



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	DESIGN AND DRAWING OF STEEL STRUCTURES	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of connections and relevant IS codes
2. Equip student with the concepts of designing flexural members
3. Understand design concepts of tension and compression members in trusses
4. Familiarize students with different types of columns and column bases and their design
5. Familiarize students with Plate girder and Gantry Girder and their design

Course Outcomes:

At the end of this course the student will be able to

- a. Analyze and design steel structural members with relevant IS codes
- b. Carryout analysis and design of flexural members and detailing
- c. Design compression members of different types with connection detailing
- d. Design Plate Girder and Gantry Girder with connection detailing
- e. Produce the drawings pertaining to different components of steel structures

SYLLABUS:

UNIT – I

Connections: Riveted connections – definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT – II

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT – III

Tension Members and compression members: Effective length of members, slenderness ratio-permissible stresses. Design compression members subjected to axial and eccentric loading. Design of members subjected to direct tension and bending. **Roof Trusses:** Different types of roof trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of purlins, members and joints.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

UNIT – IV

Design of Columns: Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected to moment.

UNIT – V

Design of Plate Girder: Design consideration – IS Code Recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.

Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II – V. Drawing classes must be conducted every week and the students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base

Plate 5 Detailing of steel roof trusses including joint details.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

Plate 7 Detailing of gantry girder.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXTBOOKS

1. ‘Steel Structures Design and Practice’ by N.Subramanian, Oxford University Press.
2. ‘Design of Steel Structures’ by Ramachandra, Vol – 1, Universities Press.
3. ‘Design of steel structures’ by S.K. Duggal, Tata Mcgraw Hill, and New Delhi

REFERENCES

1. ‘Structural Design in Steel’ by SarwarAlamRaz, New Age International Publishers, New Delhi
2. ‘Design of Steel Structures’ by P. Dayaratnam; S. Chand Publishers
3. ‘Design of Steel Structures’ by M. Raghupathi, Tata Mc. Graw-Hill
4. ‘Structural Design and Drawing’ by N. Krishna Raju; University Press,



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	HIGHWAY ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objectives of this course are:

- To impart different concepts in the field of Highway Engineering.
- To acquire design principles of Highway Geometrics and Pavements
- To acquire design principles of Intersections

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Plan high way network for a given area.
2. Determine High way alignment and design high way geometrics.
3. Design Intersections and prepare traffic management plans.
4. Judge suitability of pavement materials and design flexible and rigid pavements

UNIT I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment-Engineering Surveys – Drawings and Reports.

UNIT – II Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves- Design of Vertical Alignment- Gradients- Vertical curves.

UNIT – III Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC Method.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, India
B.TECH CIVIL ENGINEERING
(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

UNIT -IV

Highway Materials: Sub grade soil: classification –Group Index–Subgrade soil strength – California Bearing Ratio–Modulus of Subgrade Reaction. Stone aggregates: Desirable properties– Tests for Road Aggregates–Bituminous Materials: Types–Desirable properties— Testson Bitumen -Bituminous paving mixes: Requirements – Marshall Method of Mix Design

UNIT-V

Design of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements: Design factors–Flexible Pavement Design Methods–CBR method–IRC method–Burmister method–Mechanistic method–IRC Method for Low volume Flexible pavements.

Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses–Combination of stresses–Design of slabs–Design of Joints–IRC method– Rigidpavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

TEXTBOOKS:

Highway Engineering, Khanna S.K., Justo C.E.G and Veeraragavan A,Nem Chand Bros., Roorkee. Traffic Engineering and Transportation Planning, KadiyaliL. R,Khanna Publishers, New Delhi.

