SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

---------CIVIL ENGINEERING----------

Semester/Year		I/I	Program		B.Tech
Subject Category	ESC	Subject Code:	CEA103	Subject Name:	Engineering Mechanics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Physics and Mathematics.

Course Objective:

Students are expected to learn the basic concepts of Engineering Mechanics and to think clearly and critically the solution of Engineering problems with this knowledge in their respective fields.

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand the basic concepts and fundamental principles of Engineering Mechanics.
2. To enhance their understanding and apply this knowledge in their specific courses for the analysis and design problems.

UNITs	Descriptions	Hrs.	CO's
I	**Equilibrium of System of Forces :** Force Systems Basic concepts, Particle and Rigid Body equilibrium; Coplanar-Concurrent and Non-concurrent Forces, Components in Space, Resultant, Moment of Forces and its Applications; Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems; Static Indeterminacy, Friction-Application problems such as Impending motion of connected bodies, ladder friction & belt drives.	9	CO1 & CO2
II	**Trusses:** Introduction to various types of Trusses, Analysis of forces in the members of a Perfect truss: Method of joints, Method of Section, Graphical Methods.	7	CO1 & CO2
III	**Analysis of Beams and Simple Frames :** Types of Beams, loading and supports; Shear Force, Bending moment, Axial Force diagrams for various types of determinate beams and frames.	7	CO1 & CO2
IV	**Centroid and Moment of Inertia :** Centroid of simple figures from first principles, centroid of composite sections; Moment of inertia of plane sections from first principles, Moment of inertia of standard sections and composite sections, Product of Inertia, Principal Moment of Inertia.	9	CO1 & CO2
V	**Kinetics of Rigid Bodies:** Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation	8	CO1 & CO2
Guest Lectures (if any)			

Total Hours	40	

Suggestive list of experiments:

1. To verify law of Polygon of forces.
2. To find the reaction at the supports of a Simply Supported Beam and verify the law of Superposition of Forces.
3. To determine the Coefficient of friction between different surfaces using a horizontal plane.
4. To find the Coefficient of friction between Rope and Drum.
5. To verify Shear Force at a given section of a Simply Supported Beam.
6. To verify Bending Moment at a given section of a Simply Supported Beam.

Text Book-

1. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI
2. Civil Engineering materials, TTTI, Chandigarh.
3. R.C. Hibbler– Engineering Mechanics: Statics & Dynamics

Reference Books-

1. Engineering Mechanics by R.K. Bansal
2. Beer &Johnston, Vector Mechanics for Engineering–Statics &Dynamics.
3. Engineering Mechanics by Bhavi Katti

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/122/104/122104015/

https://nptel.ac.in/courses/105/106/105106116/

https://nptel.ac.in/courses/105/106/105106201/

Recommendation by Board of studies on	30-05-2025
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		II/I	Program		B.Tech
Subject Category	ESC	Subject Code:	CEA101	Subject Name:	Basic Civil Engineering

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Nil

Course Objective:

Students are expected to learn the basic concepts of Civil Engineering and to think clearly and critically the solution of Engineering problems with this knowledge in their respective fields.

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand the basic concepts and fundamental principles of Civil Engineering.
2. To enhance their understanding and apply this knowledge in their specific courses for the analysis and design problems.

UNITs	Descriptions	Hrs.	CO's
I	**Building Materials:** Stones, bricks, cement, lime, timber-their types, properties, tests & uses, laboratory tests of concrete and mortar Materials: Workability and Strength properties of Concrete, Preparation of concrete, compaction, curing, etc.	8	CO1 & CO2
II	**Elements of Building Construction:** Various components of a building and their functions, Types of foundations, Brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability	8	CO1 & CO2
III	**Surveying & Positioning:** Introduction to surveying Instruments – levels, thedolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal levelling.	10	CO1 & CO2
IV	**Mapping & Sensing:** Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.	7	CO1 & CO2
V	**Transportation Engineering:** Role of Transportation in National development, Transportation Ways, Surface- Transportation and Aviation, BOT & BOOT Projects for Highways, Elements of Traffic Engineering and Traffic Control	7	CO1 & CO2
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. To find the Consistency of cement.

2. To find the Initial & Final Setting time of cement.
3. To find the Fineness of cement.
4. To find the Specific Gravity of cement.
5. To find compressive strength of cement.
6. To find the Specific Gravity of sand
7. To find the sieve analysis and zoning of sand
8. To find the bulking and water absorption of sand.
9. Testing of coarse aggregate: Specific Gravity, sieve analysis, water absorption
10. To find the Water Absorption and compressive strength of Brick.

Text Book-

1. Building Construction by Sushil Kumar.
2. Civil Engineering materials, TTTI, Chandigarh.
3. Surveying Vol. I & II by Dr. B. C. Punamia Publication Laxmi Publication Delhi
4. Building Construction, Author: Dr. B. C. Punamia, Publisher: Laxmi Pub. Delhi
5. Engineering Material, Author: Dr. S.C. Rangwala, Publisher: Charotar Pub. House
6. Highway Engineering, Author: Khanna S. K. and Justo C. E.G., Publisher: Nemchand and Brothers

Reference Books-

1. Shesha Prakash and Mogaveer; Elements of Civil Engg &Engg. Mechanics; PHI
2. Building Materials by S.C. Rangwala-Charotar publications House, Anand
3. Building Construction by Sushil Kumar.
4. Surveying Vol. I and II, Author: S. K. Duggal, Publisher: Tata Macgraw hill Publication New Delhi

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

http://www.nptel.iitm.ac.in/courses.php?branch=Civil
http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT

Recommendation by Board of studies on	30-05-2025
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SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year	III/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-301	Subject Name:	Building Materials & Construction

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Basic knowledge to identify different types of material.

Course Objective:

Students are expected to learn concepts of physical properties of construction materials and their respective testing procedure & uses, components of Building Industry, principles and methods to be followed in constructing various components of a building.

Course Outcomes:

After completion of the course, the student will be able to:

1. To identify various building materials and select suitable type of building material for given situation and also the emerging materials in the field of Civil Engineering construction.
2. To select suitable type of foundation and various types of brick masonry, door and windows for buildings.
3. Classify different types flooring and arch geometry and building repair work.

UNITs	Descriptions	Hrs.	CO's
I	**Stones:** Occurrence, varieties, Characteristics and their testing, uses, quarrying and dressing of stones. Timber: Important timbers & their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, Alternate materials for shuttering doors/windows, Partitions and structural members etc. Brick and Tiles: Manufacturing, characteristics, Classification and uses, Improved brick from inferior soils, Hand moulding brick table, Clay brick table, Flooring types of flooring and their characteristics.	9	CO1
II	**Advance Construction Materials:** Use of fly ash in mortars, concrete, Fly ash bricks, stabilized mud blocks, non-erodible mud plinth, D.P.C. materials, building materials made by Industrial & agricultural waste, clay products P.V.C. materials, advance materials for flooring, doors & windows, fascia material, interiors materials for plumbing, sanitation & electrification.	8	CO1
III	**Foundation:** Type of soils, bearing capacity, soil stabilization and improvement of bearing capacity, settlement and safe limits. Types of foundations, wall footings, grillage, foundations, well foundation, causes of failure and remedial measures; under reamed piles, foundation on shrinkable soils, black cotton soil, timbering for trenches, dewatering of foundations. Hyperbolic parboiled footing, Brick arch foundation. Simple methods of foundation design, Damp proof courses, Repairs Techniques for foundations.	7	CO2
IV	**Masonry and Walls:** Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non-load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry	8	CO2

	block, Hollow concrete block, plastering and pointing, white and colour washing, distempering, dampness and its protection, Design of hollow block masonry walls. Doors, Windows and Ventilators: Types, based on material etc., size location, fittings, construction of sunshades, sills and jambs, RCC doors/windows frames. Types of stair cases, rule of proportionality etc., Repairs techniques for masonry, walls, doors & windows.		
V	**Floors and Roofs:** Types, minimum thickness, construction, floor finishes, Flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing. Services: Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low-cost housing., Repairs techniques for floors & roofs.	8	CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Testing of Cement: Consistency of cement, initial and final setting time, Fineness, Specific Gravity and compressive strength of cement.
2. Testing of fine aggregate: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content.
3. Testing of coarse aggregate: Specific Gravity, sieve analysis, water absorption & moisture content.
4. Test on Bricks: Water Absorption and compressive strength of Brick.
5. Test on Tiles: Water Absorption and Flexural strength of Tiles.
6. Tension test on mild steel and HYSD bars.
7. Bending Test on Wood under two point loading.

Text Book-

1. Mohan Rai& M.P. Jai Singh; Advance in Building Materials & Construction,
2. S.C. Rangwala; Engineering Materials
3. Sushil Kumar; Building Construction,
4. B.C. Punmia; Building Construction,

Reference Books-

1. Building Construction, Metchell
2. Construction Technology, Chudley R.
3. Civil Engineering Materials, N. Jackson.
4. Engineering Materials, Surendra Singh.

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/102/105102088/

https://nptel.ac.in/courses/105/106/105106206/

Recommendation by Board of studies on	30-05-2025
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering Department

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---------CIVIL ENGINEERING----------

Semester/Year	III/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-302	Subject Name:	Strength of Materials

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Physics and Mathematics.

Course Objective:

Students are expected to learn basic concepts of mechanical properties of materials, concept of stress, strain and deformation of solid and state of stress, strain energy, principal stress and principal planes, theory of torsion and stresses in springs, fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior so that the students can solve real engineering problems and design engineering systems.

Course Outcomes:

After completion of the course, the student will be able to:

1. Develop an understanding of the engineering fundamentals of structural mechanics of deformable bodies.
2. Determine stress, strain, deflection and rotation in members subjected to combination of loadings.
3. Design simple bars, beams and circular shafts for allowable stresses and loads using appropriate material considering engineering properties.

UNITs	Descriptions	Hrs.	CO's
I	Simple Stress and Strains: Mechanical Properties of material, Concept of Elastic body, Stress and Strain, Hooke's law, various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses and strain. Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses.	10	CO1, CO2
II	Shear Force, Bending Moment & Deflection of Beams: Shear Force and Bending moment Diagram in beams with various loads and couple, Simply Supported, Cantilever and Overhanging beams, Point of Contraflexure, Relationship between bending moment and shear force. SFD and BMD by Graphical Method. Theory of Bending: Concept of pure bending. Equation of bending, Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to various loads and couples, Shear Stress distribution across a section in beams of various cross sections, Built-up beams and Shear flow.	9	CO1, CO2, CO3
	Deflection of beams: Double Integration Method, Macaulay's Method, Deflection by Method of Superposition, Conjugate Beam method, Moment Area Method.	5	CO1, CO2
IV	Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsional Moment Diagram (TMD), Hollow shafts, ,	7	CO1, CO2, CO3

	Transmission of power by circular shafts, Open and closed coil springs, Leaf Spring, Spiral Spring Pressure Vessels: Thin and Thick-walled cylinders and spheres, Stress due to internal pressure, change in diameter and volume, Compound cylinders and shrink fittings, Theories of failure.		
V	Columns and Struts: Eccentric loading on columns, Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Secant formula. Unsymmetrical Bending and Curved beams: Bending of a beam in a plane which is not a plane of symmetry, Shear center, Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.	9	CO1, CO2
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. To find Modulus of Elasticity 'E' of Mild Steel and Wood by Deflection method.
2. To find Modulus of Rigidity 'N' of Mild Steel by Barton's vertical torsion apparatus.
3. To find Modulus of Rigidity 'N' of spring material by Spring test apparatus.
4. To verify Shear Force at a given section of a Simply Supported Beam.
5. To verify Bending Moment at a given section of a Simply Supported Beam.
6. To verify Maxwell's Theorem of Reciprocal Deflection.
7. To perform Tensile Test on M.S. and C.I. specimen and draw stress strain curve.
8. To perform Compression test on Teak and Jungle wood and R.C.C. C.I. cubes and compare their results.
9. To determine Ultimate Shear Strength of M.S., C.I. and Brass.
10. To determine Modulus of Rupture of Teak and Sal wood beam by Flexural Test

Text Book-

1. Mechanics of Materials, by R.C. Hibbeler, Pearson Publications.
2. Mechanics of Materials, by Barry J. Goodno& James M.Gere, Cengage Publications.
3. Strength of Materials (Schaum's), Nash William; McGraw Hill International

Reference Books-

1. Strength of Materials, Pytel and Singer, Harper International.
2. Mechanics of Materials, Beer and Johnston, McGraw Hill.
3. Strength of Materials, Subramanian R, Oxford Publications

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce50/preview

https://swayam.gov.in/nd1_noc20_ce34/preview

Recommendation by Board of studies on	30-05-2025
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		III/II	Program		B.Tech
Subject Category	DC	Subject Code:	CE-303	Subject Name:	Building Planning & Architecture

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Engineering Graphics

Course Objective:

Students are expected to learn the principles of planning, bylaws of building construction; to draw plan, elevation and section of load bearing and framed buildings; to learn about to draw various building services facilities; to prepare detailed working drawing for joinery in buildings, stair cases and to learn to draw the perspective drawing.

