaster

Coping Strategies: Alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management

UNIT - V: Planning for disaster management

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans, Legislative Support at the state and national levels.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (<http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf>)

19CE4272 PAVEMENT DESIGN
(Professional Elective-V)

B.Tech IV Year II Semester

L	T	P	C
3	-	-	3

Pre-requisite: TE,CT

Course Objectives: To learn

- The various factors affecting the pavement design and analysis of traffic data.
- The various stresses in flexible and rigid pavement & application of various theories.
- The various concepts & theories of flexible and rigid pavement design.
- The Maintenance and evaluation of flexible pavements.
- The Maintenance and evaluation of Rigid pavements

Course outcomes: After the completion of the course student should be able to

- Gain knowledge about the process of collecting data required for design, factors affecting pavement design, and maintenance of pavement.
- Excel in the path of analysis of stress, strain and deflection in pavement.
- Design flexible pavement and Rigid pavement by various methods
- Understand the various causes leading to failure of pavement and remedies for the same.
- Develop skills to perform functional and structural evaluation of pavement by suitable methods.

UNIT - I

Introduction: Desirable characteristics of pavement, Types and components, Functions of sub grade, sub base, Base course, surface course, comparison between Rigid and flexible pavement,

Design Factors: Design wheel load, contact pressure, Design life, Traffic factors, climatic factors, Road geometry, Subgrade strength and drainage, ESWL concept Determination of ESWL by equivalent deflection criteria, Stress criteria, EWL concept, and problems on above.

UNIT - II

Stresses in Pavements: Principle, Assumptions and Limitations of Boussinesq's theory, Burmister theory and problems on above.

Stresses in Rigid Pavement: Types of stress, Analysis of Stresses, Westergaard's Analysis, Modified Westergaard equations, Critical stresses, Wheel load stresses, Warping stress, Frictional stress, combined stresses (using chart / equations), problems on above

UNIT-III

Pavement Design Methods: Flexible pavement design by IRC: 37-2001 and problems.

Design of Rigid Pavement: Design of CC pavement by IRC: 58-2002 for dual and Tandem axle load, Reinforcement in slabs, Design of Dowel bars, Design of Tie bars, Design factors for Runway pavements, Design methods for airfield pavements, problems of the above.

UNIT-IV

Flexible Pavement Failures, Maintenance and Evaluation: Types of failures, Causes, Remedial/Maintenance measures in flexible pavements, Functional Evaluation by Visual inspection and unevenness measurements, Structural evaluation by Benkleman beam deflection method, falling weight deflectometer.

UNIT-V

Rigid Pavement Failures, Maintenance and Evaluation: Types of failures, causes, remedial/maintenance measures in rigid pavements, Functional evaluation by Visual inspection and unevenness measurements, wheel load and its repetition, properties of sub grade, properties of concrete. External conditions, joints, Reinforcement, Requirements of joints, Types of joints, Expansion joint, contraction joint, warping joint, construction joint, longitudinal joint, Design of joints.

TEXT BOOKS:

1. S K Khanna, C E G Justo, and A Veeraragavan, Highway Engineering, Nem Chand & Brothers
2. L.R.Kadiyali and Dr.N.B.Lal, Principles and Practices of Highway Engineering, Khanna publishers
3. Yang H. Huang, Pavement Analysis and Design, University of Kentucky.

REFERENCES:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Principles of Pavement Design, Yoder.J. & Witzorac Mathew, W. John Wiley & Sons Inc.
3. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC 37-2012: Guidelines for design of flexible pavement
5. IRC 58-2015: Guidelines for design of plain jointed rigid pavements.

19CE4273: ELEMENTS OF EARTHQUAKE ENGINEERING

(Professional Elective-V)

B.Tech IV Year II Semester

L T P C

Pre-requisite: RCC, STEEL

3 - - 3

Course Objectives:

- To impart the knowledge engineering seismology and vibration theory in discrete system.
- To comprehend conceptual design and earthquake resistant design and different methods involved.
- To perceive knowledge on analysis of earthquake resistant reinforced concrete building members.
- To apprehend the knowledge on analysis of earthquake resistant masonry buildings.
- To understand ductile design of RC buildings.

Course outcomes: After the completion of the course student should be able to

- Explain engineering seismology and derive fundamental equations of discrete system in structural dynamics which are useful for the analysis.
- Explore structural and strength parameters in a building and accordingly demonstrate the earthquake resistant design with different methods of analysis.
- Apply earthquake resistant design principles and compute design stress resultants by different methods.
- Analyze and rectify seismic behavior of masonry buildings and its components.
- Design earthquake resistant RC building and examine the behavior of components of a building during earthquakes.

