

Vision of the Institution

To ignite the minds of the students through academic excellence so as to bring about social transformation and prosperity.

Mission of the Institution

- To expand the frontiers of knowledge through Quality Education.
- To provide valued added Research and Development.
- To embody a spirit of excellence in Teaching, Creativity, Scholarship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional Behavior.

Vision of CIVIL ENGINEERING Department

To give the nation qualitative Civil Engineers, who can contribute for the construction of a better world with sophisticated infrastructural facilities, eco-friendly houses, modern transportation facilities with a pollution free environment and to protect the precious natural resources of this planet.

Mission of CIVIL ENGINEERING Department

1. To shape the students into good entrepreneurs and to promote self-confidence and all-round development of the student personality through special lectures, practical training programs, field visits and technical seminars.
2. To train the students to acquire generic knowledge in the areas of Civil Engineering
3. To continuously update the physical infrastructure through modernization, thrust area development, R & D and other schemes
4. To generate knowledge base through sustained research and developmental efforts.
5. To produce engineers with self-confidence and overall personality who can be self-employed and generate employment opportunities to fellow engineers and take active part in nation building,
6. Keeping in view the challenges of the future.

Program Educational Objectives (PEOs)

PEO:1

The main objective of the faculty is to guide them by the principles of sustainable development and global inter connectedness with the civil structures, and make them to understand the impact of civil engineering projects how they effects the society and environment in case of failures.

PEO:2

To develop their communication skills(Oral, Written, Visual, Graphic modes) which makes them to participate actively in their communities and profession when working as team leaders or members.

PEO:3

An intensive training is provided to identify, formulate and solving engineering problems in technical areas appropriate CIVIL ENGINEERING.

PEO:4

To make them competent and engaged engineering professionals applying their technical and managerial skills in planning, designing and construction.

Program Outcomes (POs) of CIVIL ENGINEERING Department

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs) of CIVIL ENGINEERING Department

PSO 1:

An ability to learn constructional concepts and to implement them in the field work and to make the structural planning in a smarter way.

PSO 2:

To encourage young energetic engineers in technical and software skills in the field of Civil Engineering with innovative thoughts along with existing and future trends in constructional field.

PSO 3 :

The capability to integrate knowledge in constructional field work and to improve skills to become an entrepreneur.

BUILDING PLANNING AND DRAWING

COURSE OBJECTIVE:

1. To understand the fundamental principles and concepts of planning and architecture for buildings.
2. To study about different views of layout.
3. To learn the development controls covered by building bye laws and National building code for buildings.

PART-A

UNIT – I

Building Byelaws and Regulations: Introduction – Terminology – Objectives of building byelaws – Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of bye buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

UNIT – II

Residential Buildings: Minimum standards for various parts of buildings - requirements of different rooms and their grouping – characteristics of various types of residential buildings.

UNIT – III

Public Buildings: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

PART-B

UNIT – 1V

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond- odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

UNIT - V

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glassed door, glassed windows – paneled windows – Swing ventilator – Fixed ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss.

Sloped and flat roof buildings: drawing plans, Elevation and Cross Sections of given sloped roof buildings

UNIT – VI

PLANNING AND DESIGNING OF BUILDINGS:

Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.

TEXT BOOKS:

1. “Planning and Design of buildings”, Y.S.Sane.
2. “Building planning designing and scheduling”,(5th Edition),Gurucharan Singh and Jagadish Singh,Standarad Publications Distributers,Delhi,2010.
3. “Building Planning and Drawing”, M.Chakravarthi.
4. “Building Planning and Drawing,A and B Serie” of JNTU College of Engineering

REFERENCES:

1. “Building byelaws” of state and Central Governments and Municipal corporations,2011.
2. “Building Drawing”, Shah and Kale.
3. “Building planning and drawing”,(3rd edition),Kumara Swami,N.Anand Charator Publishing House Pvt Ltd,2010.

COURSE OUTCOMES :

1. Comprehend local building bye-laws and provisions of National Building Code in respect of building and town planning.
2. Discuss various aspects of principles of planning and architecture in planning building and mass composition.
3. Explain the principles of planning and design considerations to construct earthquake resistant building.
4. Prepare working drawings, foundation plans and other executable drawings with proper details for residential buildings.

CONCRETE TECHNOLOGY

COURSE OBJECTIVE:

1. The course relates to the fundamentals related to concrete and concrete material, besides dealing with masonry, reinforcement, etc.
2. The course begins with an outline of what concrete is, what are the processes involved in formation of concrete, various materials that are used in concrete formation, properties of each ingredient of concrete, standard tests to be applied to concrete and concrete ingredients.
3. The course then moves on to design-mix, special concretes, Nondestructive testing, etc.

UNIT I: INGREDIENTS OF CONCRETE CEMENTS & ADMIXTURES : Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, plasticizers, super-plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water

UNIT – II

FRESH CONCRETE: Steps in manufacture of concrete –proportion, mixing, placing, compaction, finishing, curing including various types in each stage. Properties of fresh concrete - Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete , Ready mixed concrete, Shotcrete.