Course Outcomes:

After completion of the course, the student will be able to:

1. Draw the various elements of buildings like door, window, foundations, staircase etc.
2. Apply the principles of planning and bylaws used for building planning & its functional design.
3. Draw the various building services like water supply, drainage, electrification, fire safety and acoustics in the building.
4. Draw plan, elevation and section for various types of buildings - residential and public buildings.
5. Draw perspective view of building and its elements.

UNITs	Descriptions	Hrs.	CO's
I	Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of doors, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.	10	CO3
II	Building Planning – Provisions of National Building Code, Building bye-laws, open area, setbacks, FAR terminology, Principles of architectural composition (i.e., unity, contrast, etc.), principles of planning, orientation, energy efficient buildings.	8	CO1
III	Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings	7	CO5
IV	Design and Drawing of Building – Functional design and preparation of detailed drawings of residential, institutional and commercial buildings, detailing of doors, windows, ventilators and staircases etc.	8	CO2
V	Perspective Drawing – Basic principles of perspective drawing, elements of perspective drawing involving simple problems, one point and two point perspectives.	7	CO4
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators,
3. One drawing sheet of lintels and arches.
4. One drawing sheet of various types of foundations.
5. One drawing sheet of staircases,
6. One drawing sheet for services and interiors of buildings.
7. One drawing sheet containing detailed planning of a single-story residential building (common to all students)
8. One drawing sheet of residential building (Each student will make a different drawing).
9. One drawing sheet of public building (Each student will make a different drawing).
10. One sheet on perspective drawing.

Text Book-

1. Chakraborty; Building Drawing
2. Shah, Kale & Patki; Building Design and Drawing; TMH

Reference Books-

1. Guru charan Singh &Jagdish Singh Building Planning, Design and Scheduling.
2. Malik &Meo; Building Design and Drawing

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-ar06/

https://nptel.ac.in/courses/124/107/124107001/

https://nptel.ac.in/courses/105/107/105107156/

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Subject handled by department	Civil Engineering

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---------CIVIL ENGINEERING----------

Semester/Year	III/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-304	Subject Name:	Surveying-I

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Nil

Course Objective:

The students are expected to understand the importance of surveying in the field of civil engineering and to learn the basics of linear/angular measurement methods like chain surveying, compass surveying, plane table surveying in plan making, levelling and theodolite survey in elevation and angular measurements & tachometric survey for distance and height measurement

Course Outcomes:

After completion of the course, the student will be able to:

1. Identify the concept of surveying, leveling and contouring and carry out linear and angular measurements required by different methods of surveying
2. Carry out traversing, trigonometrically leveling and tachometry using appropriate instruments and perform calculations
3. Identify different types of curves and perform calculations for setting out
4. Explain the triangulation principle and its application in control survey
5. Demonstrate the knowledge of hydrographic surveying, photographic surveying and remote sensing.

UNITs	Descriptions	Hrs.	CO's
I	Introduction to Surveying- Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, Bearing of survey lines, Local attraction, Declination, Dip, Latitude and Departure. Levelling: Principles of levelling- Dumpy level booking and reducing levels, Methods- simple, differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling, Trigonometric levelling: Indirect levelling, levelling on steep ground- methods. Contouring: Characteristics, methods, uses.	9	CO1
II	Traversing by theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling. Tachometry: Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tachometers, use of tachometry for traversing and contouring.	8	CO2
III	Curves: Classification and use; elements of circular curves, calculations, setting outcurves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves, setting out.	7	CO3

IV	Control Surveys: Providing frame work of control points, triangulation principle, conaissance, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.	8	CO4
V	Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Remote sensing, simple equipments, elements of image interpretation, image-processing systems.	8	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Chain Surveying
2. Plane table Surveying
3. Compass surveying
4. Leveling by auto level
5. Measurement of Angle by theodolite
6. Plotting a closed Traverse in field by using Theodolite.
7. Plotting an open Traverse in field by sing Theodolite
8. Determination of constants of Tachometers
9. Measurement of Horizontal Distance by stadia Tachometer
10. Measurement of Height and distances by Tangential Tachometry.
11. To Settling and simple curve by linear methods.

Text Book-

1. T.P. Kanetkar, Surveying & Leveling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York

Reference Books-

1. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co, London.
2. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
3. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
4. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce51/preview

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Subject handled by department	Civil Engineering Department

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---------CIVIL ENGINEERING----------

Semester/Year		III/II	Program		B.Tech
Subject Category	DLC-I	Subject Code:	CE-305	Subject Name:	Computer Aided Drafting (CAD)

Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical			Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
-	-	-	30	10	10	50	-	-	4	2

Suggestive list of experiments:

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators,
3. One drawing sheet of lintels and arches.
4. One drawing sheet of various types of foundations.
5. One drawing sheet of staircases,
6. One drawing sheet for services and interiors of buildings.
7. One drawing sheet containing detailed planning of a single-story residential building (common to all students)
8. One drawing sheet of residential building (Each student will make a different drawing).
9. One drawing sheet of public building (Each student will make a different drawing).
10. One sheet on perspective drawing.

Text Book-

1. Chakraborty; Building Drawing
2. Shah, Kale & Patki; Building Design and Drawing; TMH

Reference Books-

1. Guru charan Singh &Jagdish Singh Building Planning, Design and Scheduling.
2. Malik &Meo; Building Design and Drawing

Modes of Evaluation and Rubric

Lab work and Practical Viva.
Rubric: Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

Recommendation by Board of studies on	30-05-2025
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Compiled and designed by	
Subject handled by department	Civil Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
---------CIVIL ENGINEERING----------

Semester/Year		IV/II		Program		B.Tech					
Subject Category	DC	Subject Code:	CE-401	Subject Name:	Fluid Mechanics – I						
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Physics and Mathematics.

Course Objective:

Students are expected to learn basic concepts of fluid flow, fluid properties and relationship between them, fundamental principles of fluid mechanics (principles of continuity, momentum, and energy) as applied to fluid motions.

Course Outcomes:

After completion of the course, the student will be able to:

1. Perceive the knowledge of basic properties of fluids, different types of flows and analyze the fluid behavior under static condition
2. Apply the basic concepts to examine the behavior of fluid under kinematic and dynamic conditions
3. Perform dimensional analysis and dynamic similitude
4. Evaluate practical flow problems for pipes, open channels
5. Compare the difference between theoretical and practical values of different flow parameters and calibrate the equipments accordingly (Lab)

UNITs	Descriptions	Hrs.	CO's
I	Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, specific volume, specific gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Classification of different Fluids, Rheological Classification of Fluid. Fluid Static's: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and Tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.	9	CO1
II	Kinematics of Flow: Path lines, streak lines, streamlines and stream tubes; Types of motion of Fluid Particles, Types of flow-ideal & real, steady & unsteady, uniform &nonuniform, flow one-, two- and three-dimensional flow, continuity equation for one- and three-dimensional flow, rotational &irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets- their utility & method of drawing flow nets.	8	CO2
III	Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venture meter, weirs and notches).	8	CO3

IV	Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, roto dynamic machines etc.)	8	CO4
V	Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Verification of Energy equation
2. Calibration of venturi meter.
3. Calibration of orifice meter.
4. Calibration of Mouth Piece.
5. Calibration of Water meter.
6. Calibration Nozzle meter.
7. Determination of Cc, Cv, Cd of orifices.
8. Reynolds experiment for demonstration of stream lines & turbulent flow.
9. Determination of Friction Factor of a pipe.
10. Verification of impulse momentum principle.
11. Calibration Notches. (Rectangular & V notch)

Text Book-

1. Modi& Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechanics and machinery; TMH
3. Cengal; Fluid Mechanics; TMH
4. White; Fluid Mechanics; TMH

Reference Books-

1. Essential of Engg Hyd. By JNIK DAKE; Afrikan Network & ScInstt. (ANSTI)
2. A Text Book of fluid Mech. for Engg. Student by Franiss JRD
3. R Mohanty; Fluid Mechanics By; PHI
4. Fluid Mechanics; Gupta Pearson.
5. Dr. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce59/preview
https://nptel.ac.in/courses/112105183

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Subject handled by department	Civil Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		IV/II		Program		B.Tech					
Subject Category	DC	Subject Code:	CE-402	Subject Name:	Transportation Engg. I						
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Basic knowledge about the railway, bridge and tunnel

Course Objective:

- To know about the basic concepts and design of various components of railway engineering.
- To know about the types and functions of railway track, junctions, points and railway stations.
- To know about the basics of bridges and its components
- To know about the tunnels and its construction methods.

Course Outcomes:

After completion of the course, the student will be able to:

1. Distinguish various component of railway transportation system and geometric design of railway elements.
2. Discuss the basic concepts of bridge planning, construction and strengthening of bridges.
3. Know about the basic components and methods of tunnel construction to facilitate the transportation system.

UNITs	Descriptions	Hrs.	CO's
I	Components of Railway Engineering: Permanent way components Railway Track Gauge , Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Rail Fastenings, Creep of Rails, Theories related to creep, Adzing of Sleepers- Sleeper density, Rail joints.	8	CO1
II	Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation, Cant and Negative Super elevation, Cant Deficiency, Degree of Curve, safe speed on curves, Transition curve, Compound curves, Reverse curves , Extra clearance on curves, widening of gauge on curves, vertical curves, cheek rails on curves.	10	CO1
III	Turnouts & Controllers: Track layouts, Switches, Design of Tongue Rails, Crossings, Turnouts, Layout of Turnout, Double Turnout Diamond crossing, Scissors crossing. Signal Objectives, Classification Fixed signals – Stop signals, Signalling systems – Mechanical, signalling system – Electrical signalling system – System for Controlling Train Movement, Interlocking , Modern signaling Installations	7	CO1
IV	Bridge Site Investigation, surveying and Planning; Loading Standards & Component parts: Selection of site, alignment, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure.	7	CO2

V	Tunnels: Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.	8	CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of penetration value of Bitumen
5. Determination of Viscosity of Bituminous Material
6. Determination of softening point of bituminous material
7. Determination of ductility of the bitumen
8. Determination of flash point and fire point of bitumen
9. Determination of stripping value of road aggregate
10. Determination of shape tests on aggregate

Text Book-

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnu swamy; Bridge Engineering; TMH
5. Railway Engineering by Arora & Saxena–Dhanpat Rai & Sons

Reference Books-

1. Railway Track by K.F. Antia
2. Principles and Practice of Bridge Engineering S.P. Bindra – Dhanpat Rai & Sons
3. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
4. Railway, Bridges & Tunnels by Dr. S.C. Saxena
5. Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRC codes

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/107/105107123/
https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-ce24/
https://en.wikipedia.org/wiki/Railway_engineering
https://nptel.ac.in/courses/105/105/105105212/

Recommendation by Board of studies on	30-05-2025
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SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year	IV/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-403	Subject Name:	Concrete Technology

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Building Materials

Course Objective:

Students are expected to learn to understand the properties of ingredients of concrete; to study behavior of concrete in its fresh and hardened state; to study about the concrete design mix; to know about the procedures in concreting;

Course Outcomes:

After completion of the course, the student will be able to:

1. Test all the concrete materials as per IS code.
2. Determine the properties of fresh and hardened of concrete
3. Design the concrete mix using IS code methods
4. Ensure quality control while testing/ sampling and acceptance criteria
5. Design special concretes and their specific applications

UNITs	Descriptions	Hrs.	CO's
I	**Concrete Making Materials:** Cement, Fine Aggregate, Coarse aggregate, Water, Chemical & Mineral admixtures. Different test on cement as per Indian standards, Tests on aggregates as per Indian standards, Bulking of sand, Sieve analysis – Grading.	8	CO1
II	**Properties of Fresh and Hardened Concrete:** Properties of fresh concrete- Workability – different tests of workability- Factors influencing workability. Tests on hardened concrete as per IS codes – Relationship between different strengths – factors influencing strength.	8	CO2
III	**Design of Concrete Mix:** Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolanic materials.	9	CO3
IV	**Production and Quality Control of Concrete:** Production of crushed stone aggregate, batching equipments for production and concreting, curing at different temperatures, Concreting underwater hot & cold weather condition, statistical quality control, field control, Inspection & Testing of Concrete.	8	CO4
V	**Special Concretes:** Light weight concrete, Ready mix concrete, Ferrocement, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Prestressed concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Testing of Cement: Consistency of cement, initial and final setting time, Fineness and Specific Gravity of cement.
2. Testing of fine aggregate: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content.
3. Testing of coarse aggregate: Specific Gravity, sieve analysis, water absorption & moisture content.
4. Concrete Mix design by IS code method (as per IS:10262-2019 & IS:456-2000)
5. Tests on Concrete- Workability tests – Slump cone test, compaction factor test, Vee-Bee consistometer test, strength tests- compressive strength, flexural strength, split tensile strength.