REFERENCES:

Principles of Highway Engineering, KadiyaliL .R,Khanna Publishers, NewDelhi

Principles of Transportation Engineering, Partha Chakraborty and Animesh Das,PHI Learning Private Limited, Delhi



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	ENVIRONMENTAL ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of water quality requirement for domestic usage and knowledge on design of water distribution network
3. Selection of valves and fixture in water distribution systems
4. Outline the planning and design of Sewerage System for a community/town/city
5. To impart knowledge on waste water treatment and disposal

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- a. Plan and design the water and distribution networks and sewerage systems
- b. Able to identify the appropriate source of water based on quality and quality requirements
- c. Select a suitable treatment for raw water treatment as well as sewage treatment
- d. Decide the manner of disposal of wastewater

SYLLABUS:

UNIT-I

Introduction: Importance and Necessity of Protected Water Supply systems. Water borne diseases. Planning of public water supply systems. Per capita demand and factors influencing it, types of water demands and its variations, factors affecting water demand, Design Period, Factors affecting the Design period, estimation of water demand for a town or city, Population Forecasting.

Sources of Water: Various surface and subsurface sources considered for water supply and their comparison- Capacity of storage reservoirs, Conveyance of Water from the source to the point of interest: Gravity and Pressure conduits, Types of Pipes and Pipe joints.

UNIT-II

Quality and Analysis of Water: Physical, Chemical and Biological characteristics of water. Water quality criteria for different uses- Rural, Municipal, Industrial and Agricultural uses. Drinking water quality standards: IS and WHO guidelines.

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods – Appurtenances of water distribution system–Laying and testing of pipe lines.

UNIT-III

Treatment of Water: Typical treatment flow of a municipal water treatment plant, Unit operations of water treatment: Theory and Design of Sedimentation, Coagulation,



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

flocculation, Filtration, Water conditioning and softening, Disinfection, Removal of color and odors – Removal of Iron and manganese – Fluoridation and De-fluoridation –Ion Exchange - Ultra filtration- Reverse Osmosis.

UNIT-IV

Planning and Design of Sewerage System

Characteristics and composition of sewage — population equivalent -Sanitary sewage flow estimation — Sewer materials — Hydraulics of flow in sanitary sewers — Sewer design — Storm drainage-Storm runoff estimation — sewer appurtenances — corrosion in sewers — prevention and control — sewage pumping-drainage in buildings-plumbing systems for drainage Primary Treatment of Sewage

Objectives — Unit Operations and Processes — Selection of treatment processes — Onsite sanitation — Septic tank- Grey water harvesting — Primary treatment — Principles, functions and design of sewage treatment units — screens — grit chamber-primary sedimentation tanks — Construction, Operation and Maintenance aspects.

UNIT-V

Secondary Treatment of Sewage

Objectives — Selection of Treatment Methods — Principles, Functions, — Activated Sludge Process and Extended aeration systems -Trickling filters— Sequencing Batch Reactor (SBR) — Membrane Bioreactor — UASB — Waste Stabilization Ponds — Other treatment methods -Reclamation and Reuse of sewage — Recent Advances in Sewage Treatment — Construction, Operation and Maintenance aspects.

Disposal of Sewage

Standards for- Disposal — Methods — dilution — Mass balance principle — Self purification of river - Oxygen sag curve — de-oxygenation and re-aeration — Streeter-Phelps model — Land disposal — Sewage farming — sodium hazards — Soil dispersion system.

TEXT BOOKS

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, George Tchobanoglou – McGraw-Hill Book Company, New Delhi, 1985.
2. Water Supply Engineering. Dr. P.N. Modi, Standard Book House, Delhi.

REFERENCES

1. Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi.
2. Water Supply Engineering.– Dr. B.C. Punmia, A.K. Jain and A.K. Jain. Laxmi Publications (P) Ltd., New Delhi.
3. Water Supply and Sanitary Engineering – G.S. Birdie and J.S. Birdie



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remolded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. To enable the students to know how geotextiles and geo synthetics can be used to improve the engineering performance of soils.
4. To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

- a. By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
- b. The student should be in a position to design a reinforced earth embankment and check its stability.
- c. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
- d. The student should be able to understand the concepts and applications of grouting.

UNIT-I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – insitu densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT-II

Dewatering–sumps and interceptor ditches –single and multi-stage well points–vacuum well points, horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization–use of industrial wastes like fly ash and granulated blast furnace slag.

Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting–hydraulic fracturing in soils and rocks –post grout tests. Introduction to Liquefaction & its effects & applications.

UNIT-IV

Reinforced earth–principles–components of reinforced earth–design principles of reinforced earth walls – stability checks – soil nailing.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

UNIT-V

Geosynthetics—geotextiles—types—functions, properties and applications – geogrids, geomembranes and gabions - properties and applications.

TEXT BOOKS:

1. ‘Ground Improvement Techniques’ by Purus Hotham Raj, Laxmi Publications, New Delhi.
2. ‘Ground Improvement Techniques’ by Nihar Ranjan Patro, Vikas Publishing House(p) limited ,New Delhi.
3. ‘An introduction to Soil Reinforcement and Geosynthetics’ by G.L.Siva Kumar Babu, Universities Press.

REFERENCE EBOOKS:

1. ‘Ground Improvement ’by MP Moseley, Blackie Academic and Professional, USA.
2. ‘Designing with Geosynthetics ’by RM Koerner, Prentice Hall



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, the student will be able to

- a) Recognize the mechanisms of degradation of concrete structures and to design durable Concrete structures.
- b) Conduct field monitoring and non-destructive evaluation of concrete structures.
- c) Design and suggest repair strategies for deteriorated concrete structures including
- d) Repairing with composites
- e) Understand the methods of strengthening methods for concrete structures
- f) Assessment of the service ability and residual life span of concrete structures by Visual inspection and in situ tests

UNIT:I

Materials for repair and rehabilitation-Admixtures-types of admixtures-purposes of using admixtures-chemical composition-Natural admixtures-Fibers-wraps-Glass and Carbon fiber wraps-Steel Plates-Nondestructive evaluation :Importance-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects -Visual investigation- Acoustical emission methods-Corrosion activity measurement- chloride content-Depth of carbonation-Impact echo methods-Ultra sound pulse velocity methods- pull out tests.

UNIT:II

Strengthening and stabilization-Techniques-design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening-Connection stabilization and strengthening, Crack stabilization.

UNIT:III

Bonded installation techniques-Externally bonded FRP-Wetlay upsheets, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding-CDC debonding-plate end de bonding-strengthening of floor of structures post grout tests. Introduction to Liquefaction & its effects & applications.

UNIT:IV

Fiber reinforced concrete-Properties of constituent materials-Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete-applications of fiber reinforced concretes-Light weight concrete-properties of light weight concrete-No fines concrete-design of light weight concrete-Fly ash concrete-Introduction-classification of fly ash-properties and reaction mechanism of fly ash-Properties of fly ash concrete in fresh state and hardened state-Durability of fly ash concretes



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

UNIT:IV

High performance concretes-Introduction-Development of high performance concretes-Materials of high performance concretes-Properties of high performance concretes-Self Consolidating concrete-properties-qualifications.

TEXT BOOKS

1. Maintenance Repair Rehabilitation & Minor works of Buildings -P.C.Varghese, PHI Publications
2. Repair and Rehabilitation of Concrete Structures—P.I.Modi,C.N.Patel,PHI Publications
3. Rehabilitation of Concrete Structures-B.Vidivelli,Standard Publishers Distributors
4. Concrete Bridge Practice Construction Maintenance & Rehabilitation-V.K.Raina, Shroff Publishers and Distributors.

REFERENCE:

1. Concrete Technology Theory and Practice-M.S.Shetty,SChandand Company
2. Concrete Repair and Maintenance illustrated-PeterHEmmons
3. Concrete Chemical Theory and Applications-Santa Kumar A.R.,Indian Society for Construction Engineering and Technology, Madras
4. Hand book on Repair and Rehabilitation of RC Buildings published by CPWD, Delhi



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	VALUATION AND QUANTITY SURVEY	L	T	P	C
		3	0	0	3

Outcomes

- a) Define basic terms related to estimation, quantity surveying and contract document
- b) Interpret the item of work from drawings and explain its general specification and unit of measurement
- c) Make use of given data from CPWDDAR/DSR for calculating the unit rate of different items of work associated with building Construction
- d) Develop detailed measurement (including BBS) and BoQofa various work like buildings, earth work for road, sanitary and water supply work
- e) Explain various basic terms related to valuation of land and Building
- f) Develop valuation of buildings using different methods of valuation.