UNIT – III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gelspace ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – concepts Proportioning of concrete mixes by various methods – BIS method of mix design

UNIT – VI

SPECIAL CONCRETES: Ready mix concrete- shortcrete- Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete– High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete – Properties of polymer concrete, High performance concrete – Self consolidating concrete – SIFCON, self healing concrete.

TEXT BOOKS:

1. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi
2. Concrete Technology by M.S.Shetty. – S.Chand & Co.; 2004
3. Properties of Concrete by A.M.Neville – PEARSON – 4th edition

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Text Book of Concrete Technology, Mahaboob Bhasha, Anuradha publications,

Course Outcomes:

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

1. Discuss the concrete ingredients and its influence at gaining strength
2. Design of concrete mix and grade as per IS codes.
3. Summarise the concepts of conventional concrete and its differences with other concretes like no fines, light weight etc.
4. Describe the application and use of fiber reinforced concrete.
5. Design and develop the self compacting and high performance concrete.

HYDRAULICS AND HYRAULIC MACHINERY**COURSE OBJECTIVES:**

The course should enable the students to:

- I. Strengthen the knowledge of theoretical and technological aspects of hydrodynamic forces on jets
- II. Correlate the principles with applications in hydraulic turbines.
- III. Apply the practical applications on Francis and Kaplan turbine.
- IV. Analysis the similarities between prototype and model types of hydraulic similitude.

COURSE OUTCOMES (COs):

CO 1: Describe the concept of different types of flows, designing of most economical sections of the Open Channel and to understand the concept of specific energy.

CO 2: Describe the concept of dimensional quantities and application of similitude concept in designing model and prototype.

CO 3: Understand the concept, working applications of impact of jets with the importance of constructing velocity triangles.

CO 4: Explore the design concept of Pelton, Francis and Kaplan turbines, Centrifugal pumps along with the design of most economical designs.

CO 5: Understand the working mechanism of different types of the pumps with their important characteristic curves.

UNIT – I UNIFORM FLOW IN OPEN CHANNELS: Types of channels –Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy’s, and Manning’s formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth

UNIT II NON-UNIFORM FLOW IN OPEN CHANNELS: Steady Gradually Varied flow-Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profilesdirect step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – III HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat , inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

UNIT – V HYDRAULIC TURBINES – I: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

UNIT – VI CENTRAIFUGAL-PUMPS: Pump installation details-classification-work done-Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curvesNPSH-Cavitation. **RECIPROCATING PUMPS:** Introduction, classification, components, working, discharge, indicator diagram, work done and slip

TEXT BOOKS:

1. Open Channel flow by K,Subramanya . Tata Mc.Grawhill Publishers
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications.
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria& Sons.

REFERENCES :

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
3. Fluid mechanics and fluid machines by Rajput, S.Chand&Co.
4. Open Channel flow by V.T.Chow, Mc.Graw Hill book company.
5. Hydraulic Machines by Banga& Sharma Khanna Publishers.

STRUCTURAL ANALYSIS – I

Course Objectives:

1. To impart the principles of elastic structural analysis and behaviour of indeterminate structures.
2. To impart knowledge about various methods involved in the analysis of indeterminate structures.
3. To apply these methods for analyzing the indeterminate structures to evaluate the response of structures
4. To enable the student get a feeling of how real-life structures behave
5. To make the student familiar with latest computational techniques and software used for structural analysis.

Course Outcomes:

The student after undergoing this course will be able to:

1. To understand analysis of indeterminate structures and adopt an appropriate structural analysis technique
2. Determine response of structures by classical, iterative and matrix methods

UNIT – I

PROPPED CANTILEVERS: Degree of static indeterminacy-compatibility condition - Analysis of propped cantilevers with elastic and rigid prop-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT – II

FIXED BEAMS – Introduction to statically indeterminate beams with U.D.load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and

combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – III

CONTINUOUS BEAMS: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT – V

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – VI

MOVING LOADS : Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section single point load, U.D.load longer than the span, U.D.load shorter than the span-Influence lines for forces in members of Pratt and Warren trusses.

TEXT BOOKS:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.

3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi
5. Basic structural Analysis by C.S. Reddy, Tata McGraw-Hill, New Delhi

REFERENCES:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujarat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat McGraw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi

STRENGTH OF MATERIALS- II

Course objectives:

This course will enable students;

1. To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
3. To analyse and understand different internal forces and stresses induced due to representative loads on structural elements.
4. To analyse and understand principal stresses due to the combination of two dimensional stresses on an element and failure mechanisms in materials.
5. To evaluate the behavior of torsional members, columns and struts.

UNIT I

PRINCIPAL STRESSES AND STRAINS:

Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

THEORIES OF FAILURES:

Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II**TORSION OF CIRCULAR SHAFTS AND SPRINGS:**

Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS: Introduction-types of springs-deflection of close and open coiled helical springs under axial pull and axial couple-springs in series and parallel-carriage or leaf springs.