Text Book-

1. Properties of Concrete – A.M. Nevelli – 5th Ed, Prentice Hall Publishers, 2012.
2. Concrete Technology – M. S. Shetty – S Chand Co., Publishers – 2006.
3. Concrete Technology – M. L. Gambhir – Tata McGraw Hill Publishers – 2012.

Reference Books-

1. Concrete Technology – R.S. Varshney – Oxford& IBH publishing co.
2. Hand books on Materials & Technology - Published by BMTPC & HUDCO
3. Mohan Rai& M.P. Jai Singh; Advances in Building Materials & Construction
4. IS:456 (2000)
5. IS:10262 (2019)

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/102/105102012/
https://nptel.ac.in/courses/105/104/105104030/
https://nptel.ac.in/courses/105/106/105106176/
https://nptel.ac.in/courses/105/105/105105106/
https://nptel.ac.in/courses/105/105/105105170/#

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---------CIVIL ENGINEERING----------

Semester/Year	IV/II	Program	B.Tech
Subject Category: DC	Subject Code: CE-404	Subject Name:	Quantity Surveying & Costing

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	1	-	4

Prerequisites:

Building material

Course Objective:

Students are expected to learn to know the importance of preparing the types of estimates under different conditions; to know about the rate analysis and bill preparations; to study about the specification writing; to understand the valuation of land and buildings.

Course Outcomes:

After completion of the course, the student will be able to:

1. Apply knowledge and techniques to prepare different types of estimates for different types of structures.
2. Carry out analysis of rates and bill preparation for various components of construction and utilize for calculating cost of works.
3. Apply the concept of valuation for evaluating rent of buildings

UNITs	Descriptions	Hrs.	CO's
I	Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimates, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.	8	CO1
II	Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)	8	CO2
III	Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.	9	CO1
IV	Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.	8	CO2
V	Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.	7	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi

Reference Books-

1. Quantity surveying & costing – Chakraborty
2. Estimating & Costing – S.C. Rangawala

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/104/105104161/

https://pdfcoffee.com/estimation-amp-costing-5-pdf-free.html

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---------CIVIL ENGINEERING----------

Semester/Year		IV/II	Program		B. Tech
Subject Category	DC	Subject Code:	CE-405	Subject Name:	Construction Planning & Management

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	1	-	4

Prerequisites:

Building construction

Course Objective:

1. To make are students conversant with the various project planning and management techniques such as CPM, PERT, BOR and milestone charts with their applications in real life project.
2. To teach the students tender procedure, contract documents, specification of various item of civil engineering construction contract procedures, how to keep & manage accounts for civil project.
3. To make them learn, various safety programmes and techniques to any casualty on the site.
4. To explain them the concept of various equipment management tools such as waiting line model, transportation model with their application.

Course Outcomes:

After completion of the course, the student will be able to:

1. Learn and apply the principle of network analysis in real life construction projects
2. Have a good understanding of construction -equipment, contract documents, contracting methods, accounts, safety in construction, organization types and systems approach to planning
3. Manage a construction site independently

UNITs	Descriptions	Hrs.	CO's
I	**Preliminary and detailed investigation methods:** Methods of construction, form work and centring. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.	8	CO1
II	**Construction equipment's:** Factors affecting selection, investment and operating cost, output of various equipment's, brief study of equipment's required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.	9	CO2
III	**Contracts:** Different types of controls, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.	7	CO2

IV	**Specifications & Public Works Accounts:** Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.	8	CO3
V	**Site Organization & Systems Approach to Planning:** Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.	8	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Modern Construction and Management, by Prof. Frank Harris
2. Value And Risk Management: A Guide to Best Practice by Michael F. Dallas
3. Construction Equipment by Peurify
4. CPM by L.S. Srinath

Reference Books-

1. Construction Management by S. Seetharaman
2. CPM & PERT by Weist & Levy
3. Construction, Management & Accounts by Harpal Singh

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/103/105103093/

https://nptel.ac.in/courses/105/104/105104161/

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---------CIVIL ENGINEERING----------

Semester/Year		IV/II	Program		B.Tech
Subject Category	DLC-II	Subject Code:	CE-406	Subject Name:	Engineering Geology Lab

Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical			Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
-	-	-	60	20	20	100	-	-	4	2

Suggestive list of experiments:

1 Fundamental of Geology
2 Study of Physical Properties of Minerals
3 Identification of Minerals and Rock sample
4 Megascopic Study of Rock Forming Minerals (Hand Specimen Study)
5 Megascopic Study of Igneous Rocks
6 Megascopic Study of Sedimentary Rocks
7 Megascopic Study of Metamorphic Rocks
8 Introduction to Geological Maps for different structural features.Presentation of Beds Along Section and Construction of Geological History:

Text Book-

3. Prabin Singh – “Engineering and General Geology”
4. S.K. Garg – “A text Book of Physical and Engineering Geology
5. ”Mukharjee, P.K., A text book of Geology, The World Press Pvt. Ltd.
6. Kesavulu, C., Textbook of Engineering Geology, Macmillan India Ltd, 1993, NewDelhi

Reference Books-

3. Gokhale, KVG.K and Rao, D.M., Experiments in Engineering Geology, Tata-McGraw Hill, 1981, New Delhi
4. Lilesand, T.M. and Ralph W. Keifer., Remote sensing and ImageInterpretation, John Wiley & Sons, 1987, New York.
5. Reddy, V. Engineering Geology for Civil Engineers; Oxford & IBH, 1997,New Delhi
6. Todd, D.K. Groundwater Hydrology, John Wiley & Sons, 1980, New York

Modes of Evaluation and Rubric

Lab work and Practical Viva.
Rubric: Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

Recommendation by Board of studies on	30-05-2025
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---------CIVIL ENGINEERING----------

Semester/Year	V/III	Program	B.Tech
Subject Category: DC	Subject Code: CE-501	Subject Name:	Advance Surveying

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Surveying

Course Objective:

1. To understand the basics and elements of different types of curves on roads and their preliminary survey
2. To learn about surveying applications in setting out of curves, buildings, culverts and tunnels
3. To get introduced to different geodetic methods of survey such as triangulation, trigonometric levelling
4. To learn about errors in measurements and their adjustments in a traverse
5. To get introduced to modern advanced surveying techniques involved such as Remote sensing, Total station, GPS, Photogrammetry etc.

Course Outcomes:

After completion of the course, the student will be able to:

1. set out curves, buildings, culverts and tunnels
2. carry out a geodetic survey, taking accurate measurements using instruments and adjusting the traverse apply mathematical adjustment of accidental errors involved in surveying measurements
3. plan a survey for applications such as road alignment and height of the building
4. invoke advanced surveying techniques over conventional methods in the field of civil engineering

UNITs	Descriptions	Hrs.	CO's
I	Modern equipment's for surveying: Digital levels and theodolites, Electronic Distance measurement(EDM), Total Station and Global Positioning Systems (GPS), Digital Planimeter .	7	CO1
II	Surveying Astronomy: Definitions of astronomical terms, coordinate systems for locating heavenly bodies, geographic, geodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of latitude and longitude.	9	CO1
III	GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datums, GPS receivers, GPS observation methods and their advantages over conventional methods. Digital Terrain Model (DTM): Topographic representation of the terrain and generation of DTM on computers using spot heights and contour maps.	8	CO2

IV	Photogrammetry: Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic.	9	CO3
V	Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Geographic Information Systems (GIS): Definition, components and advantages.	7	CO4
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Measurement of horizontal angle by repitation.
2. Determination of constants by tachometer.
3. Measurement of horizontal distance by stadia tachometry.
4. To setting curves by linear method.
5. To setting simple circular curve by Rankine method tangential angle.
6. Plotting a closed traverse in field by using theodolite.
7. Plotting of a open traverse in field by using theodolite.
8. Practising of modern equipment's.
9. Determination of horizontal and vertical distance by total station.
10. Determination of traversing and area calculation by total station.

Text Book-

1. Surveying and Leveling-Part-I & II by T.P. Kanetkar and S.V. Kulkarini, Pune Vidyarthi Griha Prakashan, Pune
2. Engineering Surveying: Theory and Examination Problems for Students by W. Schofield, Butterworth, Heinemann, Oxford.

Reference Books-

1. Surveying: Problems Solving with theory and objective type questions by A.M. Chandra, New Age International Publishers N. Delhi.
3. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
4. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.
5. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce51/preview
https://nptel.ac.in/courses/105107121

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---------CIVIL ENGINEERING----------

Semester/Year		V/III	Program		B.Tech
Subject Category	DC	Subject Code:	CE-502	Subject Name:	Fluid Mechanics - II

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Fluid Mechanics - I

Course Objective:

Students are expected to learn various types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows, non-uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump, fluid flow patterns and learns to use boundary layer theory and drag forces etc.

Course Outcomes:

After completion of the course, the student will be able to:

1. Visualize fluid flow phenomena observed in Civil Engineering systems such as flow through pipes, analysis of pipe distribution system.
2. Analyse fluid flows in open channel hydraulics and other devices such as weirs and flumes.
3. Design open channels for most economical sections like rectangular, trapezoidal and circular sections
4. Analyse the effect of drag & lift forces due to fluid.
5. Design and analyse the different hydraulic machine-like turbines, pumps etc.

UNITs	Descriptions	Hrs.	CO's
I	Turbulent flow: Laminar and turbulent boundary layers and laminar sub layer, hydro-dynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Pipe flow problems: Losses due to sudden expansion and contraction, losses in pipe, losses due to fittings, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes, Three Reservoir problems. Pipe Network: Water Hammer, Transmission of power. Hardy Cross Method.	9	CO1
II	Uniform flow in open channels: Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections of different channel. Saint Venanet equation.	9	CO2
III	Non uniform flow in open channels: Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow- hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.	7	CO3

IV	Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, a cylinder and on an aerofoil development of lift, lifting vanes, Magnus effect.	8	CO4
V	Fluid Machines: Turbines: Classifications, definitions, similarity laws, specific speed and unit quantities, various types of turbines and their classifications, Peloton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitation. Pumps: Centrifugal pumps: Various types and their important components, mano metric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, principle of working and characteristic curves. Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Mano metric head, Acceleration head.	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Determination of friction factor
2. Study the performances characteristics of Pelton Wheel
3. Study the performances characteristics of Francis Turbine
4. Study the performances characteristics of Kaplan Turbine
5. Calibration of multistage (Two) Pump & Study of characteristic of variable speed pump
6. To study the performance & details of operation of Hydraulic Ram (Water Hammer effect)
7. Determination of coefficient of discharge for a broad crested weir & to plot water surface profile over weir
8. Study of the characteristic of the Reciprocating pump
9. Study of Hydraulic Jump.
10. Study of surges in open channel flow.