UNIT - I:

Theory of Vibrations: Elements of a vibratory system – Degrees of Freedom – Continuous system – Lumped mass idealization – Oscillatory motion – Simple Harmonic Motion – Free vibration of single degree of freedom (SDOF) system – Un-damped and Damped – Critical damping – Logarithmic decrement – Forced vibrations – Harmonic excitation – Dynamic magnification factor – Excitation by rigid based translation for SDOF system – Earthquake ground motion.

UNIT - II:

Engineering Seismology: Earthquake phenomenon – Causes of earthquakes – Faults – Plate tectonics – Seismic waves – Terms associated with earthquakes – Magnitude/Intensity of an earthquake – Scales – Energy Released – Earthquake measuring instruments seismogram – Seismoscope – Seismograph – Strong ground motions – Seismic zones of India.

UNIT - III:

Introduction to earthquake resistant design: IS 1893:2016 Guidelines, : Principles of earthquake resistant design of RC members – Structural models for frame buildings – , Regular

and irregular configurations – Basic assumptions – Design earthquake loads – Basic load combinations – Permissible stresses – Seismic methods of analysis – IS code based methods for seismic design – Vertical irregularities – Plan configuration problems – Lateral load resisting systems – Determination of design lateral forces as per IS 1893 (Part-1):2016 – Equivalent lateral force procedure – Lateral distribution of base shear

UNIT - IV:

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility – Requirements for Ductility – Assessment of Ductility – Factors affecting Ductility – Ductile detailing considerations as per IS 13920-2016 – Behavior of beams, columns and joints in RC buildings during earthquakes.

UNIT - V:

Masonry Buildings: Introduction – Elastic properties of masonry assemblage – Categories of masonry buildings – Behavior of unreinforced and reinforced masonry walls – Behavior of walls – Box action and bands – Behavior of infill walls – Improving seismic behavior of masonry buildings – Load combinations and permissible stresses – Seismic design requirements – Lateral load analysis of masonry buildings.

TEXT BOOKS:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press.
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

REFERENCES:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Earthquake Resistant Design of Building structures – Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration – R. N. Iyengar, I. K. International Publishing House Pvt. Ltd.
4. Masonry and Timber structures including earthquake Resistant Design –Anand S. Arya, Nemchand & Bros
5. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy

BIS CODES:

1. IS 1893(Part-1):2016.
2. IS 13920:2016.
3. IS 4326.
4. IS 456:200

19CE4274: REMOTE SENSING AND GIS
(Professional Elective-V)

B.Tech IV Year II Semester

L	T	P	C
3	-	-	3

Course Objectives:

- An opportunity to the students to study modern ground, space and air based surveying techniques.
- To prepare the students to analyse the photographs, images, data, attribute data and know about different types of satellite and its sensors of remote sensing.
- Know the concepts of Geographic Information System (GIS) and coordinate systems used in preparation of different Maps.
- To make the students to analyse the different ground features using vector model.
- Enable the students to know how the features are identified in the cell using raster model

Course Outcomes: After the completion of the course student should be able to

- Ability to analyze aerial photographs.
- Ability to explain electromagnetic spectrum, basic concepts and process of remote sensing.
- Ability to analyze and understand the geographic coordinate system
- Ability to analyze and interpret data using vector data model.
- Ability to analyze and interpret data using raster data model.

UNIT - I

Introduction to Photogrammetry: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, Fiducial points, parallax measurement using fiducial line.

UNIT - II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT – III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input- Attribute data Management –Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters commonly used Map Projections - Projected coordinate Systems.

UNIT – IV

Vector Data Model: Representation of simple features- Topology and its importance; coverage and its data structure, Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Topology rules.

UNIT - V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing

TEXT BOOKS:

1. Remote Sensing and GIS B. Bhatta by Oxford Publishers 2015.
2. Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill 2015

REFERENCES:

1. Concepts & Techniques of GIS by C. P. Lo Albert, K.W. Yongng, Prentice Hall (India) Publications.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.
3. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.
4. Remote Sensing and GIS Lillesand and Kiefer, John Willey 2008.
5. Text Book of Remote Sensing and Geographical Information Systems by M. Anji Reddy – 4th Edition B.S.Publications

19CE4275: FINITE ELEMENT METHODS FOR CIVIL ENGINEERS
(Professional Elective-VI)

B.Tech IV Year II Semester

L	T	P	C
3	-	-	3

Course Objectives:

- To introduce basic aspects of finite elements technology.
- To provide basic knowledge on domain Discretization, polynomial interpolation application of boundary conditions.
- To explain assembly of global arrays, ad solution of the resulting algebraic systems.
- To apply the most relevant advanced finite element methods in civil engineering by implementing well-structured programs for solving basic engineering problems.
- To utilize advanced finite element software tools for the most typical civil engineering problems.

