



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

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

Semester/Year		VI/III		Program		B.Tech			
Subject Category	DC	Subject Code:	CE-1861	Subject Name:	Structural Design & Drawing –II (Steel)				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory		Practical				Total Marks	L	T	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10	30	20	150	3	-	2	4
Prerequisites:									
Structural Design & Drawing –I									
Course Objective:									
Students are expected to learn design of steel structural elements under compression, tension and flexure using various types of cross-sections as per the provisions of IS 800-2007 code of practice along with bolted and welded connections. They should attain competence to solve real life problems of simple steel structures employed in commercial and industrial buildings.									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. understand the basic concepts of steel structure design and apply the IS code of practices for design of steel structural elements. 2. design and evaluate different steel structural elements in compression, tension and flexure on the basis of strength and serviceability concepts as per IS:800-2007. 3. design riveted, bolted and welded connections for both axial and eccentric loads. Also, design and evaluate grillage foundation and footings for different steel structures. 4. solve and provide solutions to the real-world problems. 									
UNITS	Descriptions					Hrs.	CO's		
I	Various loads and mechanism of the load transfer, Partial load factors, Structural properties of steel, Structural Steel Products, Design Philosophies, Principles of Limit State Design, Design of structural connections - Bolted, Riveted and Welded connections.					9	CO1		
II	Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.					9	CO2		
III	Design of simple beams - Laterally Supported and Unsupported, Design of Beam Bearing plates, Built-up beams, Plate girders and Gantry girders, Splices in beams					6	CO2		
IV	Length of Columns, Design of Simple and Compound Columns, Lacings & battens, Bracings.					9	CO3		
V	Design of footings for steel structures, Grillage foundation. Design of Industrial Buildings - Structural framing, Roofing and Wall Materials, Purlins, Girts and Eave Strut, Floor plates and End Bearings					7	CO4		
Guest Lectures (if any)									
Total Hours						40			

Suggestive list of experiments:	
<ol style="list-style-type: none"> 1. Design & Drawing of Bolted and Welded Connections. 2. Design & Drawing of Compression and Tension members. 3. Design & Drawing of Laterally supported and unsupported Beams. 4. Design & Drawing of Plate Girder 5. Design & Drawing of Built-up Columns (Lacing system and Battening system). 6. Design & Drawing of Flat column base and Gusseted column base. 7. Design & Drawing of Roof Trusses. 8. Design & Drawing of Grillage foundation. 9. Design & Drawing of Gantry Girder. 10. Design & Drawing of an Industrial Building. 	
Text Book-	
<ol style="list-style-type: none"> 1. Design of Steel Structures, N. Subramanian, Oxford University Press 2. Limit State Design of Steel Structures, S. K. Duggal, McGraw Hill(India) Education Pvt. Ltd. 	
Reference Books-	
<ol style="list-style-type: none"> 1. Fundamentals of Structural Steel Design, M. L. Gambhir, McGraw Hill(India) Education Pvt. Ltd. 2. Design of Steel Structures, S. S. Bhavikatti, I. K. International Publishing House Pvt. Ltd. 	
Modes of Evaluation and Rubric	
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.	
List/Links of e-learning resource	
https://nptel.ac.in/courses/105/105/105105162/ https://nptel.ac.in/courses/105/106/105106113/	
Recommendation by Board of studies on	16.12.2022
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering



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Semester/Year		VI/III	Program		B.Tech				
Subject Category	DE-I (A)	Subject Code:	CE-1862 - DE-1(A)	Subject Name:	Geotechnical Engineering – I				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory		Practical		Total Marks	L	T	P		
End Sem	Mid-Sem	Quiz	End Sem		Lab-Work	3	-	2	4
70	20	10	30	20	150				
Prerequisites:									
Geology									
Course Objective:									
To provide students with basic understanding of physical and mechanical properties of soil, together with knowledge of basic engineering procedures to identify factors controlling soil behaviour and methods to determine soil properties. Students will acquire basic knowledge in engineering design of geotechnical systems									
Course Outcomes:									
At the end of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Characterize and classify soils. 2. Compute and analyse the permeability and seepage of water. 3. Understand the principles of compaction and its control. 4. Analyse the stress distribution and identify shear strength parameters for field condition. 									
UNITs	Descriptions						Hrs.	CO's	
I	Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development, Formation of soils, Soil composition, Minerals, Influence of clay minerals on engineering behaviour, Soil Structure, three phase system, Index properties and their determination, Consistency limits, Classification systems based on particle size and consistency limits.						9	CO1	
II	Soil Water and Permeability: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flow-nets, uses of a flow-net, Effective, neutral and total stresses.						8	CO2	
III	Compaction: Compaction, Field and laboratory methods, Proctor compaction tests, Factors affecting compaction, Properties of soil affected by compaction, Various equipment for field compaction and their suitability, Field compaction control, Lift thickness.						7	CO3	
IV	Effective Stress Distribution in Soils: Stress distribution beneath loaded areas by Boussinesq and westergaard's analysis, Newmark's influence chart, Contact pressure distribution.						8	CO4	
V	Shear Strength of Soils: Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Tri-axial compression test, unconfined compression test, Vane shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction						8	CO4	

Guest Lectures (if any)		
Total Hours	40	
Suggestive list of experiments:		
Objective:		
To understand the laboratory tests used for determination of physical, index and engineering properties of soil.		
<ol style="list-style-type: none"> 1. Determine the Water Content and Specific Gravity. 2. Course and find Sieve Analysis 3. Determine the Atterberg Limits (Liquid Limits and Plastic Limits) 4. Determine the Shrinkage Limit 5. Hydrometer Analysis 6. Determine the Permeability test (Constant and variable) 7. Conduct the Direct Shear Test 8. Conduct the Standard Proctor Compaction Test. 9. Conduct the Heavy Compaction Test. 		
Text Book-		
<ol style="list-style-type: none"> 1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi. 2. Soil Mech. & Found. By Dr. B.C.Punmia- Laxmi Publications, Delhi. 3. Geotech Engg. By Dr. Alam Singh - IBT Publishers, Delhi. 		
Reference Books-		
<ol style="list-style-type: none"> 1. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi 2. Soil Mech. & Found. Engg. by Ranjan Rao and Gupta, New Age 3. Soil Testing for Engg. by T.W. Lambe - John Wiley & Sons. Inc. 4. Relevant I.S. Codes 		
Modes of Evaluation and Rubric		
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.		
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.		
List/Links of e-learning resource		
https://nptel.ac.in/courses/105/101/105101201/		
https://nptel.ac.in/courses/105/105/105105168/		
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Semester/Year		VI/III	Program		B.Tech				
Subject Category	DE-I (B)	Subject Code:	CE-1862-DE-I (B)	Subject Name:	Earth Retaining Structure				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory		Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10	30	20	150	3	-	2	4
Prerequisites:									
Geotechnical Engineering									
Course Objective:									
<ol style="list-style-type: none"> 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 envelopes 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:									
<ol style="list-style-type: none"> 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: Culmann's, 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 cofferdams, cellular					6	CO1		

	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 downstream 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	
Suggestive list of experiments:			
Text Book-			
<ol style="list-style-type: none"> 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. 			
Reference Books-			
<ol style="list-style-type: none"> 1. Earth and Rock-Fill Dams: General Design and Construction considerations by United States Army Corps of Engineers, University Press of the Pacific, 2004 2. Soil mechanics in engineering and practice by Karl Terzaghi, Ralph B. Peck, Gholamreza Mesri, 3rd Edition. Wiley India Pvt Ltd, 2010. 			
Modes of Evaluation and Rubric			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
List/Links of e-learning resource			
https://nptel.ac.in/courses/105/106/105106052/ nptel.ac.in/content/storage2/courses/105101083/download/lec26.pdf			
Recommendation by Board of studies on		16.12.2022	
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Semester/Year		VI/III		Program		B.Tech								
Subject Category	DE-I (C)	Subject Code:	CE-1862-DE-I (C)	Subject Name:	Rock Mechanics									
Maximum Marks Allotted						Contact Hours			Total Credits					
Theory			Practical		Total Marks	L	T	P						
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					70	20	10	30	20	150
Prerequisites:														
Geotechnical Engineering														
Course Objective:														
<ol style="list-style-type: none"> 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:														
<ol style="list-style-type: none"> 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. 														
UNITS	Descriptions										Hrs.	CO's		
I	Exploration and classification of rocks and rock masses. Physical properties of rocks, rock formation, joints, faults, schistosity and cleavage.										8	CO1		
II	Mechanism of rock deformation, different types of failures, theories of rock failures.										8	CO1		
III	Apparent elastic, visco-elastic and elastic behavior of rocks. Mechanics of drilling in rocks, equipment and machines of rock blasting, rock-core sampling, recovery ratio, R..Q.D.										8	CO1		
IV	Design of structures in rock, underground power house, stresses around openings, design of tunnels and linings.										9	CO2		
V	Stability of rock slopes and rock fills, rock filled dam Laboratory methods of rock testing, Stratigraphy of India.										7	CO2		
Guest Lectures (if any)														
Total Hours											40			
Suggestive list of experiments:														
Text Book-														
<ol style="list-style-type: none"> 1. Stagg K.G. & Zienkiewicz, Rock Mechanics Engineering - John Wiley & Sons, London. 2. Obert, L & Duvall W.I., Rock Mechanics & Design of structures in Rock (New York) 														

