Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester - VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTT1	L	T	P	CIA	SEA	100	3	SOM, DCS
Course Name	Pre-stressed Concrete	3	0	0	40	60			

Course Objectives:

- To introduce fundamental of pre stressing and develop understanding of pre stressing system.
- To determine loss of pre stress in pre tensioned and post tensioned members as per IS Code provision.
- To analyze simple and composite section in flexure.
- To design simply supported beams as per IS Code provision.
- To design the members for shear reinforcement, Ultimate Shear Strength and end block design.

Unit	Content	Teaching/Lecture Hours
I	Introduction: Fundamentals of Prestressing - Classification and types of Prestressing- Concrete Strength and strain characteristics - Steel mechanical properties - Auxiliary Materials like duct formers.	8
II	Prestressing Systems: Principles of pretensioning and post tensioning - study of common systems of prestressing for wires strands and bars. Losses of Prestress: Losses of prestress in pre tensioned and post tensioned members - I.S. code provisions.	9
III	Analysis of Sections: In flexure, simple sections in flexure, kern distance - cable profile - limiting zones - composite sections cracking moment of rectangular sections.	9
IV	Deflection of Beams: Long term and Short term deflectionand Design of Simply Supported Beams, Allowable stress as per I.S. 1343 - elastic design of rectangular and I-sections.	10
V	Shear and Bond: Shear and bond is prestressed concrete beams - conventional design of shear reinforcement - Ultimate shear strength of a section - Prestress transfer in pretensioned beams-Principles of end block design.	10
	Total Lecture Hours	46

Course Outcomes: At the end of the course completion, a student is able

CO1	Describe mechanical properties of pre stressed concrete, types of pre stressing and its system.
CO2	Calculate losses in pre-tensioned and post tensioned members.
CO3	Analyze pre-stressed concrete members for flexure, shear and cracking moment.
CO4	Design pre stressed concrete beams of rectangular and I section and compute deflection.
CO5	Explain principle of end block design, pre stress transfer, shear and bond.

Text Books: -

1 **Krishna Raju. N (2018),** *Prestressed Concrete*, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
2 **Rajagopalan, N. (2002),** *Prestressed Concrete*, Narosa Publishing House, New Delhi
3 **Lin, T.Y. and Burns, N.H. (1981),** *Design of Prestressed Concrete Structures* (3rd Edition), McGraw Hill Book Company, New York

Reference Books: -

1 **Pandit, G.S. and Gupta, S.P. (2008),** *Prestressed Concrete*, CBS Publishers & Distributors Pvt. Ltd., New Delhi
2 **Dayaratnam, P. (2013),** *Prestressed Concrete Structures*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2							3	3	3
CO2	3	3	3	2	2							3	3	3
CO3	3	3	3	2	2							2	2	2
CO4	3	3	3	3	3							2	2	2
CO5	3	3	3	3	3							2	2	2

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTT2	L	T	P	CIA	SEA	100	3	Fluid Mechanics
Course Name	Water Resources Engineering-II	3	0	0	40	60			

Course Objectives:

- Introduce the types of dams and its failure criteria for structural stability
- Introduce the concepts of spillways and energy dissipaters
- Discuss the concept of diversion Head-works and understand design theory of seepage flow
- Introduce the concepts of regulation works, falls and hydraulic gates of spillways
- Know the concepts and design principles of Cross Drainage Works

Unit	Content	Teaching/Lecture Hours
I	Dams: Types of Dams, Forces, failure of dams and criteria for structural stability, principle and shear stress, stability analysis, Elementary profile of a gravity dam, Profile from practical considerations, Openings in dams.	10
II	Spillways and Energy Dissipaters: Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater, USBR and Indian stilling basins.	8
III	Diversion Head-works: Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Bligh's creep theory, Theory of seepage flow, Khosla's theory, Vertical drop Weir.	8
IV	Regulation Works: Introduction, Definition of falls, necessity and location of falls, comparative study of the main types of falls. Hydraulic Gates: Spillway gates, types, tainter gates, Roller gates.	8
V	Cross Drainage Works: Introduction, suitability, various types of C-D Works, Design principles of C-D Works	8
	Total Lecture Hours	42

Course Outcomes: At the end of the course completion, a student is able

CO1 To explain the various forces acting on gravity dam and its stability analysis
CO2 To Design of ogee spillway and getting concept of energy dissipation
CO3 To Explain the diversion head-works and the theory of seepage flow
CO4 To demonstrate the concept of regulation works, falls and spillways gates
CO5 To apply the basic design principles of Cross Drainage Works

Text Books:

1 S.K. Garg (2020), Irrigation Engineering and Hydraulic Structures, 29th Edition, *Khanna Publishers, New Delhi-110002*

2 B.C. Punmia and Pande B.B. Lal (2017), Irrigation and Water Power Engineering,17 Edition, Laxmi *Publications Pvt. Ltd., New Delhi-110002*

3 N.N. Basak (2014), Irrigation Engineering,1st Edition, *Tata McGraw-Hill Education, New Delhi-110002*

Reference Books:

1 S.K. Sharma (2013), Design of Irrigation Structures, 1st Edition, *S. Chand & Company Pvt. Ltd., New Delhi-110002*

2 R. Awasty and P.N. Modi (2012), Water Resources Engineering and Irrigation, Revised Edition, *Standard Book House, New Delhi-110002*

3 R. Srinivasan (2014), *Irrigation Engineering*, 1st Edition, PHI Learning Pvt. Ltd., *New Delhi-110002*

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	2							3	2
CO2	3	2	3	2	2	3							3	2
CO3	3	3	2	3	3	2							3	2
CO4	3	3	2	2	2								3	2
CO5	3	2	3	3	3	2							3	2

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Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTT3	L	T	P	CIA	SEA	100	3	Highway Engg.
Course Name	Airport and Railway Engineering	3	0	0	40	60			

Course Objectives:

- To develop the knowledge for airport planning.
- To design and analysis of airport runway and taxiway. and
- To design airport pavement crust and describe air traffic control and visual aids.
- To comprehend different parts of the rail track, their functions and its operation system with respect to construction and engineering applications.
- To design and analysis of geometric design of railway track and introduce points, crossing and turnout.