Text Book-

1. Fluid Mechanics - Modi& Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju- Tata McGraw - Hill Publishing Comp. Ltd., New Delhi
3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705- B, NaiSarak, Delhi-6

Reference Books-

1. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
2. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York).
3. Engineering Hydraulics By H. Rouse
4. Centrifugal & Axial Flow Pump ByStempanoff A.J. New York
5. Dr. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce59/preview
https://nptel.ac.in/courses/103102211

Recommendation by Board of studies on	30-05-2025
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Subject handled by department	Civil Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		V/III	Program		B.Tech
Subject Category	DC	Subject Code:	CE-503	Subject Name:	Structural Design & Drawing – I (R.C.C.)

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Mechanics of material

Course Objective:

Student is expected to learn basic fundamentals of reinforced concrete design & provision of IS 456-2000 code of practice for the design of concrete structure, the stress strain behaviour of steel and concrete, basic concepts of working stress and limit state methods, knowledge of limit state design for flexure, shear, torsion, bond and anchorage, behaviour of columns subjected to direct and eccentric load and use of interaction diagrams, design of staircases and various types of foundations along with the application of all the above to provide economic solution for the real life problems of Civil Engineering.

Course Outcomes:

After completion of the course, the student will be able to:

1. Design various reinforced concrete elements by working stress and limit state method.
2. Interpret the appropriate relevant industry design codes related to structure design.
3. Familiar with professional and contemporary issues in the design and construction of reinforced concrete members

UNITs	Descriptions	Hrs.	CO's
I	Basic Principles of Structural Design: Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and various limit state methods of design-Collapse, Serviceability and durability, partial safety factor for load and material. Calculation of various loads for structural design including wind and earthquake loads, Partial load factors. Analysis of singly and doubly reinforced sections	9	CO1
II	Design of Beams: Rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, beams with compression reinforcement, Redistribution of moments in continuous beams, Circular girders, Deep beams, Design of Beam for strength and serviceability with provision for the bond, anchorage, development length and splicing.	8	CO1
III	Design of Slabs: Slabs spanning in one direction. Cantilever, simply supported and Continuous slabs, Slabs spanning in two directions, Introduction to Circular slabs, Waffle slabs, Flat slabs, Yield line theory.	7	CO1
IV	Columns & Footings: Effective length of columns, short and long columns-Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Annular footings, Design of short and slender columns subjected to – axial loads, uniaxial and biaxial bending.	9	CO2

V	Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slab less tread-riser staircase for various support condition as per the codal provisions. NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)	7	CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Design & drawing of simply supported beam.
2. Design & drawing of cantilever beam.
3. Design & drawing of continuous beam.
4. Design & drawing of simply supported one way slab.
5. Design & drawing of two-way slab.
6. Design & drawing of one-way continuous slab.
7. Design & drawing of circular slab.
8. Design & drawing of rectangular column.
9. Design & drawing of circular column.
10. Design & drawing of rectangular footing.
11. Design & drawing of staircase (waist slab type)
12. Design & drawing of staircase (tread-riser type)

Text Book-

1. Reinforced concrete design - Pillai Menon, Tata McGraw Hills
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothaman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta &Mallick, Oxford and IBH

Reference Books-

1. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
2. Plain & Reinforced Concrete Vol. I– O.P. Jain & Jay Krishna
3. Plain & reinforced concrete – B.C. Punmia.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105162/
https://nptel.ac.in/courses/105/106/105106112/
https://nptel.ac.in/courses/105/105/105105105/

Recommendation by Board of studies on	30-05-2025
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Subject handled by department	Civil Engineering

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---------CIVIL ENGINEERING----------

Semester/Year		V/III	Program		B.Tech
Subject Category	DC	Subject Code:	CE-504	Subject Name:	Structural Analysis-I

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Mechanics of material

Course Objective:

Students are expected to learn
1. To calculate loads for structural analysis.
2. To identify determinate, indeterminate, stable and unstable structures.
3. To determine forces and deflections in determinate trusses, beams and frames.
4. To determine force & moments in indeterminate beams and small frame structures.
5. Study of two and three hinged arches and suspension cable, Analysis of determinate structure for moving loads.

Course Outcomes:

1. To outline the equilibrium of structure.
2. To identify suitable method to solve a given problem.
3. To analyze the results obtained by solving the given problem of arches & suspension cable, determinate and indeterminate structures.
4. Analysis of determinate & indeterminate structures for rolling load & influence lines.

UNITs	Descriptions	Hrs.	CO's
I	Types of structures, Different type of loading and supports, Static and Kinematic Indeterminacy, strain energy and complementary energy, Principle of virtual work, Displacements of Beams, Trusses by unit load method, Displacement due to lack of fit, temperature variation, support movements. Method of Consistent Deformation for Beams, Frames and Trusses up to two degrees of indeterminacy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of beams, Pin-Jointed and rigid frames for static loads.	8	CO1
II	Fixed and Continuous Beams: Beams fixed at ends, Beams of varying Cross-Section, Partially Fixed at Ends. Effect of Settlement of Supports, Three Moment Theorem for continuous Beams, Beams of Uniform and varying Cross-Sections. Effect of Settlement of Supports.	9	CO1
III	Indeterminate Structures - II: Analysis of beams and frames by slope Deflection method, Moment Distribution Method (without sway)	7	CO2
IV	Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects	9	CO3
V	Rolling loads and Influence Lines: Maximum SF and BM curves for various types of rolling loads, focal length, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches and trusses	7	CO4
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
2. Norris C.H., Wilbur J.B. and Utkys, Elementary Structural Analysis, McGraw Hill International, Tokyo.
3. Theory Of Structure by Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain

Reference Books-

1. R.C. Hibbler, Structural Analysis – Pearson (Prentice Hall)
2. Wang C.K., Intermediate structural analysis, McGraw Hill, New York.
3. Kinney Sterling J., Indeterminate structural Analysis, Addison Wesley.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
5. Norris C.H., Wilbur J.B. and Utkys, Elementary Structural Analysis, McGraw Hill International, Tokyo.
6. Theory Of Structure by Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://swayam.gov.in/nd1_noc20_ce35/preview
https://nptel.ac.in/courses/105101085
https://nptel.ac.in/courses/105105166

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Subject handled by department	Civil Engineering

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---------CIVIL ENGINEERING----------

Semester/Year		V/III	Program		B.Tech
Subject Category	OE-I (A)	Subject Code:	OE-505 OE-I (A)	Subject Name:	Cost Effective & Eco-Friendly Structures

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

1. Understand the Definition, Concept & Objectives of the terms cost effective & Eco-Friendly construction

1. Apply cost effective techniques in construction
2. State the importance of cost-effective construction & evaluate the objectives of green buildings.
3. Explain how Pre-Engineered Construction can be cost effective & select alternative Construction System.
4. Know the concept of Integrated Life cycle design of Materials and Structures

Course Objective:

1. Understand the Definition, Concept & Objectives of the terms cost effective & Eco-Friendly construction
2. Apply cost effective techniques in construction
3. State the importance of cost-effective construction & evaluate the objectives of green buildings.
4. Explain how Pre-Engineered Construction can be cost effective & select alternative Construction System.
5. Know the concept of Integrated Life cycle design of Materials and Structures

Course Outcomes:

On completion of the course, the students will be able to

1. State the importance of cost-effective construction.
2. Identify Environmental Issues
3. Know the application of Ferro cement & Ferro concrete Structures
4. How Pre-Engineered Construction can be cost effective
5. Compare Initial Cost of Cost Effective & Eco-Friendly Construction V/s Conventional Construction

UNITs	Descriptions	Hrs.	CO's
I	**Concepts of energy efficient & environment friendly materials and techniques.** **Cost effective materials: -** Soil, Fly ash, Ferrocement, Lime, Fibres, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer. **Energy Efficient & Environment friendly building material products: -**Basic concepts of Energy efficient buildings, Walls - Stabilised and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone	8	CO1

	masonry blocks, Ferrocement partitions. Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof, M.C.R. tile, Pavelled Blocks		
II	**Cost effective construction techniques and equipment's: -** (a) Techniques: - Rat trap bond construction, Energy Efficient roofing's, Ferrocement technique, Mud Technology. (b) Equipment's: - Brick moulding machine, Stabilised soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferrocement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.	9	CO2
III	**Cost effective sanitation: -** (a) Waste water disposal system (b) Cost effective sanitation for rural and urban areas (c) Ferrocement Drains	8	CO3
IV	**Low-Cost Road Construction: -** Cost effective road materials, stabilization, construction techniques tests, equipment used for construction, drainage, maintenance.	8	CO4
V	**Cost analysis and comparison: -** (a) All experimental materials (b) All experimental techniques	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

Text Book-

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPON Press

Reference Books-

1. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
2. Buildings How to Reduce Cost – Laurie Backer - Cost Ford

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/102/105102195/

https://nptel.ac.in/courses/127/101/127101014/

Recommendation by Board of studies on	30-05-2025
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---------CIVIL ENGINEERING----------

Semester/Year		V/III	Program		B.Tech
Subject Category	OE-I (B)	Subject Code:	OE-505 OE-I (B)	Subject Name:	Road Safety Engineering

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Basic knowledge on Road safety Engineering.

Course Objective:

To provide the basic knowledge on road safety engineering and acquaint them with evaluation of safety hazardous locations and remedial road safety measures.

Course Outcomes:

After the completion of the course the student should be able to

1.Able to acquire knowledge methods and application of road safety engineering and accident analysis.

2.Able to remember the process of road safety audit and the measures of improving road safety.

3. Able to Qualified to evaluate the effectiveness of various management techniques adopted in reducing road accidents

UNITs	Descriptions	Hrs.	CO's
I	Introduction to Road safety: Road accidents, Trends, causes, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors, Road safety improvement strategies; Elements of a road safety plan.	9	CO1
II	Understanding and Analysis of road accident Data: Before-after methods in accident analysis, Recording of accident data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Case Studies.	8	CO1
III	Road Safety Audits: Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.	7	CO2
IV	Road Accident Reconstruction: Describe the basic information that can be obtained from the roadway surface, Understand basic physics related to accident reconstruction, speed for various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.	8	CO2
V	Remedial safety Measures: Accident prevention by better planning, Accident prevention by better design of roads, Accident remedial measures, Highway operation and	8	CO3

	accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law.		
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. C. Jotin Kishty& B. Kent Lall, Transportation Engineering-An Introduction, Thrid Edition, Prentice Hall of India Private Limited, New Delhi, 2006
2. Khanna and Justo, Text book of Highway Engineering, Nemchand Brothers, Roorkee.
3. GeetamTiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016.B.C. Punmia; Building Construction.
4. nstitute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.
5.

Reference Books-

6. J. Stannard Baker, Traffic Collision Investigation, Northwestern University Center for Public Safety, 2002.
7. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).
8. AthelstanPopkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105215/

Recommendation by Board of studies on	30-05-2025
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Subject handled by department	Civil Engineering Department

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---------CIVIL ENGINEERING----------

Semester/Year		V/III	Program		B.Tech
Subject Category	DE-II (A)	Subject Code:	DE-506 DE-II (A)	Subject Name:	Transportation Engineering - II

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Basic knowledge about the road traffic, different pavement roads and highways.

Course Objective:

1. To understand the importance of various transportation system and characteristics of road transport.
2. To know about the history of road and highway development, surveys and classification of roads.
3. To study about design of various geometric components of highways.
4. To study about road traffic characteristics and design of intersections and signal.
5. To know about the type of pavement, materials and pavement design.

Course Outcomes:

After completion of the course, the student will be able to:

1. Understanding the concept of Highway planning alignment, Geometric design and design of flexible and rigid pavement and material used for pavement.
2. Acquire the knowledge of highway constructions techniques and its maintenance and also understand the concepts of traffic engineering and planning.
3. Identify the knowledge of planning a runway, taxiway of airport and their geometrical elements.