Reference Books-

1. Laeger C., Rock Mechanics & Engineering
2. Jaeger, J.C. & Cook N.G.W. "Fundamental of Rock Mechanics"
3. Reynolds H.A. "Rock Mechanics" Grosby Lockword& Sons, London.

Modes of Evaluation and Rubric

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

List/Links of e-learning resource

<https://nptel.ac.in/courses/105/105/105105212/>

<https://nptel.ac.in/courses/105/106/105106055/>

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Semester/Year		VI/III		Program		B.Tech			
Subject Category	DE-II (A)	Subject Code:	CE-1863 DE-II (A)	Subject Name:	Environmental Engineering-I				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	4
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		3	-	2	
70	20	10	30	20	150	3	-	2	4
Prerequisites:									
Chemistry									
Course Objective:									
<ol style="list-style-type: none"> 1. To understand the basic characteristics of water and waste water audits determination in laboratory. 2. To provide adequate knowledge about the water and waste water treatment process and their design. 3. To expose the student to understand the design of water supply line, distribution system, house drainage system & sewage system. 4. To make the students capable to prepare water supply & waste water project 									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Identify the sources of water & waste water demand. 2. Apply the water treatment & waste water treatment concept and methods. 3. Prepare basic process for design of water treatment plant as well as waste water treatment plant. 4. Apply water distribution process, operation and maintenance. Preparation of water supply project. 									
UNITs	Descriptions						Hrs.	CO's	
I	Estimation of ground and surface water resources. Quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.						10	CO1	
II	Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water, water standards for different uses. Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations, maintenance of distribution system, Analysis of distribution system						8	CO2	
III	Water Treatment methods-theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.						7	CO3	
IV	Unit operations and unit process 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.						8	CO4	

V	Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerobic and anaerobic lagoons, septic tank & Imhofe tank,, sludge thickening and digestion sludge drying beds, sludge disposal.	7	CO4
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
<ol style="list-style-type: none"> 1. To study the various standards for water and waste water. 2. To study of sampling techniques for water and waste water 3. Measurement of turbidity 4. To determine the conc. of chlorides in a given water samples 5. Determination of hardness of the given sample 6. Determination of residual chlorine by "Chloroscope" 7. Determination of Alkalinity in a water sample 8. Determination of Acidity in a water sample 9. Determination of Dissolved Oxygen (DO) in the water sample. 10. Determination of BOD in the waste water sample 			
Text Book-			
<ol style="list-style-type: none"> 1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi 2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi. 			
Reference Books-			
<ol style="list-style-type: none"> 1. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi 2. Environmental Engineering - H.S. Peavy&D.R.Rowe - McGraw Hill Book Company, New Delhi 3. Water Supply & Sanitary Engg. by S.K. Husain 4. Water & Waste Water Technology - G.M. Fair & J.C. Geyer 5. Waste Water Engg. - Treatment Disposal & Reuse" - Metcalf & Eddy - Tata McGraw Will, New Delhi 6. Waste Water Treatment - Arceivala - Tata McGraw Will, New Delhi 7. Industrial Pollution Control, hand book - Lund H.F. Tata McGraw Will, New Delhi 			
Modes of Evaluation and Rubric			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
List/Links of e-learning resource			
https://nptel.ac.in/courses/103/107/103107084/			
https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/			
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-----CIVIL ENGINEERING-----