Unit	Content	Teaching/Lecture Hours
I	**Airport Planning:** Significance of transport, Different modes of transportation, Airport master plan- FAA recommendation. Regional planning, airport site selection, survey for site selection, Estimation of future air traffic, Characteristics of aircraft, Environmental consideration.	8
II	**Runway Design:** Orientation of runway, Basic runway length, Corrections for basic runway length, Runway geometric design **Taxiway Design:** Controlling factors of taxiway, Geometric design for taxiway, Design for exit taxiways.	9
III	**Airport Pavement Design:** Design factors, Design of flexible pavement, Design of rigid pavement, design of overlay pavements **Air Traffic Control and Visual Aids:** Air traffic control objectives, control system. Visual aids-airport markings and lighting	9
IV	**Introduction to Railways in India:** Role of Indian Railways in National Development Railways for Urban Transportation –LRT & MRTS. Alignment of Railway Lines: Engineering Surveys for Track Alignment. Permanent Way: Components and their Functions **Rails** - Types of Rails, Length of rail, Weight of Rail, Rail Joints, Creep of rail, Buckling of rail, Kinks of Rail Fastenings, Coning of Wheels& tilting of rails. **Sleepers** –Types, Functions, sleeper density **Ballasts**- Types, function, advantage & disadvantage of each type.	9
V	**Geometric Design of Railway Tracks:** Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal Curves. **Points and Crossings, Turnouts:** Working Principles, Cross overs.	9
	Total Lecture Hours	44

Course Outcomes: At the end of the course completion, a student is able to

CO1 understand the fundamentals of airport planning.

CO2 design the runway and taxiway.

CO3 design the airport pavement design and describe air traffic control and visual aids.

CO4 explain Indian railway system and component of permanent way.

CO5 apply the geometric design of railway tracks and explain working principle of turnouts, points and crossings.

Text Books: -

1 Robert Horonjeff, Francis X. McKelvey, William J. Sproule, and Seth B. Young(2010), *Planning and design of airports, McGraw-Hill, New York.*

2 S. K. Khanna, M.G. Arora and S.S. Jain (2003), Airport Planning and Design, *Nem Chand & Bros., Roorkee-247667*

3 J. S. Mundrey (2009), Railway Track Engineering, *McGraw Hill Publishing Co.*

Reference Books: -

1 S.C. Rangwala and K.S. Rangwala (2011), Airport Engineering, *Charotar Publishing House Pvt. Ltd, Anand-388001*

2 S.C. Rangwala (2008), Railway Engineering, *Charotar Publishing House, Anand, India*

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2								3	1	3
CO2	3	3	2	2								3	1	3
CO3	3	3	3	2								3	1	3
CO4	3	3	2	1								3	1	3
CO5	3	2	1	1								3	1	3

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Syllabus	Semester - VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP1	L	T	P	CIA	SEA	100	3	CEUBTE1 CEUCTT1, CEUDTT1 CEUETT1
Course Name	Bridge Engineering	3	0	0	40	60			

Course Objectives:

CO1 To discuss the IRC standard live loads and design the deck slab bridge.
CO2 To analyse and box pipe culverts for the given loading and detail the box culverts.
CO3 To design and detail the T-Beam bridges.
CO4 To design and check the stability of piers and abutments.
CO5 To discuss about the construction techniques of precast members.

Unit	Content	Teaching/Lecture Hours
I	**General Considerations for road Bridges** Introduction – Site selection – Soil exploration for site – Selection of bridge type – Economical span – Number of spans – Determination of HFL – General arrangement drawing **Standard Specifications for Road Bridges:** Width of carriageway- Clearances- Loads to be considered- Dead load– I.R.C. standard live loads- Impact effect- Review of I.R.C. loadings- Application of live loads on deck slabs – Wind load – Longitudinal forces- Centrifugal forces- Horizontal forces due to water currents.	**06**
II	**Culverts Design**: Introduction, Analysis and design of box culverts- slab culverts – pipe culverts- Reinforcement detailing and bar bending schedule need to be prepared.	**10**
III	**Design of Reinforced Concrete T-Beam Bridge:** Introduction–Analysis and Design of T – Beam Girder bridges- Reinforcement detailing and bar bending schedule need to be prepared.	**10**
IV	**Design of Substructure:** Analysis and Design of Abutments and pier- Reinforcement detailing to be prepared, Construction	**9**
V	**Bridge Bearings:** Bearings, forces on bearings, types of bearings design of elastomeric bearings, basics for selection of bearings. Construction techniques for Via– Ducts, Methods of erection - Pre-cast girders, Launching procedures, design of launching girders.Advanced Topics in Bridge Engineering	**07**

Text Books: -

1. T.R. Jagadeesh & M.A. Jayaram, Design of Bridge Structures, Prentice Hall India Pvt. Ltd.
2. V.K. Raina, Concrete Bridge Practice: Analysis, Design, and Economics, Shroff Publishers & Distributors Pvt. Ltd.

3. Praveen Nagarajan, Design of Concrete Bridges: As per Latest IRC Codes, Wiley India
4. J.S. Alagia, Bridge Engineering, Charotar Publishing House
5. Indian Roads Congress (IRC), Indian Road Congress (IRC) Codes, Indian Roads Congress (IRC)
6. Essentials of Bridge Engineering – D. Johnson Victor, 6th Edition (2021), CBS Publishers & Distributors
7. Bridge Engineering Handbook – Wai-Fah Chen & Lian Duan, 2nd Edition (2014), CRC Press
8. Krishnam Raju N., Design of Bridges, 4th edition, Oxford and IBH Publishing Co., Ltd.,2008

Course Outcomes:

At the end of the course completion, a student is able

CO1: Summaries the general considerations for Road Bridges and Describe the standard specifications for Road bridges.

CO2: Analyse and design different types of culverts and detailing and prepare bar bending schedule.

CO3: Analyse and design T-Beam Girder bridge and detailing and preparing bar bending schedule.

CO4: Analyse, design and detailing of substructure abutment elements.