UNIT I

Introduction- Quantity Surveying- Basic principles, Role/responsibility of Quantity surveyor at various stages of construction. Estimate-Details required, Type of estimate, purposes. Contingencies, Work-charge establishment, Tools and Plant, centage charge, Day work, Prime cost, Provisional sum & provisional Quantity, Overhead charges, Cost index, Contract documents (Brief description only)Bill of Quantity-Typical format-use Item of works- Identify various item of work from the drawings-unit of measurement of various materials and works (focus may give to RCC residential building) General rule & method of measurement with reference to Indian Standard Specifications- IS1200.

UNIT II

Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR. Specifications-General specification of all items of a residential building. Detailed specification (CPWD specifications) of major item of work like Earth work excavation in foundation, masonry, Reinforced cement concrete, finishing of building work Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR (Data should be given).

UNIT III

Detailed Estimate- Preparation of detailed measurement using Centre line method & Short wall long wall (separate wall) method for RCC single storied building (Flat roof) including stair cabin- Residential/office/school building. BOQ preparation of a single storied RCC building work. Material quantity calculation of the items of work (Rubble, Brick work, Concrete work, Plastering) in detailed estimate prepared for building work. (Data for unit



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, India
B.TECH CIVIL ENGINEERING
(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

quantity should be provided from DAR)

UNIT IV.

Bar Bending Schedule- Preparation of BBS of RCC beams, slabs, Column footings, Retaining wall. Road estimation-Estimation of earthwork from longitudinal section-metalled road. Estimation of sanitary and water supply work -Water tank, Septic tank, Manhole (*No Detailed estimate needed-concept of item of work, its general specification and unit of measurement*). (Valuation – purpose, factor affecting, introduction to terms-Value, Cost, Price, kinds of values Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase, Depreciation, obsolescence -Free hold and leasehold properties.)

UNIT V

Methods of calculating depreciation – straight line method – constant percentage method, sinking fund method and quantity survey method.

Methods of valuation–rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Various method of valuation of land (Brief description only)

Text Books:

1. B.N.Dutta, Estimation and costing in civil engineering, UBS publishers
2. Rangwala, Estimation Costing and Valuation, Charotar publishing house pvt.ltd
3. Dr. S. Seetha Raman, M.Chinna swami, Estimation and quantity surveying, Anuradha publications Chennai.
4. M Chakraborthy, Estimating, Costing, Specification and valuation, published by the author, 21 B, Babanda Road, Calcutta 26

References:

1. BS Patil, Civil Engineering contracts and estimates, university press
2. VNVazirani & SPChandola, Civil Engineering Estimation and Costing, Khanna Publishers
3. IS1200-1968; Methods of measurement of building & civil engineering works
4. CPWDDAR2018andDSR2018orlatest
5. CPWD Specifications Vol1&2(2019orlatestedition)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	FINITE ELEMENT METHOD	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, the student will be able to

- a) Develop finite element formulations of 1degree of freedom problems and solve Them
- b) Understand any Finite Elements of ware to perform stress, thermal and modal Analysis
- c) Compute the stiffness matrices of different elements and system
- d) Interpret displacements, strains and stress resultants
- e) Analyze planar structural systems using finite element modeling

UNIT I

Introduction: Review of stiffness method-Principle of Stationary potential energy-Potential energy of anelastic body-Rayleigh-Ritz method of functional approximation-variational approaches- weighted residual methods

UNIT II

Finite Element formulation of truss element: Stiffness matrix-properties of stiffness matrix –Selection of approximate displacement functions-solution of a planetruss-transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports-Galerkin's methodfor1-Dtruss– Computation of stress in a truss element.

