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

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

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

Recommendation by Board of studies on	13-06-2024
Approval by Academic council on	
Compiled and designed by	
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-III (B)	Subject Code:	CE-701 DE-III (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

Recommendation by Board of studies on	13-06-2024
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering

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

Semester/Year		VIII/IV	Program		B.Tech
Subject Category	DE-III (C)	Subject Code:	CE-701 DE-III (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

Recommendation by Board of studies on	13.6.2024
Approval by Academic council on	
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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-IV (A)	Subject Code:	CE-702 DE-IV (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

Recommendation by Board of studies on	13-06-2024
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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 (B)	Subject Code:	CE-702 DE-IV (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	13-06-2024
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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-III (B)	Subject Code:	CE-702 DE-III (B)	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/

Recommendation by Board of studies on	13-06-2024
Approval by Academic council on	
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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-V (A)	Subject Code:	CE-703 DE-V (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

Recommendation by Board of studies on	13.6.2024
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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-V (B)	Subject Code:	CE-703 DE-V (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/

Recommendation by Board of studies on	13-06-2024
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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-V (C)	Subject Code:	CE-703 DE-V (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/

Recommendation by Board of studies on	13-06-2024
Approval by Academic council on	
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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		VII/IV	Program		B.Tech
Subject Category	DE-VI (A)	Subject Code:	CE-704 DE-VI (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/

Recommendation by Board of studies on	13-06-2024
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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 (B)	Subject Code:	CE-704 DE-VI (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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Subject handled by department	Civil Engineering

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

Semester/Year		VI/III	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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Subject handled by department	Civil Engineering