CO5: Understand the concept of bearings and design of elastomeric bearings

COs, POs and PSOs Mapping

PO / CO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design Development of Solution	PO4 Investigation of complex problem	PO5 Modern Tool Usage	PO6 Engineer & Society	PO7 Environment & Sustainability	PO8 Ethics	PO9 Individual & Team Work	PO10 Communication	PO11 Project Management & Finance	PO12 Life Long Learning	PSO1	PSO2	PSO3
CO1	3	3	3			2	1		1	1		1	3	1	1
CO2	3	3	3		1	2	1	1	1	1			3	2	2
CO3	3	3	3		1	2	1	1	1	1			3	2	2
CO4	3	3	3	2		2	1		1	1		1	3	2	2
CO5	3		3	2		2	1	1		1		1	3	1	1

Weightage: 1-Sightly, 2-Moderately, 3-Strongly

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Syllabus	Semester - VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP2	L	T	P	CIA	SEA	100	3	
Course Name	Traffic Engineering	3	0	0	40	60			

Course Objectives:

- To develop the basic knowledge of traffic engineering.
- To define Traffic flow characteristic.
- To develop knowledge about traffic control system.
- To understand the parking and accidents.
- To develop the knowledge of different pollution occurring and its remedial measures.

Unit	Content	Teaching/Lecture Hours
I	**Introduction to Traffic Engineering:** Definition and scope of traffic engineering, functions, organization and importance of traffic engineering. Elements of traffic engineering: vehicular, driver and road characteristics.	6
II	**Traffic Flow Parameters:** Traffic volume, density, speed and related terms, Relationship between various parameters. Traffic flow models. Study and analysis of vehicle arrivals, headways, and shock wave in traffic flow. Highway capacity and level of service.	10
III	**Traffic Control:** functions and importance of traffic control. Methods of traffic control: Traffic signs, Road Markings, and other traffic controls aids. Traffic Regulation. Intersection control and design of traffic signals.	10
IV	**Parking and accident studies:** parking system, peripheral parking schemes, parking requirements. Parking statistics, Parking survey. Design of parking places. Accident studies: causes of accident, Accident analysis: accident data collection, accident investigation, accident data analysis.	10
V	**Traffic and Environment:** Pollution problems of cities, Detrimental effects of traffic on environment, Noise pollution, Air pollution, Vibration, Environmental Impact Assessment.	6
	Total Lecture Hours	42

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

CO1	Understand the basic characteristics of traffic stream.
CO2	Conduct traffic flow studies and analyze traffic data
CO3	**Design traffic signal systems**.
CO4	**Analyze** the parking statistics and roadway accidents
CO5	Manage controlling the different pollution occurring in road

Text Books:-

1. Kadialy L.R., "Traffic Engg. and Transport Planning", 8th edition, Khanna Publishers.
2. Partha chakrobarty & Animesh Das, "Principles of Transportation Engineering", PHI.
3. C. Jotin Khisty, B. Kent Lal, "Transportation Engineering – An Introduction", PHI.
4. Transportation Engineering - An Introduction by Khisty C. J., Prentice Hall, NJ
5. Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
6. Transportation Engineering & Planning by Papacostas C.S. and Prevedouros, P.D., PHI, New Delhi.

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1										3		2
CO2	3	2	2	1		1							2	3	2
CO3	3	2	3	1		2							3	2	1
CO4	3	2	2	1		3							3		2
CO5	3	2				2	3						3		2

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP3	L	T	P	CIA	SEA	100	3	
Course Name	Soil Dynamics	3	0	0	40	60			

Course Objectives:

- To understand earthquake causes, seismic waves, and measurement techniques through principles of tectonics, faulting, and source modeling.
- To understand and apply vibration theory and wave propagation to solve soil dynamics problems
- To understand and analyze dynamic soil properties and wave propagation using laboratory and theoretical methods.
- To analyze ground motion and vibration isolation using codal provisions and response analysis techniques
- To understand and analyze seismic soil behavior and design appropriate remediation using geotechnical principles

Unit	Content	Teaching/Lecture Hours
I	Earthquake seismology – Causes of earthquake, Plate tectonics, Earthquake fault sources, Seismic waves, Elastic rebound theory, Quantification of earthquake, Intensity and magnitudes, Earthquake source models.	10
II	Engineering problems involving soil dynamics; Role of inertia; Theory of Vibrations: Single and two-degree freedom systems; Wave propagation in elastic media	9
III	Dynamic moduli, Dynamic elastic constants. Poisson's Ratio, Damping ratio, Liquefaction parameters, Laboratory techniques. Factors affecting shear modulus, Elastic modulus, and Elastic Constants. Propagation of seismic waves in soil deposits - Attenuation of stress waves	8
IV	Elastic homogeneous half space and lumped parameter solutions; Vibration isolation; Codal provisions; Strong Ground Motion: Measurement, characterization, and estimation; Amplification theory and ground response analysis.	9
V	Liquefaction of soil and its remediation; Seismic slope stability; Seismic bearing capacity and earth pressures.	8
	Total Lecture Hours	44

Course Outcomes: At the end of the course, a student is able

CO1 To apply seismological principles to analyze earthquake causes, wave behavior, and quantify seismic events.

CO2 To analyze dynamic soil behavior using vibration theory and wave mechanics in engineering applications.

CO3 To evaluate dynamic soil parameters and seismic wave behavior using appropriate testing and analytical techniques.

CO4 To evaluate the amplification and response of elastic media under strong ground motion using theoretical models

CO5 To evaluate liquefaction, assess seismic stability, and design soil remediation using analytical geotechnical methods.

Text Books: -

1 Kramer, S. L. (1996). Geotechnical earthquake engineering. Upper Saddle River, NJ: Prentice Hall.

2 Das, B. M. (2010). Principles of foundation engineering (7th ed.). Stamford, CT: Cengage Learning.

Reference Books: -

1 Idriss, I. M., & Boulanger, R. W. (2008). Soil liquefaction during earthquakes. Oakland, CA: Earthquake Engineering Research Institute.