UNIT III

Finite element formulation of Beam elements: Beam stiffness-assemble age of beam stiffen matrix- Examples of beam analysis for concentrated and distributed loading-Galerkin's method – 2 Darbitrarily oriented beam element-inclined and skewed supports-rigid plane frame examples

UNIT IV

Finite element formulation for plane stress, plane strain and axi symmetric problems-Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems-comparison of CST and LST elements- convergence of solution-interpretation of stresses

UNIT V

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element-shape functions, evaluation of stiffness matrix, consistent modalload vector- Gauss quadrature-appropriate order of quadrature-element and mesh instabilities-spurious zero energy modes, stress computation-patch test.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

TEXTBOOKS

1. A first course in the Finite Element Method—Daryl L.Logan, Thomson Publications.
2. Concepts and applications of Finite Element Analysis—Robert D.Cook, Michael EPlesha, John Wiley & Sons Publications

REFERENCES:

1. Introduction to Finite Elements in Engineering-Tirupati R.Chandrupatla, Ashok D. Belgunda, PHI publications.
2. Finite Element Methods (For Structural Engineers)Wail N Rifaie, Ashok K Govil, New Age International(P)Limited



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	BRIDGE ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of Bridges and IRC standards
2. Equip student with the concepts and design of Slab Bridges, T Beam Bridges, Box Culverts
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and their maintenance

Course Outcomes:

At the end of this course the student will be able to

- a. Explain different types of Bridges with diagrams and Loading standards
- b. Carry out analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
- c. Carry out analysis and design of Plate girder bridges
- d. Organize for attending inspections and maintenance of bridges and prepare reports.

SYLLABUS:

UNIT-I

General Introduction to types of Bridges- (Slab bridges, TBeam, Arch bridges, Cable Stayed bridges, pre stressed concrete bridges, Truss Bridges, Culverts) - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT-II

Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs-dispersion length-Design of interior panel of slab-Guyon's-Massonet Method-Hendry-Jaegar Methods- Courbon's theory- Pigeaud's method

UNIT-III

T-Beam bridges- Analysis and design of various elements of bridge–Design of deck slab, longitudinal girders, Secondary beams- Reinforcement detailing

UNIT-IV

Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

UNIT-V

Box Culverts: Loading–Analysis and Design-Reinforcement detailing.

Inspection and Maintenance of Bridges: Procedures and methods for inspection–Testing of bridges- Maintenance of Sub Structures and Super structures-Maintenance of bearings- Maintenance Schedules.

TEXTBOOK

1. ‘Essentials of Bridge Engineering ’by Johnson Victor D
2. ‘Design of Bridge Structures’ by T.R. Jagadeesh, M.A. Jayaram, PHI
3. ‘Design of RC Structures’ by B. C.Punmai, Jain & Jain, Lakshmi Publications

REFERENCES:

1. ‘Design of Concrete Bridges’ by Aswini, Vazirani,Ratwani
2. ‘Design of Steel Structures’ by B.C.Punmai, Jain & Jain, Lakshmi Publications
3. ‘Design of Bridges’ by Krishna Raju



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	WATER RESOURCES ENGINEERING	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- The course is designed to make the students,
1. Learn the types of irrigation systems.
 2. Understand the concepts of planning and design of irrigation systems.
 3. Study the relationships among soil, water and plant and their significance in planning an irrigation system.
 4. Understand design principles of erodible and non-erodible canals.
 5. Know the principles of design of weirs on permeable foundations.
 6. Know the concepts for analysis and design of storage head works.
 7. Learn design principles of canal structures.

Course Outcomes

At the end of the course the student will be able to

- a. Estimate irrigation water requirements.
- b. Design irrigation canals
- c. Design irrigation canal structures
- d. Plan and design diversion head works
- e. Analyze stability of gravity and earth dams.
- f. Design hydraulic ogee spillways

SYLLABUS:

UNIT-I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals - Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT- III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall. (Description only)

Regulators: Head and cross regulators, design principles (Description only)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage. (Description only)

Outlets: Types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components, causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis.