Course outcomes: After the completion of the course student should be able to

- Explain various elements used in finite element method.
- Formulate the shape functions stiffness matrix, bar element or 1D ,2D element's
- Formulate shape functions and stiffness matrices for continuous beams
- Formulate shape function triangular elements demonstrate isoperimetric
- Use various solution techniques to assemble elements and finite element solutions for static loads.

UNIT – I

Introduction to Finite Element Method – Basic Equations in Elasticity Stress – Strain equation – concept of plane stress – plane strain advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom Displacement function – Natural Coordinates – strain displacement relations.

UNIT – II

Lagrangian – Serendipity elements –regular, Irregular 2 D & 3D – Element – shape functions upto quadratic formulation.

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffness matrix – stress – strain relation

UNIT – III

FEA Beam elements – stiffness matrix - shape function– Analysis of continuous beams.

UNIT – IV

FEA Two-dimensional problem – CST – LST element – shape function – stress – strain.

Isoperimetric formulation – Concepts of, isoperimetric elements for 2D analysis -formulation of CST element.

UNIT-V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOKS:

1. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning India Pvt. Ltd.
2. Concepts and applications of Finite Element Analysis by Robert D. Cook *et al.*, Wiley India Pvt. Ltd.
3. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall of India

REFERENCE BOOKS:

1. Finite Element Analysis by P. Seshu, PHI Learning Private Limited
2. Applied Finite Element Analysis by G. Ramamurty, I.K. International Publishing House Pvt. Ltd.
3. Introduction to Finite Element Analysis by J.N.Reddy, 3rd edition, Oxford Publications.

19CE4276:CONSTRUCTION TECHNOLOGY AND MANAGEMENT
(Professional Elective-VI)

	L	T	P	C
B.Tech IV Year II Semester	3	-	-	3

Pre-requisite: BMCP, C, EC&V

Course Objectives:

- To aware the student about the roles and responsibilities of a project manager.
- To make the student identify the equipment used in construction.
- To make the student to prepare a schedule of activities in a construction project.
- To aware the student about safety practices in construction industry.
- To make the student to prepare tender and contract document for a construction project.

Course Outcomes: After the completion of the course student should be able to

- Understand the roles and responsibilities of a project manager.
- Identify the equipment used in construction.
- Prepare schedule of activities in a construction project.
- Understand safety practices in construction industry.
- Prepare tender and contract document for a construction project.

UNIT - I

Management -Fundamentals of construction project management: Introduction, Project Initiation and Planning. Breakdown of a construction project.

UNIT - II

Planning of construction facilities - Earthwork construction - Equipment for construction, Construction Finances – decision making, Cement concrete construction- Construction of Piles - Construction of Cofferdams - Construction of Tunnels.

UNIT - III

Development of project activity networks, Precedence Diagram Method, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Line Balance Methods in scheduling, Time Value of Money, Investment Analysis, Cost-Benefit Analysis.

UNIT - IV

Introduction to Building Information Modelling (BIM), Lean construction, and Integrated Project Delivery in construction, Crashing of project, Cost Optimization, Invoicing, Preparation of RA bill, Safety in construction, Estimation.

UNIT – V

Contracts: Contracts in construction, fundamentals of delay analysis and claims; Advances in construction management, tender and tender document - Deposits by the contractor - Arbitration. Negotiation - M. Book - Muster roll –stores.

TEXT BOOKS:

1. Bennett, F. Lawrence., The management of construction: a project life cycle approach. Rutledge, 2003.
2. Oberlender, Garold D., Project management for engineering and construction. Vol. 2New York: McGraw-Hill, 1993.
3. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education2014

REFERENCES:

1. Peurifoy, Robert Leroy, Cliff J. Schexnayder and Shapira A. Construction planning, equipment, and methods. No. 696 pp. McGraw-Hill, 2010.

19CE4277:GROUND IMPROVEMENT TECHNIQUES
(Professional Elective-VI)

B.Tech IV Year II Semester

L	T	P	C
3	-	-	3

Pre-requisite: Soil Mechanics, FE

Course Objectives:

- To understand the need for ground modification.
- To understand the various methods of mechanical modifications.
- To understand the various hydraulic methods of hydraulic modifications.
- To understand the various physical and chemical methods of modifications.
- To understand the various methods for ground modifications by confinements

Course Outcomes: After the completion of the course student should be able to

- Discuss the need for ground modification.
- Apply the various Mechanics methods of ground modifications.
- Apply the various Hydraulic methods of ground modifications.
- Apply the various physical and chemical methods for ground modifications.
- Apply the various confinement methods for ground modifications.