2 Budhu, M. (2011). Soil mechanics and foundations (3rd ed.). Hoboken, NJ: John Wiley & Sons.

COs, POs, and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3								3	2	2
CO2	3	3	3	3								3	2	2
CO3	3	3	3	3								3	2	2
CO4	3	3	3	3								3	2	2
CO5	3	3	3	3								3	2	2

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester - VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP4	L	T	P	CIA	SEA	100	3	
Course Name	Construction Equipment & Automation	3	0	0	40	60			

Course Objectives:

- To understand the factor for equipment selection and cost of owning and operating.
- To expertise in evaluation and analysis of different equipment life.
- To learn the engineering fundamentals of excavating equipments.
- To learn fundamentals of the pile driving and lifting equipments.
- To understand the concreting equipments and techniques and the advanced instruments like GIS etc. in construction.

Unit	Content	Teaching/Lecture Hours
I	Introduction to course & Planning Process of Equipment Factors affecting equipment selection. Cost of Owning and Operating Construction Equipment Elements of ownership cost, Depreciation accounting methods, Cost Estimation using Average Annual Investment method. Use of compounding factors in Equipment cost estimation based on time value method, Operating cost components, Caterpillar method and Peurifoy method.	10
II	Equipment life and replacement analysis determination of economic life of equipment. Minimum cost method, Maximum profit method, Time value concept	10
III	Engineering Fundamentals of Moving Earth Machine Performance-Required power, Available power, Usable power, Performance chart. Earthmoving and Excavating equipment Bull Dozers, Scrapers, Front end loaders, Excavators, Trucks, Productivity estimation and balancing of interdependent machines	10
IV	Piles and Pile driving equipment Pile types, pile hammers, principle of pile hammer, factors affecting pile hammer selection, Types of pile hammer: Drop hammer, Single acting and double acting steam hammers, Diesel hammers, Vibratory pile drivers. Lifting equipment Cranes, Principles of lifting mechanism of crane, types of cranes-lattice boom crawler crane, lattice boom truck mounted cranes, telescopic boom crane, Tower cranes, Factors affecting lifting capacity of crane, Range diagram.	10
V	Concreting equipment Steps in concrete making process, types of concrete mixer machines, Methods of handling and transporting concrete, Consolidation of concrete, Methods of finishing and curing of concrete. Aerial and Satellite Surveying: GIS and GPS in Construction; use of Drones for spread out sites; Use of robots for repetitive activities.	8
	Total Lecture Hours	48

Course Outcomes: At the end of the course completion, a student is able

CO1 To apply the knowledge in equipment selection and able to find cost of owning and operating.

CO2 To find the equipment life, which help in comparisons of different equipments.

CO3 To select the earth excavating equipment on the basis of output and different selection factors.

CO4 To decide the pile driving equipment and lifting equipment based on safe working load determination

CO5 To decide the concreting equipment based on the construction project and relate the knowledge on Surveying to the new frontiers of science like GIS, GPS and Remote Sensing.

Text Books: -

1 Construction Planning and Equipment - R.L.Peurifoy - Tata McGraw Hill, New Delhi

Reference Books: -

1 Construction Equipment & Planning and Application. - Mahesh VermaArtec Publication.

2 GPS satellite surveying- Alfred Leick,.Wiley

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2		1		2		3	3	2	1	
CO2	1	2	2	2		1		2		3	3	2	1	
CO3	2	2	2	2		1		2		3	3	2	1	
CO4	2	2	2	2		1		2		3	3	2	1	
CO5	2	2	2	2	2	1		2		3	3	2	1	

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Syllabus	Semester - VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP5	L	T	P	CIA	SEA	100	3	
Course Name	Environmental Impact Assessment and Life Cycle Analysis	3	0	0	40	60			

Course Objectives:

- Identify environmental attributes for the EIA study.
- Identify methodology and prepare EIA reports.
- Specify methods for prediction of the impacts.
- Formulate environmental management plans.
- Understand the concept of life cycle analysis (LCA) and the basic principles.

Unit	Content	Teaching/Lecture Hours
I	**Introduction:** Historical development of Environmental Impact Assessment (EIA). EIA in Project Cycle. Legal and Regulatory aspects in India. – Types and limitations of EIA – Cross sectoral issues and terms of reference in EIA – Public Participation in EIA. EIA process- screening – scoping - setting – analysis – mitigation	8
II	**Components and Methods for EIA:** Matrices – Networks – Checklists – Connections and combinations of processes – Cost benefit analysis – Analysis of alternatives – Software packages for EIA – Expert systems in EIA. Prediction tools for EIA – Mathematical modelling for impact prediction – Assessment of impacts – air – water – soil – noise – biological — Cumulative Impact Assessment – Documentation of EIA findings – planning – organization of information and visual display materials – Report preparation. EIA methods in other countries.	10
III	Environmental Management Plan: Environmental Management Plan - preparation, implementation and review – Mitigation and Rehabilitation Plans – Policy and guidelines for planning and monitoring programmes – Post project audit – Ethical and Quality aspects of Environmental Impact Assessment.	6
IV	An Introduction to Sustainability Concepts and Life Cycle Analysis (Introduction, Material flow and waste management, what it all means for an engineer? Water energy and food nexus). Risk and Life Cycle Framework for Sustainability (Introduction, Risk, Environmental Risk Assessment, Example Chemicals and Health Effects, Character of Environmental Problems)	8

V	Environmental Data Collection and LCA Methodology (Environmental Data Collection Issues, Statistical Analysis of Environmental Data, Common Analytical Instruments, Overview of LCA Methodology - Goal Definition, Life Cycle Inventory, Life Cycle Impact Assessment, Life Cycle Interpretation, LCA Software tools). Life Cycle Assessment – Detailed Methodology and ISO Framework (Detailed Example on LCA Comparisons, LCA Benefits and Drawbacks, Historical Development and LCA Steps from ISO Framework)	10
	Total Lecture Hours	42

Course Outcomes: At the end of the course completion, a student is able

CO1 Identify environmental attributes for the EIA study.
CO2 Identify methodology and prepare EIA reports.
CO3 Specify methods for prediction of the impacts.
CO4 Understand EIA tools & methodologies, auditing and documentation of EIA
CO5 Formulate environmental management plans

Text Books: -

1. Anjaneyulu.Y., and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007
2. Canter, L.W., Environmental Impact Assessment, McGraw Hill Pub. Co., New York. 1997
3. David P. Lawrence, Environmental Impact Assessment: Practical Solutions to Recurrent Problems, John Wiley & Sons, 2003
4. Environmental Assessment, 2001. Ravi Jain, LV Urban, GS Stacey, H Balbach, McGraw-Hill.