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates.

TEXTBOOKS:

1. 'Irrigation and Waterpower Engineering' by Punmia B C, P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi
2. 'Irrigation and Water Resources Engineering' by Asawa G L (2013), New Age International Publishers
3. 'Irrigation Engineering' by Raghunath H.M (2012), Wiley India.
4. 'Irrigation Water Resources and Waterpower Engineering' by Modi P N (2011), Standard Book House, New Delhi

REFERENCES:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T. K (2012), S. Chand & Co Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year II Semester	DISASTER MANAGEMENT	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the ‘relief system’ and the ‘disaster victim.’
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- a. Affirm the usefulness of integrating management principles in disaster mitigation work
- b. Distinguish between the different approaches needed to manage pre- during and post-disaster periods
- c. Explain the process of risk management
- d. Relate to risk transfer

SYLLABUS:

UNIT-I

Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT-II

Man Made Disaster and Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management.

UNIT-III

Risk and Vulnerability: Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

development, Climate change risk rendition – Financial management of disaster – related losses.

UNIT-IV

Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations-roads and bridges- mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

UNIT-V

Multi-sectional Issues, Education and Community Preparedness: Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction- Education in disaster risk reduction- Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

TEXT BOOKS:

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers& Distributors Pvt.Ltd.
2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications
3. ‘Disaster Science & Management’ by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., NewDelhi.
4. ‘Disaster Management – Future Challenges and Opportunities’ by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

REFERENCE BOOKS:

1. ‘Disaster Management’ edited by H K Gupta (2003), Universitiespress.
2. ‘Disaster Management – Global Challenges and Local Solutions’ by Rajib shah & R R Krishnamurthy (2009), Universitiespress.R. Nishith, Singh AK,
3. “Disaster Management in India: Perspectives, Issues and strategies” New Royal BookCompany.”



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, India
B.TECH CIVIL ENGINEERING
(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year –II Semester	SUSTAINABILITY IN ENGINEERING PRACTICES	L	T	P	C
		3	0	0	3

Course Outcomes: At the end of the course, the student will be able to

- CO1:** Explain sustainable development and different environmental agreements and protocols
- CO2:** Discuss real time activities causing environmental issues and different methods to use renewable energy resources
- CO3:** Explain local and global environmental issues
- CO4:** Differentiate between carbon emissions for regular and sustainable cities and explain different practices to move industries towards sustainability
- CO5:** Discuss different renewable energy resources and explain methods to implement green technology

UNIT-I

Introduction to Sustainable Engineering- Sustainable development, concepts of sustainable development: three pillar model, egg of sustainability model, Atkisson's pyramid model, prism model, principles of sustainable development, sustainable engineering, threats for sustainability.

Environmental Ethics and Legislations – Environmental ethics and education, multilateral environmental agreements and protocols, enforcement of environmental laws in India – The Water Act, The Air Act, The Environment Act.

UNIT-II

Local Environmental Issues- Solid waste, impact of solid waste on natural resources, zero waste concept and three R concept, waste to energy technology: thermo-chemical conversion, biochemical conversion.

Global Environmental Issues- Resource degradation: deterioration of water resources, land degradation, air pollution, climate change and global warming, ozone layer depletion, carbon footprint, carbon trading.

UNIT-III

Tools for Sustainability - Environmental management System (EMS), concept of ISO14000, life cycle assessment (LCA): basic components, advantages, disadvantages, case study. Environmental impact assessment (EIA), environmental auditing, bio mimicking, case studies.

UNIT-IV

Sustainable Habitat - Concept of green building, green building materials, green building certification and rating: green rating for integrated habitat assessment(GRIHA),leader ship



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

in energy and environmental design (LEED) rating, energy efficient buildings, sustainable cities, sustainable transport, sustainable pavements, case studies in sustainability engineering: Green building, sustainable city, sustainable transport system.

Sustainable Industrialization and Urbanization – Sustainable urbanization, industrialization, material selection, pollution prevention, industrial ecology, industrial symbiosis, poverty reduction.