UNITs	Descriptions	Hrs.	CO's
I	**Highway planning, Alignment & Geometric Design**: Principles of highway planning, road planning in India and financing of roads, classification patterns. Highway alignment and survey. **Cross sectional elements**- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, and numerical problems.	8	CO1
II	**Pavement material and design: Design** of flexible and Rigid pavements using IRC Codes, desirable properties and test of highway materials, design of mixes and stability, WBM, WMM, BM, BC, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars.	8	CO1
III	**Highway maintenance:** Surface and sub-surface drainage of highway, pavement failure, types of flexible and rigid pavement failure, pavement performance evaluation and maintenance, strengthening and overlay design: Benkelman beam and Dynamic Cone Penetration Test (DCPT).	6	CO2
IV	**Traffic Engineering and Planning:** Traffic characteristics - Traffic studies-speed, capacity, volume, speed and delay, peak hour factor, origin destination, parking and accident. Statistical analysis of traffic data: microscopic and macroscopic parameters of traffic flow. Traffic operations regulation and control; design of intersections- at grade and grade separated. Signal design by Webster's method. Principles of	8	CO2

	planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.		
V	**Airport Planning and Design:** Airport site selection, aircraft characteristic and their effects on runway alignments, taxi ways and runways, pattern of runway capacity. Windrose diagrams, basic runway length and corrections, classification of airports. Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc.	10	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherty
4. Highway Engineering by S.K. Khanna& C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna& M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"

Reference Books-

1. Sharma & Sharma, Principles and Practice of Highway Engg.
2. Haung, Analysis and Design of Pavements
3. Relevant IRC & IS codes
4. Laboratory Manual by Dr. S.K. Khanna
5. Highway Engg. By Hews & Oglesby
6. Highway Material by Walker

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/101/105101087/
https://nptel.ac.in/courses/105/101/105101008/
https://nptel.ac.in/courses/105/104/105104098/

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---------CIVIL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DC	Subject Code:	CE-601	Subject Name:	Structural Design & Drawing –II (Steel)

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Structural Design & Drawing –I

Course Objective:

Students are expected to learn design of steel structural elements under compression, tension and flexure using various types of cross-sections as per the provisions of IS 800-2007 code of practice along with bolted and welded connections. They should attain competence to solve real life problems of simple steel structures employed in commercial and industrial buildings.

Course Outcomes:

After completion of the course, the student will be able to:

1. understand the basic concepts of steel structure design and apply the IS code of practices for design of steel structural elements.
2. design and evaluate different steel structural elements in compression, tension and flexure on the basis of strength and serviceability concepts as per IS:800-2007.
3. design riveted, bolted and welded connections for both axial and eccentric loads. Also, design and evaluate grillage foundation and footings for different steel structures.
4. solve and provide solutions to the real-world problems.

UNITs	Descriptions	Hrs.	CO's
I	Various loads and mechanism of the load transfer, Partial load factors, Structural properties of steel, Structural Steel Products, Design Philosophies, Principles of Limit State Design, Design of structural connections - Bolted, Riveted and Welded connections.	9	CO1
II	Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.	9	CO2
III	Design of simple beams - Laterally Supported and Unsupported, Design of Beam Bearing plates, Built-up beams, Plate girders and Gantry girders, Splices in beams	6	CO2
IV	Length of Columns, Design of Simple and Compound Columns, Lacings & battens, Bracings.	9	CO3
V	Design of footings for steel structures, Grillage foundation. Design of Industrial Buildings - Structural framing, Roofing and Wall Materials, Purlins, Girts and Eave Strut, Floor plates and End Bearings	7	CO4
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Design & Drawing of Bolted and Welded Connections.

2. Design & Drawing of Compression and Tension members.
3. Design & Drawing of Laterally supported and unsupported Beams.
4. Design & Drawing of Plate Girder
5. Design & Drawing of Built-up Columns (Lacing system and Battening system).
6. Design & Drawing of Flat column base and Gusseted column base.
7. Design & Drawing of Roof Trusses.
8. Design & Drawing of Grillage foundation.
9. Design & Drawing of Gantry Girder.
10. Design & Drawing of an Industrial Building.

Text Book-

1. Design of Steel Structures, N. Subramanian, Oxford University Press
2. Limit State Design of Steel Structures, S. K. Duggal, McGraw Hill(India) Education Pvt. Ltd.

Reference Books-

1. Fundamentals of Structural Steel Design, M. L. Gambhir, McGraw Hill(India) Education Pvt. Ltd.
2. Design of Steel Structures, S. S. Bhavikatti, I. K. International Publishing House Pvt. Ltd.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105162/

https://nptel.ac.in/courses/105/106/105106113/

Recommendation by Board of studies on	30-05-2025
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Compiled and designed by	
Subject handled by department	Civil Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

---------CIVIL ENGINEERING----------

Semester/Year	VI/III	Program	B.Tech
Subject Category: DC	Subject Code: CE-602	Subject Name:	Geotechnical Engineering – I

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Geology

Course Objective:

To provide students with basic understanding of physical and mechanical properties of soil, together with knowledge of basic engineering procedures to identify factors controlling soil behaviour and methods to determine soil properties. Students will acquire basic knowledge in engineering design of geotechnical systems

Course Outcomes:

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

1. Characterize and classify soils.
2. Compute and analyse the permeability and seepage of water.
3. Understand the principles of compaction and its control.
4. Analyse the stress distribution and identify shear strength parameters for field condition.

UNITs	Descriptions	Hrs.	CO's
I	Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development, Formation of soils, Soil composition, Minerals, In0uence of clay minerals on engineering behaviour, Soil Structure, three phase system, Index properties and their determination, Consistency limits, Classification systems based on particle size and consistency limits.	9	CO1
II	Soil Water and Permeability: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flow-nets, uses of a flow-net, Effective, neutral and total stresses.	8	CO2
III	Compaction: Compaction, Field and laboratory methods, Proctor compaction tests, Factors affecting compaction, Properties of soil affected by compaction, Various equipment for field compaction and their suitability, Field compaction control, Lift thickness.	7	CO3
IV	Effective Stress Distribution in Soils**:** Stress distribution beneath loaded areas by Boussinesq and westergaard's analysis, Newmark's influence chart, Contact pressure distribution.	8	CO4
V	Shear Strength of Soils: Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Tri-axial compression test, unconfined compression test, Vane shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction	8	CO4

Guest Lectures (if any)		
Total Hours	40	

Suggestive list of experiments:

Objective:

To understand the laboratory tests used for determination of physical, index and engineering properties of soil.

1. Determine the Water Content and Specific Gravity.
2. Course and find Sieve Analysis
3. Determine the Atterberg Limits (Liquid Limits and Plastic Limits)
4. Determine the Shrinkage Limit
5. Hydrometer Analysis
6. Determine the Permeability test (Constant and variable)
7. Conduct the Direct Shear Test
8. Conduct the Standard Proctor Compaction Test.
9. Conduct the Heavy Compaction Test.

Text Book-

1. Soil Mech. & Found. Engg.by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. By Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Geotech Engg. By Dr.Alam Singh - IBT Publishers, Delhi.

Reference Books-

1. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi
2. Soil Mech. & Found. Engg. by Ranjan Rao and Gupta, New Age
3. Soil Testing for Engg. by T.W. Lambe - John Wiley & Sons. Inc.
4. Relevant I.S. Codes

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/101/105101201/

https://nptel.ac.in/courses/105/105/105105168/

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---------CIVIL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DC	Subject Code:	CE-603	Subject Name:	Environmental Engineering-I

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Chemistry

Course Objective:

1. To understand the basic characteristics of water audit determination in the laboratory.
2. To provide adequate knowledge about the water treatment process and its design.
3. To expose the student to understanding the design of water supply lines, and distribution systems.
4. To make the students capable of preparing a water supply project

Course Outcomes:

After completion of the course, the student will be able to:
CO1: Define and explain water demand and identify the sources of water
CO2: Identify and discuss the various characteristics of water
CO3: Apply the guidelines for the design of water treatment units
CO4: Describe the unit operations and process for water treatment
CO5: Classify water distribution networks and Identify pipe appurtenances

UNITs	Descriptions	Hrs.	CO's
I	Need for protected water supply, essentials of water supply, project documents preparation. Sources of water- Different sources of water Quantity of water - Population forecasting - different methods, rate of demand - factors affecting and its variation.	10	CO-1
II	Intakes/water-borne diseases and their control, conveyance of water (Pump capacity, Economic diameter). Quality of water - Physical, chemical, and biological characteristics, analysis of water, and drinking water standards.	08	CO-2
III	Treatment of water - Aeration of water - types of aerators, theory of sedimentation, sedimentation with coagulation, coagulants, feeding devices, mixing devices, flocculation - design considerations.	08	CO-3
IV	Unit operations and Unit process- Filtration - types of filters - design considerations. Disinfection – theory, methods of disinfections, chlorination. Other treatment methods - softening of water, Removal of iron and manganese, defluoridation, desalination.	08	CO-4
V	Distribution of water - distribution methods, systems of supply, service reservoirs and their capacity, layouts of distribution. 04 Pipe appurtenances: service connection, location of water supply pipes in buildings. wastage of water - Leakage detection & prevention, corrosion, and its prevention.	06	CO-5

Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. To study the various standards for water and wastewater.
2. To study sampling techniques for water and wastewater.
3. Measurement of turbidity.
4 To determine the conc. of chlorides in a given water sample.
5. Determination of hardness of the given sample.
6. Determination of residual chlorine by “Chloroscope”.
7. Determination of Alkalinity in a water sample.
8. Determination of Acidity in a water sample.
9. Determination of Dissolved Oxygen (DO) in the water sample.
10. Determination of BOD in the wastewater sample

Text Book-

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi.
3. Environmental Engg.-I, by Garg S.K., Khanna Publishers, New Delhi

Reference Books-

1. Manual on water supply and treatment CPHEEO, Ministry of Urban Development, New Delhi 1991.
2. Birdie G.S., Water Supply and Sanitary Engg., Dhanpath Rai and Sons, New Delhi 1987.
3. B.C. Punmia, Water Supply, and Sanitary Engg., Dhanpath Rai and Sons, New Delhi.
4. Modi and Sethi, Water Supply and Sanitary Engg., Dhanpath Rai and Sons, New Delhi.
5. Water & Waste Water Technology by Mark J. Hammer - Prentice - Hall of India, New Delhi
6. Environmental Engineering - H.S. Peavy & D.R. Rowe - McGraw Hill Book Company, New Delhi 7. Water Supply & Sanitary Engg. by S.K. Husain 4. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
5.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://nptel.ac.in/courses/103/107/103107084/

https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/

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---------CIVIL ENGINEERING----------

Semester/Year	VI/III	Program	B.Tech

Subject Category	DC	Subject Code:	CE-604	Subject Name:	Hydrology &Water Resource Engineering

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

Fluid mechanics and Engineering Mathematics.

Course Objective:

1. Student will understand the Role of the Water resources in Development of human civilization and sustainability.
   Student will learn the concept, theory and principle related to Hydrological cycle and application of water for irrigation purpose.
   Student will learn Data Collection techniques related to various parameter like precipitation, Runoff and losses.
2. Student will learn Analysis of Data, its interpretation and use for forecasting and related problems.
3. Student will learn Design of the Structures for Flood control, Canals, Wells etc

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand the Role of the Water resources in human civilization and its development.
   Demonstrate concept, theory and principle related to Hydrological cycle and application of water for irrigation purpose.
   Understand the data Collection techniques related to various parameter like precipitation, Runoff and losses.
2. To acquire aptitude for Analysis of Data, its interpretation and use for forecasting related problems.
3. Design the Structures for Flood control, Canals, Wells.etc

UNITs	Descriptions	Hrs.	CO's
I	**Hydrology** : Hydrological cycle, precipitation and its measurement, recording and non-recording rain gauges, estimating missing rainfall data, rain gauge networks, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.	15	CO1/CO2
II	**Floods and Ground water**: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt	5	CO1/CO2

	efflorescence-causes and effects. reclamation of water logged and salt affected lands.		
III	**Water resources planning and management:** Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.	8	CO1/CO2
IV	**Canal irrigation:** Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, economics. Canal falls & cross drainage works, - description and design, head and cross regulators. escapes and outlets, canal transitions.	7	CO1/CO3
V	**Well irrigation:** Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.	5	CO1/CO2 CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. HydrologyEngg. Hydrology - J.NEMEC - Prentice Hall
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
3. Engg. Hydrology by K. Subhramanya - Tata McGraw Hills Publ. Co.
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
5. Engg. Hydrology by H.M. Raghunath
6. A Text book of Hydrology-Dr.P.Jaya Rami Reddy-University Science press

Reference Books-

1. Irrigation & Water Power Engg. - Dr. B.C. Punmia, Dr. Pande, B.B. Lal
2. Irrigation, Water Resources & Water Power by Dr. P.N. Modi
3. Irrigation Engineering by Varshney
4. Irrigation Engineering by Santosh Kumar Garg
5. Irrigation, Water Power & Water Resources Engg. by K.R. Arora

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/104/105104103/
https://nptel.ac.in/courses/105/105/105105110/

Recommendation by Board of studies on	30-05-2025
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---------CIVIL ENGINEERING----------

Semester/Year	VI/III	Program	B.Tech
Subject Category	OE-IV (A)	Subject Code: OE-605 OE-IV (A)	Subject Name: Environmental Impact Assessment

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Basic knowledge on the effects and impacts of Transportation Projects on environment

Course Objective:

To provide the basic knowledge on environmental impact assessment of Transportation projects and

- List and define various indicators such as terrestrial subsystems, Indicators aquatic sub systems, Socio-economic and able to Select various indicators for EIA studies.