Reference Books: -

1. Handbook on Life Cycle Assessment: Operational guide to the ISO standards, Kluwer Academic Publishers, 2004
2. Hosetti, B. B., Kumar A, Eds, Environmental Impact Assessment & Management, Daya Publishing House, 1998
3. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Inter science, New Jersey, 2003.
4. Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science, London, 1999.

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1									1		3		1
CO2	3		2				2	2	1				3		1
CO3	2	1	2				3				1	2	3		1
CO4	3		2					2	1		1	2	3		1
CO5	2						3		2		1	2	3		1

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

SYLLABUS	SEMESTER-VII	Periods/ Week			Continuous Internal Assessment	Semester Examination Assessment	Marks	Credits	Pre-requisite Course(s)
Subject Code:	CEUGTP6	L	T	P	CIA	60	100	03	
Subject:	Water Resources Planning & Management	3	0	0	40				

Course Objectives:

1. To develop the basic knowledge of Water Resources Planning & Management.
2. To Understand water resources planning processes.
3. To develop a fundamental understanding of **water resources systems**
4. To develop skills in **evaluating and monitoring water quantity**
5. To develop and apply advanced water quantity and quality modeling techniques

Course Content:

Unit	Content	Teaching/Lecture Hours
I	**UNIT 1: Introduction**: Role of water in national development, assessment of water resources of country, scope of water resources development vis-a-vis environment, Irrigation development in India, utilisation of Irrigation potential.	
II	**UNIT 2: Planning**: Water resources planning process; planning for single purpose and multipurpose projects, estimation of different water needs and project formulations, comparison of alternatives, cost-benefit analysis	
III	. **UNIT 3: Water Resources Systems:** Definition, types of system, optimization techniques, system approach, system analysis, linear programming, and formulation of a linear programming problem, formulation with different types of constraints, graphical analysis, graphical solution, simplex method, optimization techniques and systems approach.	
IV	**UNIT 4: Management**: Evaluation and monitoring of water quantity and quality, managing water distribution networks for irrigation, flood control and power generation, inter-basin transfer of water, conjunctive use of surface and ground water.	
V	**UNIT 5: Modelling:** Water quantity and quality modelling, evaluation of impacts of water resources projects on river regimes and environment, reservoir sedimentation and watershed management.	
		Total lectures hours

Text Books:

1. Principles of Water Resources Planning – Good Man, A.S., (Prentice Hall, Inc., Englewood Cliffs, N.J. 1984.)
2. Water Resources Engineering – Linsley, R.K. and Franzini, J.B., (3rd Edition) (McGraw Hill, New York, 1979)

3. Name of Reference Books: Water Resources System, Planning and Management – M.C. Chaturvedy (Tata McGraw Hill)
4. Water Resources System, Planning and Management – Helweg O.J. (John and Wiley & Sons)
5. Water Resources Planning and Management – Edited by R. Quentin Grafton and Karen Hussey. This book covers various aspects of water resources management, including environmental policy and hydrology [here](https://www.cambridge.org/core/books/water-resources-planning-and-management/13DABDF522518B2CF15052C2438EB218).
6. Water Resource Systems Planning and Management – By Daniel P. Loucks and Eelco van Beek. This textbook provides an introduction to methods, models, and applications for water resource systems planning [here](https://link.springer.com/book/10.1007/978-3-319-44234-1).
7. Handbook of Water Resources Management: Discourses, Concepts and Example – Edited by Janos J. Bogardi, Joyeeta Gupta, and others. This book discusses theories and methods from multiple disciplines relevant to water resources management. (https://link.springer.com/book/10.1007/978-3-030-60147-8).

Course Outcomes:

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

1. Assess water resources at a national level, considering environmental impacts and sustainable utilization of irrigation potential.
2. Apply water resource planning techniques to design single-purpose and multipurpose projects, including cost-benefit analysis and project formulation.
3. Utilize systems approach and optimization methods, such as linear programming and system analysis, for efficient water resource management.
4. Evaluate and monitor water quantity and quality, ensuring effective distribution for irrigation, flood control, and power generation.
5. Implement integrated water management strategies, including inter-basin transfers and conjunctive use of surface and groundwater for sustainable development.
6. Develop and apply advanced modeling techniques to assess the impacts of water resource projects on river regimes, reservoir sedimentation, and watershed sustainability.

Course Outcomes and their mapping with Programme Outcomes:

COs	**POs**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1										3		2
CO2	3	2	2	1									2	3	2
CO3	3	2	3	1									3	2	1
CO4	3	2	2	1									3		2
CO5	3	2				2	3						3		2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP7	L	T	P	CIA	SEA	100	3	
Course Name	Air and Noise Pollution and Control	3	0	0	40	60			

To comprehend the essential concepts of Air and Noise pollution Learning

- **To understand, measure and evaluate the character & behaviour of air and noise pollutants**
- **To understand the measurement techniques and strategies to control their presence in the ambient atmosphere**

Course Objectives:

- To comprehend the essential concepts of Air and Noise pollution Learning
- To understand, measure and evaluate the character & behaviour of air and noise pollutants
- To understand the measurement techniques and strategies to control their presence in the ambient atmosphere
- To understand the measurement techniques and strategies to control noise pollution

Unit	Content	Teaching/Lecture Hours
I	Air pollution: composition and structure of atmosphere, global implications of air pollution. classification of air pollutants: particulates, hydrocarbon, carbon monoxide, oxides of sulphur, oxides of nitrogen and photochemical oxidants. Indoor air pollution. Effects of air pollutants on humans, animals, property and plants.	8
II	Air pollution chemistry: meteorological aspects of air pollution dispersion; temperature lapse rate and stability, wind velocity and turbulence, plume behaviour, dispersion of air pollutants, the Gaussian Plume Model, stack height and dispersion.	6
III	Ambient air quality and standards: air sampling and measurements; Ambient air sampling, collection of gaseous air pollutants, collection of particulate air pollutants, stack sampling. Control devices for particulate contaminants: gravitational settling chambers, cyclone separators, wet collectors, fabric filters (Bag-house filter), electrostatic precipitators (ESP).	8
IV	Control of gaseous contaminants: Absorption, Adsorption, Condensation and Combustion, Control of sulphur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons. Automotive emission control, catalytic convertor, Euro-I, Euro-II and Euro-III specifications, Indian specifications	10
V	Basics of acoustics and specification of sound: sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psycho-acoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise environments: Infra-sound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices	10
	Total Lecture Hours	**42**

Course Outcomes: At the end of the course completion, a student is

CO1 Understand basic concepts and terminologies of air & noise pollution, sources and effects on environment

CO2 Understand air & noise pollution indices, various acts and legislations.