UNIT - I

Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, in situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico- chemical, Electrical, Thermal methods and their applications.

UNIT - II

Mechanical Modification: Shallow Compaction Techniques; Deep Compaction Techniques- Blasting, Vibro-compaction, Dynamic Tamping and Compaction piles.

UNIT - III

Hydraulic Modification: Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-kinetic dewatering, Filtration, Drainage and Seepage control with Geosynthetics, Preloading and vertical drains,

UNIT - IV

Physical and Chemical Modification – Modification by admixtures, Modification by Grouting, Introduction to Thermal Modification including freezing.

UNIT - V

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

TEXT BOOKS:

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications.
2. M. P. Moseley and K. Krisch (2006) – Ground Improvement, II Edition, Taylor and Francis.
3. Purushotham Raj. P, Ground Improvement Techniques, Lakshmi Publications, 2nd Edition, 2016.

REFERENCE BOOKS:

1. Koerner, R. M (1994) – Designing with Geosynthetics – Prentice Hall, New Jersey
2. Jones C. J. F. P. (1985) – Earth Reinforcement and soil structures – Butterworths, London.
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement, John Wiley & Sons, 1994.
4. K. Krisch & F. Krisch (2010) - Ground Improvement by Deep Vibratory Methods, Spon Press, Taylor and Francis
5. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indian edition, 2012.

19CE4278: INDUSTRIAL WASTE WATER TREATMENT
(Professional Elective-VI)

B.Tech IV Year II Semester

L	T	P	C
3	-	-	3

Pre-requisite: EE

Course Objectives: To Learn About

- The various stages of treatment for waste water.
- The various treatment operations for waste water.
- The various Biological treatment processes.
- The various treatment process on nutrient requirements.
- The various sludge treatment procedures.

Course Outcomes: After the completion of the course student should be able to

- Identify the wastewater characteristics produced from a industries.
- Identify the stages of treatment for waste water.
- Explore the suitable Biological treatment for the waste water.
- Apply the aerobic treatment process for the waste water.
- Identify the sludge treatment and disposal methods.

UNIT - I

Introduction: Wastewater Characteristics, Standards of Disposal, Treatment Objective and Strategies, Layouts of Primary, Secondary and Advanced Treatment Units.

UNIT - II

Design of Preliminary and Primary Treatment Operations: Screens, Grit Chambers, Skimming Tank, Primary and Secondary Sedimentation Tanks.

UNIT - III

Biological Treatment Processes: Types, Kinetics of Plug Flow and Completely Mixed Systems.
Attached Growth Processes: Trickling Filters (Standard Rate, High Rate), Bio filters, Practices, Features and Design, Operational Difficulties and Remedial Measures, Rotating Biological Contactors. Suspended Growth Processes:

UNIT - IV

Activated Sludge Process, Modifications and Design Equations, Process Design Criteria, Oxygen and Nutrient Requirements - Classification and Design of Oxidation Ponds, Lagoons.

UNIT - V

Sludge Treatment and Disposal: Sludge Thickening, Aerobic and Anaerobic Sludge Digestion Processes, Design of Digester Tank, Sludge Dewatering, Ultimate Disposal, Sludge Drying Beds, Other Methods of Sludge Treatment.

TEXT BOOKS:

1. Wastewater Treatment – Concepts and Design Approach, by G L Karia and R A Christian, Prentice Hall of India, 2006
2. Environmental Engineering by Gerard Kiely, McGraw Hill Education (India) Pvt Ltd, 2013
3. Environmental Engineering – A Design Approach by A. P. Sincero and G A Sincero, Prentice Hall of India, 2014

REFERENCES:

1. Wastewater Engineering - Collection, Treatment, Disposal and Reuse by Metcalf and Eddy,, McGraw Hill Education (India) Pvt Ltd, 2013
2. Industrial Waste Treatment by Nelson Leonard Nemerow, Butterworth-Heinemann, 2007.
3. Biological Process Designs for Wastewater Treatment by Benefield L.D. and Randall C.D. Prentice Hall Pub. Co., 1980.

19CE4281: MAJOR PROJECT-PHASE II

B.Tech IV Year II Semester

L	T	P	C
-	-	14	7