Course Outcomes:

After the completion of the course the student should be able to

1. To describe the environmental imbalances, indicators and explain the concept of EIA
2. To identify and describe elements to be affected by the proposed developments and/or likely adverse impacts to the proposed project, including natural and man-made environment;
3. To identify the negative impacts and propose the provision of infrastructure or mitigation measures

UNITs	Descriptions	Hrs.	CO's
I	**Introduction** Environment and its components, Concept of Ecological imbalances, carrying capacity and sustainable development	9	CO1
II	**EIA Procedure - Scoping & Screening** Evolution of environmental impact assessment (EIA), Current screening process in India. A step-by-step procedure for developing EIA, Elements of Environmental Analysis.	8	CO1
III	**EIA Methodologies and Impact Identification** Public consultation, Post monitoring, Data collection for Air Quality Impact analysis, Environmental health impact assessment, Environmental risk analysis, Economic valuation methods, Cost-benefit analysis	7	CO2
IV	**Prediction & Assessment of Impacts on the Water and Soil Environment** Water Quality Impact Analysis and energy impact analysis, Impact Analysis of Water resources projects, Prediction & Assessment of Impacts on the Soil Environment	8	CO2
V	**EIA Case Studies, EIA Reporting & Review of EIA** Case studies of Industrial and other EIA projects, Brief introduction about Environment legislation and Environmental Audit, Practical applications of EIA methodologies.	8	CO3
Guest Lectures (if any)			

Total Hours	40	

Text Book-

1. Jain, R.K., Urban, L.V., Stracy, G.S., (1991), "Environmental Impact Analysis", Van Nostrand Reinhold Co., New York
2. Rau, J.G. and Wooten, D.C., (1996), "Environmental Impact Assessment", McGraw Hill Pub. Co., New York 3. Canter, L.W., (1997), "Environmental Impact Assessment", McGraw Hill Pub. Co., New York
3. Grand Jean, E. Gilgen A., “Environmental Fact ors in Urban Planning”, Taylor and Francis Limited, London, 1976.
4. UNESCO, (1987), "Methodological Guidelines for the Integrated Environmental Evaluation of Water Resources Development", UNESCO/UNEP, Paris

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://onlinecourses.nptel.ac.in/noc24_ar03/preview

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---------CIVIL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	OE-IV (B)	Subject Code:	OE-605 OE-IV (B)	Subject Name:	Remote Sensing & GIS

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Surveying

Course Objective:

To Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images know the concept of Geographical Information System (GIS), coordinate system GIS Data and its types, Understand the students managing the spatial Data Using GIS. Understand Implementation of GIS interface for practical usage.

Course Outcomes:

After completion of the course, the student will be able to:

4. Describe different concepts and terms used in Remote Sensing and its data
5. Understand the Data conversion and Process in different coordinate systems of GIS interface
6. Evaluate the accuracy of Data and implementing a GIS
7. Understand the applicability of RS and GIS for various applications.

UNITs	Descriptions	Hrs.	CO's
I	Concepts of Remote Sensing Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactions with earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, types of sensors. Remote Sensing Platforms and Sensors, IRS satellites. Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.	8	CO1
II	Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co- ordinate systems, Map projections, Map transformation, Geo-referencing,	8	CO2
III	Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata	8	CO2
IV	Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS. Spatial Analysis: Introduction,	8	CO3

	topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques		
V	Implementing a GIS and Applications Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS Applications of GIS: GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.	8	CO4
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw Hill Education (Indian Edition), 7th Edition, 2015.
3.

Reference Books-

1. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.
2. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, Wiley Publishers, 2012.

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

https://archive.nptel.ac.in/courses/105/101/105101206/
https://archive.nptel.ac.in/courses/105/107/105107201/
https://archive.nptel.ac.in/courses/107/105/107105088/
https://archive.nptel.ac.in/courses/105/107/105107206/

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Subject handled by department	Civil Engineering Department

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---------CIVIL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DE-III (A)	Subject Code:	CE-606 DE-III (A)	Subject Name:	Structural Analysis – II

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Structural Analysis – I

Course Objective:

1. To analyse and evaluate systems in structural engineering using various force and displacement methods.
2. Approximate analysis of structures for gravity and lateral loads, matrix flexibility and stiffness methods of structural analysis.
3. Students can state computer implementation of the structural engineering problems.
4. Perform plastic analysis of various structures.
5. Students will be competent to provide solution for most of the real life structural Engineering problems..

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand various classical and matrix methods of structural analysis for determinate and indeterminate structures.
2. Perform analysis of various civil engineering structures for static and dynamic loadings.
3. Analyse beams and frames using plastic analysis.
4. Draw influence line diagrams for statically determinate & indeterminate structure.

UNITs	Descriptions	Hrs.	CO's
I	Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals frames with inclined members. Analysis of beams, sway and non-sway frames by Kani's method.	9	CO2
II	Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads, Approximate analysis of multistory frames for vertical and lateral loads.	9	CO2
III	Matrix methods of structural analysis: Flexibility Method & Stiffness Method for beams and trusses.	8	CO1
IV	Plastic analysis of beams and frames.	7	CO3
V	Influence lines for indeterminate structures, Muller-Breslau's principle, Analysis of Beam-Columns.	7	CO4
Guest Lectures (if any)			
Total Hours		40	

LIST OF EXPERIMENTS:

Reference Books-

1. Wang C.K., Intermediate structural analysis, McGraw Hill, New York.
2. Kinney Sterling J. Indeterminate structural Analysis, Addison Wesley.
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Norris C.H., Wilbur J.B. and Utkys, Elementary Structural Analysis, McGraw Hill nternational, Tokyo.
5. Ghali A and Neville M, Structural Analysis-A unified classical and Matrix Approach, Chapman & Hall, New York.
6. Weaver W. & Gere J.M., Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi

Modes of Evaluation and Rubric

Quiz, Assignment, Midterm exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105109/

https://nptel.ac.in/courses/105/101/105101086/

https://nptel.ac.in/courses/105/106/105106050/

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---------CIVIL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DE-III (B)	Subject Code:	CE-606 DE-III (B)	Subject Name:	Structural Dynamics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Structural Analysis

Course Objective:

The main objective of the course is to introduce dynamic loading and the dynamic performance of the structures to the students. Different types of dynamic loading also to be discussed. The detailed study on the performance of structures under earthquake loading is also one of the focus of the course.

Course Outcomes:

At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

UNITs	Descriptions	Hrs.	CO's
I	**THEORY OF VIBRATIONS** Difference between static loading and dynamic loading – Degree of freedom – idealisation of structure as single degree of freedom system – Formulation of Equations of motion of SDOF system - D'Alemberts principles – effect of damping – free and forced vibration of damped and undamped structures – Response to harmonic and periodic forces.	9	CO1
II	**MULTIPLE DEGREE OF FREEDOM SYSTEM** Two degree of freedom system – modes of vibrations – formulation of equations of motion of multi degree of freedom (MDOF) system - Eigen values and Eigen vectors – Response to free and forced vibrations - damped and undamped MDOF system – Modal superposition methods.	9	CO1
III	**ELEMENTS OF SEISMOLOGY** Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Estimation of earthquake parameters - Magnitude and intensity of earthquakes – Spectral Acceleration.	6	CO1
IV	**RESPONSE OF STRUCTURES TO EARTHQUAKE** Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Pre stressed Concrete Structure under earthquake loading – Pinching effect – Bouchinger Effects – Evaluation of earthquake forces as per IS:1893 – 2002 - Response Spectra – Lessons learnt from past earthquakes.	9	CO1
V	**DESIGN METHODOLOGY**	7	CO1

	Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 1993 – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Later load analysis – Design and detailing as per IS:13920 – 1993.		
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Chopra, A.K., “Dynamics of Structures – Theory and Applications to Earthquake Engineering”, 4th Edition, Pearson Education, 2011.

Reference Books-

1. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd. 2007

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/106/105106151/

https://nptel.ac.in/courses/105/101/105101209/

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---------CIVIL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DE-III (C)	Subject Code:	CE-606 DE-III (C)	Subject Name:	Precast and modular construction

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Pre stress Concrete

Course Objective:

At the end of this course the student shall be able to appreciate modular construction, industrialized construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.

Course Outcomes:

The student shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods in using these elements

UNITs	Descriptions	Hrs.	CO's
I	**INTRODUCTION** Need for prefabrication – Principles – Materials – Modular coordination Standardization – Systems – Production – Transportation – Erection.	8	CO1
II	**PREFABRICATEDCOMPONENTS** Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls	8	CO1
III	**DESIGN PRINCIPLES** Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.	8	CO1
IV	**JOINT IN STRUCTURAL MEMBERS** Joints for different structural connections – Dimensions and detailing – Design of expansion joints	8	CO1
V	**DESIGN FOR ABNORMAL LOADS** Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse	8	CO1
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

Reference Books-

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

Modes of Evaluation and Rubric
Quiz, Assignment, Mid term exam and End term exam. Rubric: End term exam.
List/Links of e-learning resource
https://nptel.ac.in/courses/124/105/124105013/ https://nptel.ac.in/courses/105/106/105106117/

Recommendation by Board of studies on	30-05-2025
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Subject handled by department	Civil Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-IV (A)	Subject Code:	CE-701 DE-IV (A)	Subject Name:	Geotechnical Engineering - II

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Geotechnical Engineering - I

Course Objective:

Students are expected to learn the basic concept of types of foundation and bearing capacity, Estimate the amount of consolidation and settlement, Basic understanding of Earth Pressure concept, slope stability and understand the process of soil exploration by different methods

Course Outcomes:

After completion of the course, the student will be able to:

1. Identify different types of foundations, their failures and also classify and determine the bearing capacity of soils.
2. Apply the knowledge of Consolidation and soil stability.
3. Identify different soil exploration method and plant such method.

UNITs	Descriptions	Hrs.	CO's
I	**Shallow Foundations**: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion-less and cohesive soils, General and local shear failures, Factors effecting B.C., Theories of bearing capacity, I.S. code on B.C., Determination of bearing capacity, Limits of total and differential settlements, Plate load test.	9	CO1
II	**Deep Foundations**: Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion-less and cohesive soils, Static and dynamic formula, Pile load test, Settlement of pile group, Negative skin friction, under-reamed piles and their design. Piles under tension, inclined and lateral load	8	CO1
III	Consolidation: - Definition and object of consolidation, Difference between compaction and consolidation. Concept of various consolidation characteristics. Terzaghi's Differential equation and its derivation. consolidation test determination of cv from curve fitting methods, consolidation pressure determination. Normally consolidated and over consolidated clays. Causes of over-consolidation. Effect of disturbance on e-	8	CO2

	Logσ curves of normally consolidated clays, importance of consolidation settlement in the design of structures.		
IV	Earth pressure theory and Stability of Slopes: Rankine and Coulomb theory, infinite and finite slopes, Types of slope failures, Rotational slips, Stability number, Effect of ground water, Selection of shear strength parameters in slope stability analysis, Analytical and graphical methods of stability analysis, Stability of Earth dams.	8	CO3
V	Subsurface Investigation: Objectives of exploration, planning of exploration program, soil samples and soil samples, field penetration tests: SPT, SCPT, DCPT. Introduction to geophysical methods, bore log and report writing.	7	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publications Delhi
3. Soil Mech. & Found. Engg. by Ranjan Rao and Gupta, New Age
4. Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.