CO3 Discuss air & noise pollution standards and measurement methods.

CO4 Analyze removal techniques to control air pollution.

CO5 Analyze techniques to control noise pollution.

Text Books: -

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering.
2. Martin Crawford: Air Pollution Control Theory.
3. Wark and Warner: Air Pollution: Its Origin and Control.
4. M.N.Rao & HVN Rao, Air Pollution, Tata McGraw-Hill Publishing Company Limited, New Delhi.

Reference Books: -

1. Environmental Pollution Control Engineering- CS Rao, Wiley Eastern Ltd., New Delhi, 1996.
2. Environmental Noise Pollution – PE Cunniff, McGraw Hill, New York, 1987
3. Mycock, McKenna and Theodore: Handbook of Air Pollution Control Engineering and Technology.
4. Suess and Craxford: W.H.O. Manual on Urban Air Quality Management

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3				3	3						1		
CO2		2				3	3					3			1
CO3		2		3		3	3						1		
CO4		3	3									3			1
CO5			3												1

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester - VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP8	L	T	P	CIA	SEA	100	3	Nil
Course Name	Engineering Hydrology	3	0	0	40	60			

Course Objectives:

- To develop the fundamentals of hydrology and Precipitation.
- To study various abstractions of precipitation.
- To understand the concepts of Runoff and its correlations
- To learn about the importance of Hydrographs and floods.
- To understand the fundamentals of groundwater hydrology

Unit	Content	Teaching/Lecture Hours
I	**Precipitation:** Hydrologic Cycle, Forms of precipitation, measurement, mean precipitation, depth-area-duration, and intensity-duration frequency relations, probable maximum precipitation	8
II	**Abstractions:** Evaporation process, measurement, and estimation, Evapotranspiration measurement and estimation, Infiltration process, measurement, and estimation.	8
III	**Runoff:** Measurement of streamflow, stage, velocity, rating curve, measurement of runoff, characteristics, runoff volume, flow duration curve.	8
IV	**Hydrograph and Flood:** Components of hydrograph, base flow, effective rainfall, unit hydrograph, s-curve, synthetic hydrograph, instantaneous hydrograph. Basics of flood estimation and routing, simulation on HEC-RAS software.	10
V	**Groundwater:** Occurrence of groundwater, types of aquifers, aquifer properties, Darcy's law, conductivity and transmissivity, steady state well hydraulics, laboratory and field measurement of permeability.	8
	Total Lecture Hours	42

Course Outcomes: At the end of the course completion, a student is able

CO1 Describe the basic concepts of hydrology and precipitation to integrate them with the physical hydrological processes.

CO2 Understand and explain the various process, measurements, and estimations of hydrological components

CO3	Formulate the rainfall-runoff relationship and apply it to engineering practices.
CO4	Explain and apply the hydrographs and flood routing concepts for practical purposes and investigations
CO5	Understand and explain the groundwater hydrology concepts.

Text Books:

1 Engineering Hydrology K.Subramanya, Tata McGraw-Hill Education

2 Ojha,C.S.P. , Bhunya, P. and Berndtsson, R.- Engineering Hydrology, Oxford University Press Canada

3 D. K. Todd, Groundwater Hydrology, John Wiley and Sons

Reference Books:

1 Hand Book of Applied hydrology V. T. Chow, McGraw-Hill, Inc

2 K. C. Patra, Hydrology and Water Resources Engg., Narosa Publishing house, New Delhi.

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2									3		
CO2	3	3	1	2									3		
CO3	3	3	1	2									3		
CO4	3	3	1	2	3								3	3	
CO5	3	3	1	2									3		

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	**CEUGTP9**	L	T	P	CIA	SEA	100	3	EM, SM, SA
Course Name	Earthquake Resistant Design of Structures	3	0	0	40	60			

Course Objectives:

- To introduce Engineering seismology and functional planning and the effects of configurations of buildings for earthquakes.
- To introduce the requirements for conceptual design for earthquake safety and the analysis methods.
- To acquaint with IS code-based design lateral forces for earthquake resistant design of structures.
- To identify the behavior of structural and nonstructural elements for seismic resistance and impart design of shear walls.
- Introduce Capacity Design as per IS 13920: 2016, Capacity Design for Beams, Columns, beam column joints and structure as a whole.

Unit	Content	Teaching/ Lecture Hours
I	Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults-Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy Released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph-Characteristics of strong ground motions- Seismic zones of India. Introduction-Functional Planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength - Seismic design requirements-regular and irregular configurations-basic assumptions.	8
II	Conceptual Design - Horizontal and Vertical Load Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. Twisting of Buildings – Flexible Building and Rigid Building Systems. Strength and Stiffness – Ductility – Definition – Ductility Relationships – Choice of construction Materials – Unconfined Concrete & Confined Concrete – Masonry, Steel Structures. Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method – Equivalent Lateral Force Method. Dynamic Analysis – Response Spectrum Method – Modal Analysis Torsion.	12
III	Introduction to Earthquake Resistant Design – Seismic Design Requirements and Methods. RC Buildings – IS Code based Method. - Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem - Design Lateral	10

	Force, Base Shear Evaluation – Lateral Distribution of Base Shear	
IV	Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes – Behaviour of Unreinforced and Reinforced Masonry Walls – Behaviour of Walls Box Action and Bands – Behaviour of infill Walls - Non Structural Elements – Failure Mechanism of Nonstructural Elements – Effects of Nonstructural Elements on Structural System – Analysis – Prevention of Damage to Nonstructural Elements – Isolation of Non-Structures, Design of Shear walls: Classification according to Behavior, Loads in Shear walls, Design of Rectangular and Flanged Shear walls	**8**
V	Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey and short columns during earthquake- Seismic Evaluation and Retrofitting. Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns-Case studies.	**10**
	Total Lecture Hours	**48**

Course Outcomes: On the completion of this course, the student will be able to:

CO1: Identify the causes of earthquakes, its propagation, and measurement and can quantify the hazard at the location of the structure and quantify the forces based on the source.