UNIT-V

Renewable energy resources- Conventional and non- conventional forms of energy, solar energy, fuel cells, wind energy, small hydroplants, biogas systems, biofuels, energy from ocean, geothermal energy, conservation of energy.

Green technology and Green Business: Sustainable business, green technology, green energy, green construction, green transportation, green chemistry, green computing

Text Book:

R.L. Ragand Lekshmi Dinachandran Remesh. *Introduction to Sustainable Engineering*.
2nd Edition, PHI Learning Pvt. Ltd., 2016.

References:

1. D.T.AllenandD.R.Shonnard.*SustainabilityEngineering:Concepts,DesignandCaseStudies*, 1st Edition, Prentice Hall, 2011.
2. A.S.Bradley,A.O.Adebayo,P.Maria.*Engineeringapplicationsinsustainabledesignanddevelopment*, 1st Edition, Cengage learning, 2016.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year –II Semester	WATER SUPPLY SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes:

At the end of the course, students will be able to:

CO1: Outline of the various facets of water usage in daily life

CO2: Explain the origin of Natural waters and also to synthesize it for regular use

CO3: Discuss the utilization of non-potable water

CO4: Describe water supply system from a reservoir

CO5: Explain the characteristics of wastewater

UNIT-I

WATER AND LIFE:

Necessity of water – Domestic demand – Public demand – Irrigation – Transportation – Sanitation – Dilution of waste waters – Dust palliative – Recreation – Fire protection.

UNIT-II

SOURCES OF WATER:

Surface sources – Ground sources – Water from atmosphere – Desalination – Recycling of waste water – Recharging of aquifers.

UNIT-III

DUAL SUPPLY OF WATER:

Potable and non-potable water – Protected water – Grey water – Black water – Water bornediseases – water related diseases – Sewage Irrigation.

UNIT-IV

DISTRIBUTION OF WATER:

Based on topography – Gravity distribution – Direct pumping – Combined pumping and gravity flow. Service Reservoirs – Continuous supply – Intermittent supply – Networks of distribution– Emergency water supply as in case of fire accidents – Valves, hydrants and meters.

UNIT-V

INDUSTRIAL WATER:



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

Location of Industry with reference to surface sources of water – Quality of water required for industrial operations – characteristics of waste water produced – Standards for letting industrial effluents into sources of water.

TEXT BOOKS:

1. K.N. Duggal, “Elements of Environmental Engineering”, 7th Edition, S. Chand Publishers, 2010.
2. Hammer and Hammer “Water and wastewater Technology”, 4th Edition, Prentice hall of India, 2003.
3. Howard S. Peavy, Donand P. Rowe, George Technobanoglos, “Environmental Engineering”, 1st Edition Mc Graw –Hill Publications, Civil Engineering Series, 1985.

REFERENCES:

1. B.C.Punmia, “Water Supply Engineering”, Vol. 1, “Waste water Engineering Vol. II”, 2nd Edition, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
2. Fair, Geyer and Okun, “Water and Waste Water Engineering”, 3rd Edition, Wiley, 2010.
3. Metcalf and Eddy, “Waste Water Engineering”, 3rd Edition, Tata Mc Graw Hill, 2008.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year – II Semester	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Learning Objectives:

The course will address the following:

1. Estimation of some important characteristics of water and wastewater in the laboratory
2. It also gives the significance of the characteristics of the water and wastewater

Outcomes:

Upon the successful completion of this course, the students will be able to:

- a. Estimate some important characteristics of water and wastewater in the laboratory
- b. Draw some conclusion and decide whether the water is suitable for construction or not, drinking or not; ultimate disposal as per effluent standards or not.
- c. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
- d. Estimate and study the strength of the raw and treated effluents in terms of BOD, COD, pH, TDS and chloride of the neutralization tank treating effluents from Chemistry lab or Environmental Engineering Laboratory

SYLLABUS:

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of Total Solids, Organic Solids and Inorganic Solids and Settleable Solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter & Wrinklers Method and B.O.D.
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.
14. Visit a Water Treatment Plant and give a technical report.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA-533003, Andhra Pradesh, India
B.TECH CIVIL ENGINEERING
(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

NOTE: At least 10 of the above experiments are to be conducted.