Reference Books-

1. Geotech. Engg. by C.Venkatramaiah-New AGE International Publishers, Delhi
2. Foundation. Engg. by G A Leonards, McGraw Hill Book Co. Inc.
3. Relevant IS Codes.

Modes of Evaluation and Rubric

Quiz, Assignment, Tutorial, Mid term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105185/

https://onlinecourses.nptel.ac.in/noc21_ce01/preview

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-IV (B)	Subject Code:	CE-701 DE-IV (B)	Subject Name:	Pavement Design

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	1	-	4

Prerequisites:

Pavement construction material, type of pavement, Basic IRC code,

Course Objective:

1. This course will facilitate students to
2. To know about the data required for pavement design, factors affecting pavement design, and maintenance of pavement.
3. To understand about the different stress, strain and deflection occur in pavement system.
4. To understand the design concepts of flexible pavement rigid pavement by IRC codal provision.
5. Understand the various causes of failure in pavement and maintenance activities.
6. To know about the functional and structural evaluation of pavement by appropriate methods.

Course Outcomes:

After completion of the course, the student will be able to:

1. Know the stresses, strains and deflections in rigid and flexible pavements; traffic loading; and material characterization.
2. Design methodologies for both rigid and flexible pavements.
3. Understand the structural and functions failure and the evaluation of pavements.

UNITs	Descriptions	Hrs.	CO's
I	Equivalent Single Wheel Load (ESWL) : Definition, calculation of ESWL, repetition of loads and their effects on the pavement structures.	6	CO1
II	Flexible Pavements: Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method, IRC Method.	10	CO1
III	Rigid Pavements : Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping	8	CO2

	stresses, frictional stresses, critical combination of stresses, critical loading positions.		
IV	Rigid pavement design: IRC method, Fatigue analysis, PCA chart method, joints, design and construction & types, AASHTO Method, Reliability analysis.	6	CO2
V	Evaluation and Strengthening of Existing Pavement : Benkelman beam method, Serviceability Index Method. Rigid and flexible overlay and their design procedure.	10	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Principles of pavement design by E.J.Yoder & M.W. Witczak
2. AASHO, “AASHO Interim Guide for Design of Pavement Structures”, Washington, D.C.
3. Portland Cement Association, Guidelines for Design of Rigid Pavements, Washington

Reference Books-

1. DSIR, Conc. Roads Design & Construction
2. Srinivasan M. "Modern Permanent Way"

Modes of Evaluation and Rubric

Quiz, Assignment, Tutorial, Mid term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/104/105104098/

https://nptel.ac.in/content/storage2/courses/105101087/downloads/Lec-19.pdf

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-IV (C)	Subject Code:	CE-701 DE-IV (C)	Subject Name:	Earth Retaining Structure

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	1	-	4

Prerequisites:

Geotechnical Engineering

Course Objective:

1. To understand lateral earth pressure theories and pressure theories and design of retaining walls.
2. To design anchored bulkheads by different methods.
3. To understand pressure envelops and design of various components in braced cuts and cofferdams.
4. To understand stability of earth dams and its protection and construction.

Course Outcomes:

After completion of the course, the student will be able to:

1. To understand the concept of earth retaining structure.
2. To design retaining walls, anchored bulkheads, braced cuts, cofferdams and earth dams.

UNITs	Descriptions	Hrs.	CO's
I	**Lateral Pressure**: Basic concepts, Rankine and Coulomb earth pressure theories, graphical methods. Determining active and passive pressures: Culmanns, Rebhan's, logarithmic spiral methods, friction circle method. Consideration of surcharge, seepage, earth quake, wave effect, stratification, type of backfill, wall friction and adhesion. **Retaining walls:** Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.	9	CO1
II	**Anchored bulkheads:** Classification of anchored bulkheads, free and fixed earth support methods. Rowe's theory for free earth supports and equivalent beam methods for fixed earth supports. Design of anchored rods and dead man	9	CO1
III	**Braced cuts and Cofferdams:** Braced excavations and stability of vertical cuts, lateral pressures in sand and clay, Braced and cellular cofferdams: uses, types, components, stability, piping and heaving. Stability of cellular	6	CO1

	cofferdams, cellular cofferdams in rock and in deep soils.		
IV	**Earth dams- Stability analysis:** Classification, seepage control in embankments and foundations, seepage analysis, stability analysis: upstream and down stream for steady seepage, rapid draw down, end of construction, method of slices and Bishop's method.	9	CO2
V	**Earth dams -Protection & Construction:** Slope protection, filters, embankment construction materials and construction, quality control, grouting techniques. Instrumentation and performance observations in earth dams.	7	CO2
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Foundation design by W. C. Teng, Prentice Hall,1962
2. Analysis and design of foundations by Bowles. J. W McGraw Hill, 4th edition, 1955.
3 Earth and Rock-Fill Dams: General Design and Construction Considerations by United States Army Corps of Engineers, University Press of the Pacific,2004

Reference Books-

1. Soil mechanics in engineering and practice by Karl Terzaghi, Ralph B. Peck, GholamrezaMesri, 3rd Edition. Wiley India Pvt Ltd, 2010.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/106/105106052/

https://www.youtube.com/watch?v=ucbinKVZvF8

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-V (A)	Subject Code:	CE-702 DE-V (A)	Subject Name:	Irrigation and Hydraulic Structure

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

Fluid Mechanics, Hydrology and water resources engineering.

Course Objective:

1. Student will understand the Role of the Irrigation system, Hydraulic structures and its necessity & development.
2. Student will learn the concept, theory and principle related to Hydraulic structures like gravity dams' earthen dams, spillways, energy dissipaters, canal structures, hydroelectric scheme
3. Student will learn Analysis of site Data to work out type of forces likely to come, materials available and their use in Dam construction
4. Student will learn Design of the Structures.
5. Student will develop knowledge of layout of structures and application of modern tools.

Course Outcomes:

After completion of the course, the student will be able to:

1. Appreciate the Role of the Hydraulic structures and its necessity in development.
2. To demonstrate the concept, theory and principle related to irrigation Hydraulic structures like gravity dams' earthen dams, spillways, energy dissipaters, canal structures, hydroelectric scheme
3. To analyze of site Data to work out duty of water type of forces likely to come their action, magnitude, and materials available and their use in Dam construction
4. To design of the Structures and will apply necessary check .
5. To plan a layout of structures with modern tools.

UNITs	Descriptions	Hrs.	CO's
I	**Irrigation water requirement and soil-water-crop relationship:** Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods-surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.	8	CO1

II	**Gravity dams:** Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.	8	CO2
III	**Earth Dams:** Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition. **Rock fill dams:** Types, merits and demerits, conditions favourable for their adoption.	8	CO3
IV	**Spillways: Ogee** spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways. **Energy dissipators and gates:** Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works, syphon aqueduct.	8	CO4
V	**Hydropower Plants:** Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.	8	CO5
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney

Reference Books-

1. Irrigation & Water Power Engg. by Punmia & Pandey-Laxmi Publications Delhi
2. Water Power Engineering by Dandekar

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource
https://nptel.ac.in/courses/126/105/126105010/ https://nptel.ac.in/content/storage2/courses/105105110/pdf/m4l04.pdf

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B. Tech
Subject Category	DE-V (B)	Subject Code:	CE-702 DE-V (B)	Subject Name:	Open Channel Hydraulics

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

Fluid Mechanics

Course Objective:

1. The objective of this course is to introduce Open Channel Flow to students, explaining the types of open channel and their behaviors, the causes and principles of such behaviors,
2. Applications open channels, enabling the students to identify the open channels.
3. To analyze, design and manage some of the types.

Course Outcomes:

After completion of the course, the student will be able to:

1. Identify hydraulic behaviours of open channels and their causes;
2. Predict the behaviour of open channels in different situations;
3. Analyse and design of artificial channels with rigid and mobile boundary.
4. Apply this knowledge in the fields like irrigation, flood control and watershed management.

UNITs	Descriptions	Hrs.	CO's
I	Basic Flow Concepts: Types of channels, classification of flows, basic equations, velocity distribution, velocity coefficients, pressure distribution.	8	CO1
II	Energy & momentum principles: Specific energy, critical flow, section factor for critical flow computation, first hydraulic exponent, computation of critical flow, specific force, specific force, channel transitions.	9	CO2
III	Uniform flow in rigid boundary channels: Shear stress distribution, velocity distribution in turbulent flow, Chezy's equation, Manning's equation, conveyance of a channel, section factor for uniform flow computation, second hydraulic exponent, computation of uniform flow.	7	CO3
IV	Uniform flow in mobile boundary channels: Incipient motion condition, shield's analysis, regimes of flow, prediction of regimes, flow resistance.	9	CO4
V	Design of channels: Rigid boundary channels, non-scouring channels, alluvial channels.	7	CO4
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. K. Subramanya, Flow in Open Channels, Tata Mc. Graw Hill, 2009 and later ed.
2. K.G. Rangaraju , Flow through Open Channels, Tata Mc. Graw Hill, 1993.
3. M.H Chaudhury, Open Channel Flow, Prentice Hall of India, 2008 and later ed..

Reference Books-

1. V.T Chow, Open Channel Hydraulics, McGraw Hill, 2009.
2. NPTEL Web Resources on Open Channel Flow/Hydraulics

Modes of Evaluation and Rubric

Quiz, Assignment, Mid term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/107/105107059/

https://nptel.ac.in/courses/105/103/105103096/

Recommendation by Board of studies on	30-05-2025
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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-V (C)	Subject Code:	CE-702 DE-V (C)	Subject Name:	Marine Construction

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Fluid Mechanics

Course Objective:

1. Students are expected to learn the importance of concept of Marine construction and its design.
2. Student are expected to learn the welding method apply on marine structure

Course Outcomes:

After completion of the course, the student will be able to:

1. To understand the principle of ship and offshore structure.
2. To understand the different method of fusion welding.

UNITs	Descriptions	Hrs.	CO's
I	Introduction to ships & offshore structures; Characteristics of shipbuilding industry; Structural Requirement - Longitudinal strength, Transverse strength, Torsional strength, Local strength; Framing system / stiffening arrangement - Longitudinal framing, Transverse framing; Basic structural components – Stiffeners, Longitudinal, Transverse, Girders & Transverses, Hatch side girder, Hatch end beam, Stringers, Brackets;	9	CO1
II	Structural sub-assemblies - Flat stiffened panel, curved stiffened panel, Floors - Longitudinally framed, transversely framed; Bulkheads - Transverse water tight bulkhead, non water tight bulkheads, Flat stiffened bulkhead, Corrugated bulkhead; Decks & shells;	9	CO1
III	Bottom shell, Side shell, Inner bottom plating; Structural assemblies -Double bottom construction, Wing tanks & duct keels, Fore & Aft end construction, Midship sections of various ship types - General cargo carrier, Bulk carrier/OBO, Container ship, Oil tanker, RO-RO ship	6	CO1
IV	Structural alignment & continuity: Steel material preparation - Shot blasting, Acid pickling; Plate & Section forming - Mechanical methods, 3-point hydraulic press, Universal press, Line heating; Plate cutting – Mechanical, Thermal - Oxy-fuel, Plasma; Fusion Welding & Power Source; Welding parameters and their effects;	9	CO2
V	Fusion Welding Methods – MMAW, GMAW, GTAW, SAW, Electro slag Welding, Electro gas welding; Single side welding; Solid state welding - Friction stir welding; Welding distortions;	7	CO2

	Distortion prevention; Distortion mitigation; Welding defects; Nondestructive testing		
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Ship Construction 6th Edition, by D.J. Eyres
2. Aluminum Welding 2nd Edition Narosa Publishing House, New Delhi ,by N. R. Mandal

Reference Books-

1. Welding Techniques, Distortion Control and Line Heating. Narosa Publishing House, New Delhi, by N R Mandal
2. Ship Design and Construction, Edited by: Robert Taggart, SNAME publication

Modes of Evaluation and Rubric

Quiz, Assignment, Tutorial, Mid term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/114/105/114105004/

https://nptel.ac.in/courses/114/105/114105031/

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Subject handled by department	Civil Engineering

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-VI (A)	Subject Code:	CE-703 DE-VI (A)	Subject Name:	Advanced Structural Design

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Structural Design.