CO2 Adopt a suitable structural system to resist earthquake forces considering safe behavior of structural and nonstructural elements with different material properties and load combinations

CO3 Design seismically safe structures in accordance with the provisions of Indian code IS 1893.

CO4 Implement design of shear wall elements for earthquake safety of structures.

CO5 Design or retrofitting of structures by detailing the elements, beams, columns, beam-column joints as per capacity-based design adopting ductility provisions as per IS 1893, IS 13920, to mitigate the vulnerability of earthquake damages of elements and structures.

Text Books:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd
3. Earthquake Resistant Design for Engineers & Architects by Dowrick, D. J., John Willey & Sons, 2nd Edition; 1987.
4. Earthquake Resistant Design of structures by S. K. Duggal, Oxford University Press.
5. Concrete Structures in Earthquake Regions by Booth, E., Longman Higher Education, 1994.
6. Reinforced Concrete Structures by Park, R. &Paulay, T., John Willey & Sons, 2nd Edition; 1975.
7. Masonry and Timber structures including Earthquake Resistant Design –Anand S. Arya, Nem chand & Bros.
8. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial College Press.
9. Design of Reinforced Concrete Structures by N. Subramanian, Oxford University Press.
10. Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd
11. Handbook on Seismic Analysis and Design of Structures by Farzad Naeim, Kluwer Academic Publisher, 2001.

Reference Books:

1. IS 1893 (Part-1): 2016, "Criteria for Earthquake Resistant – Design of structures." B.I.S., New Delhi.
2. IS 4326: 2013, "Earthquake Resistant Design and Construction of Building", Code of Practice, B.I.S., New Delhi.
3. IS 13920: 2016, "Ductile design and detailing of reinforced concrete structures subjected to seismic forces" – Code of practice, B.I.S., New Delhi.

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**1**				**1**	**3**	**3**	**1**
CO2	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**1**				**1**	**3**	**3**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**1**				**1**	**3**	**3**	**1**
CO4	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**1**				**1**	**3**	**3**	**1**
CO5	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**1**				**1**	**3**	**3**	**1**

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Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP10	L	T	P	CIA	SEA	100	3	
Course Name	Transportation Planning	3	0	0	40	60			

Course Objectives:

- To understand the concept of transport planning.
- To estimate trip generation techniques.
- To learn about trip distribution models.
- To understand various aspects of trip assignment..
- To understand the various methods of model split.

Unit	Content	Teaching/Lecture Hours
I	**Transport Planning Process:** Status of transportation in India. Urban, regional and national transport planning. Transport planning process, various stages. Study area. Zoning. O-D surveys.	8
II	**Trip Generation:** Trip purpose. Factors affecting trip generation. Trip generation estimation by linear regression analysis, brief review of category analysis.	8
III	**Trip Distribution:** Methods of trip distribution. Basic concepts of uniform factor method, average factor method and opportunity model. Trip distribution by gravity model.	8
IV	**Traffic Assignment:** All or nothing assignment. multipath assignment, capacity restraint assignment. Route-choice behavior. User Equilibrium assignment- System optimum assignment- Incremental Assignment-Stochastic user equilibrium assignment- Dynamic Assignment.	10
V	**Modal Split:** General considerations for modal split. Factors affecting modal split. Brief introduction to various methods of modal split.	8
	Total Lecture Hours	42

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

CO1	Understand the Concept of Transport Planning.
CO2	**Apply** Estimating Trip Generation Techniques
CO3	**Understand** Trip Distribution Models.
CO4	**Analyze** Trip Assignment Techniques
CO5	**Explain** Various Methods of Modal Spli

Text Books: -

7. Traffic Engg and Transport Planning by L. R. Kadiyali, Khanna Publishers, Delhi.
8. Introduction to Transport Planning by Bruton, M.J., Hutchinson Technical Education, London.
9. Principles of Urban Transport Systems Planning by Hutchinson, B.G., Scripta, McGrawHill, NewYork.
10. Transportation Engineering - An Introduction by Khisty C. J., Prentice Hall, NJ
11. Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
12. Transportation Engineering & Planning by Papacostas C.S. and Prevedouros, P.D., PHI, New Delhi.

COs, POs and PSOs Mapping

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	1	2	1	1						1		
CO 2	3	2	3	3	3	3	1						3	3	3
CO 3	3	3	2	3	3	3	1	1					3	3	3
CO 4	3	2	2	2	2	1							1	1	3
CO 5	3	3	3	3	3	3							3	3	

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Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP11	L	T	P	CIA	SEA	100	3	
Course Name	Geosynthetic Reinforced Soil Structure	3	0	0	40	60			

Course Objectives:

- To explain types, functions, and quality standards of geosynthetics in civil engineering applications.
- To analyze geosynthetic behavior through tests and apply reinforcement concepts in geotechnical design
- To evaluate geosynthetic applications in landfill liners and pavement systems.
- To apply geosynthetics in erosion control and analyze sustainability through real-world case studies
- To explore innovative geosynthetics and assess their potential in sustainable engineering practices

Unit	Content	Teaching/Lecture Hours
I	Introduction to Geosynthetics: Definition, history, and importance; Types and Classification of Geosynthetics; Geosynthetic Functions and Properties: Quality Control of Geosynthetics: Production processes, Standards & Importance of quality control in Geosynthetic Applications.	10
II	Role of geosynthetics in sustainable development. Geosynthetic Testing and Characterization: Laboratory and field testing methods, Interpretation of test results; Geosynthetic Reinforcement in Geotechnical Engineering: Introduction to soil reinforcement, Design principles and applications in slope stabilization and retaining walls.	9
III	Geosynthetics in Geoenvironmental Engineering: Applications in landfill liners and caps, Environmental benefits and regulations; Geosynthetics in Transportation Geotechnics: Use in pavement design and construction, Geosynthetic-reinforced foundations and subgrades.	8
IV	Geosynthetics in Hydraulic Applications: Riverbank protection and erosion control Dams and reservoir applications; Case Studies in Sustainable Geosynthetic Applications: Real-world projects showcasing geosynthetics, Lessons learned, and best practices	9

V	Emerging Trends and Innovations in Geosynthetics: Sustainable materials and technologies Research and development in the field, Integrating geosynthetics into sustainable engineering practices, Opportunities and challenges in the evolving field	8
	Total Lecture Hours	44

Course Outcomes: At the end of the course, a student is able

CO1 To identify geosynthetics and explain their classification, functions, and production quality control processes.