UNIT – III**COLUMNS AND STRUTS:**

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions-derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula. Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT – IV**DIRECT AND BENDING STRESSES:**

Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT – V**UNSYMMETRICAL BENDING:**

Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to

unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

UNIT – VI

ANALYSIS OF PIN-JOINTED PLANE FRAMES:

Concept of determinate and indeterminate trusses-Degree of static indeterminacy –Analysis of various types cantilever and simply supported internally determinate trusses using (i) Method of Joints , (ii) Method of Sections and (iii) Tension coefficient method.

Text Books:

T1.Strength of materials by Bhavikatti, Lakshmi Publications.

T2.Mechanics of Materials by Dr. Punmia.

T3.Strength of Materials by D.Sadhu Singh.

References:

R1.Solids of mechanics by Popov.

R2.strength of materials by Jindal, Umesh publications

Course outcomes:

After studying this course, students will be able;

1. To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion.
2. To suggest suitable material from among the available in the field of construction and manufacturing.
3. To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts.
4. To understand the basic concept of analysis and design of members subjected to torsion.
5. To understand the basic concept of analysis and design of structural elements such as columns and struts.

Course Objectives:

- To know various components and their functions in a railway track.
- To acquire design principles of geometrics in a railway track.
- To know various techniques for the effective movement of trains.
- To acquire design principles of airport geometrics and pavements.

SYLLABUS**TRANSPORTATION ENGINEERING-I****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 AND MANAGEMENT:

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.

UNIT – IV

Highway Materials: Sub-grade soil: classification –Group Index – Sub-grade soil strength – California Bearing Ratio – Modulus of Sub-grade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on 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 – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

UNIT – VI

Highway Construction and Maintenance: Types of Highway Construction – Earthwork; Construction of Earth Roads, Gravel Roads, Water Bound Macadam Roads, Bituminous Pavements and Construction of Cement Concrete Pavements. Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements.

TEXT BOOKS:

1. ‘Highway Engineering’ by Khanna S.K., Justo C.E.G and Veeraragavan A, Nem Chand Bros, Roorkee.
2. ‘Traffic Engineering and Transportation’ Planning by Kadiyali L.R, Khanna Publishers, New Delhi.
3. ‘Highway Engineering’ by Srinivasa Kumar R, Universities Press, Hyderabad.

REFERENCES:

1. ‘Transportation Engineering and Planning’ by Papacostas C.S. and PD Prevedouros, Prentice Hall of India Pvt. Ltd; New Delhi.
2. ‘Principles of Highway Engineering’ by Kadiyali LR, Khanna Publishers, New Delhi.
3. ‘Transportation Engineering - An Introduction’ by Jotin Khisty C, Prentice Hall, Englewood Cliffs, New Jersey.
4. ‘Highway Engineering’ by Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi.
5. ‘Principles of Transportation Engineering’ by Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi
6. ‘Practice and Design of Highway Engineering’ by Sharma SK, Principles, S.Chand & Company Private Limited, New Delhi.

Course Outcomes:

Upon completion of this course, students should:

- Design geometrics in a railway track
- Provide good transportation network
- Design airport geometrics and airfield pavements.
- Plan, construct and maintain Docks and Harbours

SURVEYING Lab

LIST OF THE EXPERIMENTS
Study Of The Theodolite
Measurement Of Horizontal Angle By Repetition Method
Measurement Of Vertical Angle
Theodolite survey: Finding the Height of far objects
Tacheometry survey: Heights and Distance problems using Tacheometric principles

Curve Setting by using long chord method
Curve Setting by using Tangent method
Determination Of Area Using Total Station
Traversing Using Total Station
Determination Of Remote Height
Total station : Contouring
Determination Of Distance, Gradient And Difference In Height Between Two In Accessible Points

Course Objectives:

1. To impart the practical knowledge in the field- measuring distances, directions, angles
2. To determining R.L.'s areas and volumes
3. To set out Curves
4. To stake out points
5. To traverse the area
6. To draw Plans and Maps

Course Outcomes:

1. At the end of the course, the student will be able to:
2. Apply the principle of surveying for civil Engineering Applications
3. Calculation of areas, Drawing plans and contour maps using different measuring equipment at field level
4. Write a technical laboratory report

FM&HM LAB**LIST OF THE EXPERIMENTS**

Calibration of Venturi meter
Calibration of Orifice meter
Determination of Coefficient of loss of head in a sudden contraction and friction factor
Impact of jet on vanes
Study of Hydraulic jump
Calibration of contracted Rectangular notch or Triangular notch
Efficiency test on Centrifugal pump
Efficiency test on Reciprocating pump
Performance test on Pelton wheel turbine
Performance test on Francis turbine
Verification of Bernoulli's equation

COURSE OBJECTIVES:

The course should enable the students to:

- I. Enrich the concept of fluid mechanics and hydraulic machines.
- II. Demonstrate the classical experiments in fluid mechanics and hydraulic machinery.
- III. Correlate various flow measuring devices such as Venturimeter, orifice meter and notches etc.
- IV. Discuss the performance characteristics of turbines and pumps

COURSE OUTCOMES:

1. Understanding of basic physics of fluids.
2. Gaining knowledge to calculate and design engineering applications involving fluid.
3. Understanding of analyzing flow systems in terms of mass, momentum, and energy balance.
4. Having knowledge about current research topics about fluid mechanics.