List of Equipments

- 1) pH meter
- 2) Turbidity meter
- 3) Conductivity meter
- 4) Hot air oven
- 5) Muffle furnace
- 6) Dissolved Oxygen meter
- 7) U-V visible spectrophotometer
- 8) COD Reflux Apparatus
- 9) Jar Test Apparatus
- 10) BOD incubator
- 11) Autoclave
- 12) Laminar flow chamber
- 13) Hazen's Apparatus

Textbooks

1. Standard Methods for Analysis of Water and Waste Water – APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

Reference

1. Relevant IS Codes.
Chemistry for Environmental Engineering by Sawyer and Mc. Carty



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year – II Semester	HIGHWAY ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Course Learning Objectives:

The objectives of this course are:

1. To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bituminous mix
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:

At the end of the course, the student will be able to

- a. Test aggregates and judge the suitability of materials for the road construction
- b. Test the given bitumen samples and judge their suitability for the road construction.
- c. Obtain the optimum bitumen content for Bituminous Concrete
- d. Determine the traffic volume, speed and parking characteristics.
- e. Draw highway cross sections and intersections.

SYLLABUS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING

1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Elongation and thickness gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

TEXTBOOKS:

1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

**B.TECH CIVIL ENGINEERING
(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)**

III Year -II Semester	CAD LAB	L	T	P	C
		0	1	2	2

Course Objectives: The objectives of the course are to

1. **Learn** the usage of any fundamental software for design
2. **Create** geometries using pre-processor
3. **Analyze** and Interpret the results using post processor
4. **Design** the structural elements

Course Outcomes

After the completion of the course student should be able to

- a) Model the geometry of real-world structure Represent the physical model of structural element/structure
- b) Perform analysis
- c) Interpret from the Post processing results
- d) Design the structural elements and a system as per ISCodes

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 DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL, WL, EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designing software's.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

III Year -II Semester	AUDIT COURSE TECHNICAL PAPER WRITING & IPR	L	T	P	C
		2	0	0	-

Course Objective:

1. The course will explain the basic related to writing the technical reports and understanding the concepts related to formatting and structuring the report. This will help students to comprehend the concept of proofreading, proposals and practice

Unit I: Introduction: An introduction to writing technical reports, technical sentences formation, using transitions to join sentences, Using tenses for technical writing.

Planning and Structuring: Planning the report, identifying reader(s), Voice, Formatting and structuring the report, Sections of a technical report, Minutes of meeting writing.

Unit II: Drafting report and design issues: The use of drafts, Illustrations and graphics.

Final edits: Grammar, spelling, readability and writing in plain English: Writing in plain English, Jargon and final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.

Unit III: Proofreading and summaries: Proofreading, summaries, Activities on summaries.

Presenting final reports: Printed presentation, Verbal presentation skills, Introduction to proposals and practice.

Unit IV: Using word processor: Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments, Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes, Working with Footnotes and Endnotes, Inserting citations and Bibliography, Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros,

Unit V: Nature of Intellectual Property: Patents, Designs, Trade and Copyright.

Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property

Text Books:

1. Kompal Bansal & Parshit Bansal, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.
2. William S. Pfeiffer and Kaye A. Adkins, "Technical Communication: A Practical Approach", Pearson.
3. Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA-533003, Andhra Pradesh, India

B.TECH CIVIL ENGINEERING

(R23 – IIIrd YEAR COURSE STRUCTURE & SYLLABUS)

Reference Books:

1. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
2. Day R, how to Write and Publish a Scientific Paper, Cambridge University Press(2006)

E-resources:

1. <https://www.udemy.com/course/reportwriting/>
2. <https://www.udemy.com/course/professional-business-english-and-technical-report-writing/>
3. <https://www.udemy.com/course/betterbusinesswriting/>