CO2 To interpret test results and design reinforced soil structures like slopes and retaining walls.

CO3 To assess geosynthetic solutions for environmental protection and transportation infrastructure enhancement.

CO4 To Demonstrate understanding of geosynthetics in hydraulic structures and summarize best practices from case studies

CO5 To Examine new geosynthetic technologies and evaluate their role in future sustainable infrastructure.

Text Books: -

1 Koerner, R. M. (2012). *Designing with geosynthetics* (6th ed.). Xlibris Corporation

2 Shukla, S. K. (2017). *An introduction to geosynthetic engineering* (2nd ed.). CRC Press.

Reference Books: -

1 Rao, G. V. (2007). *Geosynthetics: Engineering applications*. Chennai, India: Alpha Science International.

2 Mandal, J. N. (2021). *Geosynthetics: Expanding horizons*. CRC Press.

COs, POs, and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3								3	2	2
CO2	3	3	3	3								3	2	2
CO3	3	3	3	3								3	2	2
CO4	3	3	3	3								3	2	2
CO5	3	3	3	3								3	2	2

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Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGTP12	L	T	P	CIA	SEA	100	3	
Course Name	Safety Management in construction	3	0	0	40	60			

Course Objectives:

- To Know about Accidents and their Causes and Legal Implications.
- To provide an information about duties and responsibilities of construction management.
- To study about the safety in constructions and their applications.
- To Understand the Various Safety Equipment and Gear Used On Site.
- To learn about the safety policies.

Unit	Content	Teaching/Lecture Hours
I	**Construction Accidents** Accidents and their Causes – Human Factors in Construction Safety - Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications	10
II	**Construction Safety Management** Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring. Writing safety manuals, preparing safety checklists and inspection reports.	10
III	**Safety in Construction Operations** Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction. Prevention of accidents. Safety measures. Safety in use of construction equipment e.g. vehicles, cranes, hoists and lifts etc. safety of scaffolding and working platforms. Safety while using electrical appliances. Explosives used.	10
IV	**Various Safety Equipment And Gear Used On Site** First aid on site, Safety awareness program. Labour laws, legal requirement and cost aspects of accidents on site, Incentive for safety practices.	10
V	**Study of Safety Policies** Methods, equipment, training provided on any ISO approved construction Company, safety in office, working on sites of high-rise construction, deep excavation.	8
	Total Lecture Hours	48

Course Outcomes: At the end of the course completion, a student is able to

CO1 Know about Accidents and their Causes and Legal Implications.

CO2 Gain knowledge about duties and responsibilities of construction management.

CO3 Learn about the safety in and their applications.

CO4 Manage the Various Safety Equipment and Gear Used on Site.

CO5 Summarize the safety policies, methods equipment 's, training provided on any ISO approved construction company.

Text Books: -

1 Davies V.S.Thomasin K, Construction Safety Handbook, Thomas Telford, London.

Reference Books:-

1 Construction safety manual published by National Safety Commission of India.

2 Safety Management in Construction Industry – A manual for project managers. NICMAR Mumbai.

3 ISI for safety in Construction – Bureau of Indian Standards.

4 Safety Management in construction – S. K. Bhattacharjee, Khanna Publishers

5 Girimaldi and Simonds, "*Safety management*" –, AITBS, New Delhi.

6 Jimmie Hinze, *Construction safety*, Prentice-Hall, ©1997.

7 Herbert William Heinrich, *Industrial Accident Prevention*, McGraw-Hill, 1950

COs, POs and PSOs Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3			3	3					3
CO2	3				3			3	3					3
CO3	3				3			3	3					3
CO4	3				3			3	3					3
CO5	3				3			3	3					3

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGMO1	L	T	P	CIA	SEA	100	3	
Course Name	MOOCs*	3	0	0	40	60			

NOTE:

*The students should be opted the MOOC(s) offered by NPTEL/SWAYAM of 03 credits only and that needs to be approved by the BoS.

**Student shall take MOOCs based on availability of courses at SWAYAM portal during that academic year.

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGES1	L	T	P	CIA	SEA	-	0	
Course Name	Industrial Training Seminar*	-	-	-	-	-			

Note :-

*The students have to submit their summer internship/Industrial Training **report certified by the concerned organization in** the department at the time of registration in 7th Semester. Further, they are required to present their training report as seminar in the department for evaluation as successful or unsuccessful.

Syllabus	Semester -VII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	CEUGPF1	L	T	P	CIA	SEA	100	4	
Course Name	Minor Project	-	-	8	50	50			

Session:2025-26/Scheme & Syllabus of 4th Yr/B.Tech. Civil Engineering (NEP 2020)

Syllabus	Semester -VIII	Teaching Hours/ Week			Continuous Internal Assessment	Semester Examination Assessment	Total Marks	Credits	Pre-requisite Course(s)
Course Code	**CEUHIF2**	L	T	P	CIA	SEA	200	8	
Course Name	**Major Project****	-	-	16	100	100			

NOTE:

***The students may carry out the Major Project work in any Industry/Research Organization/Research Institute/in the Department in 8th semester of B.Tech. degree as per NEP 2020.**

*The students are required to present the progress of Major Project Work in the Department at every 06 weeks/as per the schedule notified by the department for continuous evaluation.

*The students who will be carrying out their major project work in organizations other than the department, they may choose co-supervisor from that respective organization

*At the end of the semester the students have to submit the major project report in hardbound as per the guidelines to be issued by the department for evaluation.