Course Objective:

Students are expected to learn concepts of design of advanced and special structural elements of RCC and Steel. Design problems of retaining walls, bridges, plate girders, towers & chimneys with the help of various Indian standard codes, bridge rule and IRC codes.

Course Outcomes:

After completion of the course, the student will be able to:

1. Evaluate and design both R.C.C. as well as steel bridges for IRC loadings.
2. Evaluate and design various steel structures viz. chimneys, towers, masts, bunkers and silos.
3. Evaluate and design R.C.C. water tanks and retaining walls.

UNITs	Descriptions	Hrs.	CO's
I	**Earth Retaining Structures:** Cantilever and Counterfort type retaining walls.	8	CO3
II	**Water Tanks:** Tanks on ground, Underground tanks: rectangular, circular tanks, Overhead tanks: rectangular, circular & **Intze** tanks.	9	CO3
III	T-beam & Slab bridges- for highway loading (IRC Loads).	7	CO1
IV	Plate girder bridges, (Riveted and welded) Trussed girder bridges for Railways and Highways (IRC & IRS Loading).	9	CO1
V	Design of Guyed &self-supporting type Chimneys, Design of Towers and Masts. Silos and Bunkers.	7	CO2
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. R.C.C. by B.C.Punmia.
2. Essentials of Bridge engineering – D.J.Victor
3. Bridge Engineering – Ponnuswamy

Reference Books-

1. Advanced R.C.C. Design by N.K. Raju.
2. Design of steel Structures – B.C. Punmia.
3. Steel Structures by RamchandraVol II

4. Steel Structures by Arya & Ajmani
Modes of Evaluation and Rubric
Quiz, Assignment, Mid term exam and End term exam. Rubric: End term exam.
List/Links of e-learning resource
https://nptel.ac.in/courses/105/106/105106050/ https://nptel.ac.in/content/syllabus_pdf/105106050.pdf

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-VI (B)	Subject Code:	CE-703 DE-VI (B)	Subject Name:	Computational Methods in Structural Engineering

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

Structural Analysis and Mathematics.

Course Objective:

1. To make students well versed with the Matrix methods of structural Analysis with a focus on the Direct Stiffness Method.
2. To make them learn applications of Matrix method for various types of discrete structures viz frames, grids, trusses and other complex structures.
3. To make the students well acquainted with the Finite Element Analysis and its techniques including iso parametric formulation and applications of FEA in Civil Engineering.

Course Outcomes:

After completion of the course, the student will be able to:

1. To analyse building frames (2D & 3D)
2. To analyse trusses, grid floors of building & bridges,
3. To analyse any discrete structure and continuum structures like water tank, dams, retaining walls etc.
4. To take up any project, prepare its model and analyse it.

UNITs	Descriptions	Hrs.	CO's
I	Matrix formulation for the principle of virtual work and energy principles, principle of contra gradience, stiffness and flexibility matrices, Degree of Freedom, Axial, bending, shear and torsional deformations. Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall with rigid ends, forces and displacements in general coordinate axes, structure stiffness matrix.	9	CO1
II	Basics of the Direct Stiffness method - Analysis of pin-jointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, pre-stressing forces, (Sway & Non-sway).	9	CO2
III	Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints - Lagrange Multiplier and Penalty Methods.	7	CO3

IV	Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalized element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)	9	CO1
V	Two Dimensional Iso-parametric elements, shape functions for Simplex, Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for iso-parametric elements, degrading of elements, plate bending elements.	8	CO4
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
2. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishers and Distributors, New Delhi.
3. DevdasMenon , Advanced Structural Analysis, Narosa Publishing House.
4. P.Seshu, Text Book of Finite Element Analysis, Prentice Hall of India, New Delhi.

Reference Books-

1. Chandrupatla T.R. &Belegundu A.D., Introduction to Finite Elements in Engineering, Pearson Education.
2. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
3. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/105/105105043/

https://nptel.ac.in/courses/114/106/114106045/

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Subject handled by department	Civil Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-VI (C)	Subject Code:	CE-703 DE-VI (C)	Subject Name:	Design of Pre stressed Concrete Structure

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Concrete Technology.

Course Objective:

1. Within few years of graduation our graduates will be making significant contributions as practicing engineers to their employees and society.
2. Out graduates would be successful in completing advance degrees at top institutions Will emerge as entrepreneurs

Course Outcomes:

After completion of the course, the student will be able to:

1. Understanding the concept of pre-stressing in the concrete structure and identify the material for pre-stressing.
2. Design pre-tensioned and post-tensioned beam.
3. Understand the design of composite pre-stressed beam cylinder and non-cylinder pipe water tanks, and portal frame.

UNITs	Descriptions	Hrs.	CO's
I	Principle of pre stressing, materials for pre stressing, loss of pre stress, pre -tensioning and post-tensioning anchorage.	8	CO1
II	Design of pre tensioned and post-tensioned (Type I, II, III) beams. choice of section and cable profile, design for shear and bond, stresses in end block. calculation of deflections. limit state design.	9	CO1
III	Design of composite pre-stressed beams, stresses due to shrinkage, shear connectors.	7	CO2
IV	Circular pre stressing, design of cylinder pipes, non-cylinder pipes and water tanks.	9	CO2
V	Design of continuous beams. Design of portal frames.	7	CO3
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. N .Krishna Raju, Prestressed Concrete, Tata McGraw Hill, New Delhi
2. Jain O.P., Plain and, Reinforced Concrete, Vol. II, Nemichand and Bros, Roorkee.

3. Lin T.Y. Design of Prestressed Conc. Structures 4. Chi, Michael & Bibersten F.A. - Theory of Prestressed
Reference Books- 1. Dayratnam P., Prestressed Conc. Structures 2. Abeles P.W. Introduction to Prestressed Conc.
Modes of Evaluation and Rubric
Quiz, Assignment, Mid term exam and End term exam. Rubric: End term exam.
List/Links of e-learning resource
https://nptel.ac.in/courses/105/106/105106117/ https://nptel.ac.in/courses/105/106/105106118/

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-VII (A)	Subject Code:	CE-704 DE-VII (A)	Subject Name:	Environmental Engineering-II

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Environmental Engineering-I

Course Objective:

1. Determine the amount and natural (Physical chemical &biological) of waste water generated by an area.
2. Design and maintenance the various operation and process being carried out at a wastewater treatment plant.
3. Develop scheme for the proper pay out of sewer system and act upon it
4. Give state of the art solution for removal of impurities formulation by advance method
5. Prepare policies and working plan in the matters of urban & rural sanitation with solid waste disposal.

Course Outcomes:

After completion of the course, the student will be able to:

1. To determine the physical, chemical and biological characteristics of wastewater.
2. In wastewater management systems and design of various treatment units.
3. To develop sewer layout plan and act upon it.
4. To give state of the art solutions for removal of impurities by advanced wastewater treatment methods.
5. To understand about the disposal of wastewater and solid waste.

UNITs	Descriptions	Hrs.	CO's
I	Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.	8	CO1
II	Characteristics and analysis of waste water, recycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e., BOD & COD, TOC, TOD, Th OD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e., by land treatment & by dilution, self-purification capacity of stream, Oxygen sag analysis.	9	CO2

III	Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.	7	CO3
IV	Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.	8	CO4
V	Advanced Waste Water treatment - Diatomaceous earth filters, ultra-filtration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sludge & night soil	8	CO5
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company(P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
3. Environmental Engg. - M.L. Davis & D.A. Cornwell - McGraw Hill Company

Reference Books-

1. Chemistry for Environmental Engg. - Sawyer &Mc Carty - McGraw Hill Book Company New Delhi
2. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
3. Waste Water Engineering - Metcalf & Eddy - McGraw Hill Book Company New, Delhi

Modes of Evaluation and Rubric

Quiz, Assignment, Tutorial, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/103/107/103107084/

https://nptel.ac.in/courses/105/106/105106119/

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-VII (B)	Subject Code:	CE-704 DE-VII (B)	Subject Name:	Air Pollution

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

Environmental Engineering.

Course Objective:

1. To provide general understanding of air quality and its impact on the environment
2. To understand the fundamentals of meteorology and stability of atmosphere
3. To study the fate and transport of air pollutants and its measurement techniques
4. To discuss the different control methods and its principles for gaseous pollutant
5. To review the sources and control of indoor air pollution

Course Outcomes:

After completion of the course, the student will be able to:

1. Identify the types and sources of air pollutants
2. Predict the effects of air pollutants on human health and the environment
3. Choose appropriate technologies for removal of particulates and gaseous pollutants
4. Measure the pollutant concentration in indoor environment
5. Suggest the control techniques for indoor air pollution

UNITs	Descriptions	Hrs.	CO's
I	Air pollutants – Sources – Classification of air pollutants – Particulates and gaseous pollutants – Effects of air pollutants on human health, vegetation and property.	9	CO1
II	Global issues and air pollution – Global warming – Ozone layer depletion – Ambient air quality and emission standards – Air pollution indices – Air act.	9	CO2
III	Fundamentals of meteorology – Wind roses – Atmospheric stability – Atmospheric diffusion of pollutants – Transport, transformation and deposition of air contaminants – Plume behaviour – Atmospheric diffusion theories – Plume rise – Gaussian dispersion models.	6	CO3
IV	Control principles – Principles and equipment description of control technologies – Particulates control by Gravitation, centrifugal, filtration, scrubbing, electrostatic precipitation – Absorption, adsorption, condensation, incineration and bio filtration for control of gaseous air pollutants – Biological air pollution control technologies – Bio scrubbers, bio filters.	9	CO4
V	Air pollutants in indoor environments – Levels of pollutants in indoor and outdoor air – Indoor air pollution from outdoor sources – Measurement methods – Control Technologies.	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Text Book-

1. Anjaneyulu, D., Air Pollution and Control Technologies, Allied Publishers, Mumbai, 2002.
2. Rao, C. S., Environmental Pollution Control Engineering, New Age International, New Delhi, 2006.
3. Rao, M. N. and Rao H. V. N., Air Pollution, Tata McGraw-Hill, New Delhi, 2007.
4. W. L. Heumannn, Industrial Air Pollution Control Systems, McGraw-Hill, New York, 1997.

Reference Books-

1. Davis M. L. and Cornwell D. A., Introduction to Environmental Engineering, Tata McGraw Hill Education Pvt. Ltd,.New Delhi, 2010.
2. Peavy H. S., Rowe D. R. and Tchobanoglous G., Environmental Engineering, McGraw Hill, New York, 1985.
3. Mahajan S. P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.

Modes of Evaluation and Rubric

Quiz, Assignment, Tutorial, Mid-term exam and End term exam.
Rubric: End term exam.

List/Links of e-learning resource

https://nptel.ac.in/courses/105/102/105102089/

https://onlinecourses.nptel.ac.in/noc22_ce22/preview

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---------CIVIL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DLC	Subject Code:	CE-706	Subject Name:	Minor Project -I

Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical			Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
-	-	-	90	30	30	150	-	-	8	4

Modes of Evaluation and Rubric

Practical Viva.
Rubric: Practical: 50% Quiz and 50% Viva.

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---------CIVIL ENGINEERING----------

Semester/Year		VIII/IV	Program		B. Tech
Subject Category	DLC	Subject Code:	CE-801	Subject Name:	Major Project

Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical			Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
-	-	-	150	50	50	250	-	-	16	8

Prerequisites:

Civil Engineering

Course Objective:

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.

The project work will be a live problem in the industry or macro-issue having a bearing on performance of the civil engineering and should involve scientific research, design, collection, and analysis of data, determining solutions and must preferably bring out the individuals contribution.

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand and analyse the real-life problems related to civil engineering.
2. Provide solution of problems related to civil engineering.

Modes of Evaluation and Rubric

The project should be presented in a standard format.
The term work should be continuously evaluated as per the norms/guidelines.
Rubric:
Planning of Project Work-30%
Methodology of the work and Detailed/Design Analysis-40%
Demonstration and Presentation-20%
Real Life Application/Scope of Future Work-10%

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