Semester/Year		VI/III		Program		B.Tech			
Subject Category	DE-II (B)	Subject Code:	CE-1863 DE-II (B)	Subject Name:	ENVIRONMENTAL IMPACT ASSESSMENT				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					L
70	20	10	30	20	150	3	-	2	4
Prerequisites:									
Environmental Engineering									
Course Objective:									
<ol style="list-style-type: none"> 1. To provide basic understanding of EIA process as it is used for research, planning project or program evaluation, monitoring & regulatory enforcement. 2. To introduce students to the legal, social, administrative and technical process of preparing or evaluating environmental impact document. 3. To relate the use of scientific research to practical situation in project planning and decision making 									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Carryout scoping or screening of development project for Environmental & social assessment. 2. Explain different methodologies for environmental impact prediction and assessment. 3. Fully participate in interdisciplinary environmental report preparation. 4. Plan utilize EIA document for policy development, project planning or for legal or political action. 5. Evaluate environmental impact assessment report for possible environmental effects & prepare appropriate initial studies. 									
UNITS	Descriptions						Hrs.	CO's	
I	Concept of EIA: Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)						9	CO1	
II	Methods of Impact Identification: Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.						9	CO2	
III	Impact analysis: Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.						6	CO3	
IV	Preparation of written documentation: Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.						9	CO4	
V	Public Participation in Environmental Decision making: Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public						7	CO5	

	participation techniques, Practical considerations for implementation.		
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
Text Book-			
1. Canter R.L., Environmental Impact Assessment, McGraw Hill, New Delhi.			
Reference Books-			
1. Shukla S.K. & Shrivastava P.R., Concept in Environmental Impact Analysis, Common Welth Publication, New Delhi 1992			
Modes of Evaluation and Rubric			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
List/Links of e-learning resource			
https://nptel.ac.in/courses/103/107/103107084/			
https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/			
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 -----**CIVIL ENGINEERING**-----

Semester/Year		VI/III	Program		B.Tech				
Subject Category	DE-II (C)	Subject Code:	CE-1863 DE-II (C)	Subject Name:	COST EFFECTIVE & ECO-FRIENDLY STRUCTURES				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory		Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		70	3	-	2
Prerequisites:									
<ol style="list-style-type: none"> 1. Understand the Definition, Concept & Objectives of the terms cost effective & Eco-Friendly construction 2. Apply cost effective techniques in construction 3. State the importance of cost-effective construction & evaluate the objectives of green buildings. 4. Explain how Pre-Engineered Construction can be cost effective & select alternative Construction System. 5. Know the concept of Integrated Life cycle design of Materials and Structures 									
Course Objective:									
<ol style="list-style-type: none"> 1. Understand the Definition, Concept & Objectives of the terms cost effective & Eco-Friendly construction 2. Apply cost effective techniques in construction 3. State the importance of cost-effective construction & evaluate the objectives of green buildings. 4. Explain how Pre-Engineered Construction can be cost effective & select alternative Construction System. 5. Know the concept of Integrated Life cycle design of Materials and Structures 									
Course Outcomes:									
<p>On completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. State the importance of cost-effective construction. 2. Identify Environmental Issues 3. Know the application of Ferro cement & Ferro concrete Structures 4. How Pre-Engineered Construction can be cost effective 5. Compare Initial Cost of Cost Effective & Eco-Friendly Construction V/s Conventional Construction 									
UNITS	Descriptions					Hrs.	CO's		
I	<p>Concepts of energy efficient & environment friendly materials and techniques. Cost effective materials: - Soil, Fly ash, Ferrocement, Lime, Fibres, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer. Energy Efficient & Environment friendly building material products: -Basic concepts of Energy efficient buildings, Walls - Stabilised and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone masonry blocks, Ferrocement partitions. Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof,</p>					8	CO1		

	Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof, M.C.R. tile, Pavelled Blocks		
II	Cost effective construction techniques and equipment's: - (a) Techniques: - Rat trap bond construction, Energy Efficient roofing's, Ferrocement technique, Mud Technology. (b) Equipment's: - Brick moulding machine, Stabilised soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferrocement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.	9	CO2
III	Cost effective sanitation: - (a) Waste water disposal system (b) Cost effective sanitation for rural and urban areas (c) Ferrocement Drains	8	CO3
IV	Low-Cost Road Construction: - Cost effective road materials, stabilization, construction techniques tests, equipment used for construction, drainage, maintenance.	8	CO4
V	Cost analysis and comparison: - (a) All experimental materials (b) All experimental techniques	7	CO5
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
Text Book-			
1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao – New Age International Publishers			
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPON Press			
Reference Books-			
1. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers			
2. Buildings How to Reduce Cost – Laurie Backer - Cost Ford			
Modes of Evaluation and Rubric			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
List/Links of e-learning resource			
https://nptel.ac.in/courses/105/102/105102195/			
https://nptel.ac.in/courses/127/101/127101014/			
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Semester/Year		VI/III		Program		B.Tech			
Subject Category	DE-III (A)	Subject Code:	CE-1864-DE-III (A)	Subject Name:	STRUCTURAL ANALYSIS – II				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10	-	-	100	3	-	-	3
Prerequisites:									
Structural Analysis – I									
Course Objective:									
<ol style="list-style-type: none"> 1. To analyse and evaluate systems in structural engineering using various force and displacement methods. 2. Approximate analysis of structures for gravity and lateral loads, matrix flexibility and stiffness methods of structural analysis. 3. Students can state computer implementation of the structural engineering problems. 4. Perform plastic analysis of various structures. 5. Students will be competent to provide solution for most of the real life structural Engineering problems.. 									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Understand various classical and matrix methods of structural analysis for determinate and indeterminate structures. 2. Perform analysis of various civil engineering structures for static and dynamic loadings. 3. Analyse beams and frames using plastic analysis. 4. Draw influence line diagrams for statically determinate & indeterminate structure. 									
UNITs	Descriptions					Hrs.	CO's		
I	Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals frames with inclined members. Analysis of beams, sway and non-sway frames by Kani's method.					9	CO2		
II	Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads, Approximate analysis of multistory frames for vertical and lateral loads.					9	CO2		
III	Matrix methods of structural analysis: Flexibility Method & Stiffness Method for beams and trusses.					8	CO1		
IV	Plastic analysis of beams and frames.					7	CO3		
V	Influence lines for indeterminate structures, Muller-Breslau's principle, Analysis of Beam-Columns.					7	CO2		
Guest Lectures (if any)									
Total Hours						40			
LIST OF EXPERIMENTS:									

Reference Books-

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

Modes of Evaluation and Rubric

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

List/Links of e-learning resource

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

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

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

Recommendation by Board of studies on

16.12.2022

Approval by Academic council on

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Civil Engineering



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 -----**CIVIL ENGINEERING**-----

Semester/Year		VI/III	Program		B.Tech			
Subject Category	DE-III (B)	Subject Code:	CE-1864-DE-III (B)	Subject Name:	Structural Dynamics			
Maximum Marks Allotted						Contact Hours		Total Credits
Theory			Practical		Total Marks			
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work			L	T
70	20	10	-	-	100	3	-	-

Prerequisites:

Structural Analysis

Course Objective:

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

Course Outcomes:

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

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

V	DESIGN METHODOLOGY Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 1993 – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Later load analysis – Design and detailing as per IS:13920 – 1993.	7	CO1
Guest Lectures (if any)			
Total Hours		40	
Text Book-			
1. Chopra, A.K., "Dynamics of Structures – Theory and Applications to Earthquake Engineering", 4th Edition, Pearson Education, 2011.			
Reference Books-			
1. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd. 2007			
Modes of Evaluation and Rubric			
Quiz, Assignment, Mid-term exam and End term exam. Rubric: End term exam.			
List/Links of e-learning resource			
https://nptel.ac.in/courses/105/106/105106151/			
https://nptel.ac.in/courses/105/101/105101209/			
Recommendation by Board of studies on		16.12.2022	
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 -----**CIVIL ENGINEERING**-----

Semester/Year		VI/III		Program		B.Tech			
Subject Category	DE-III (C)	Subject Code:	CE-1864-DE-III (C)	Subject Name:	Precast and modular construction				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					70
	20	10	-	-	100			3	
Prerequisites:									
Pre stress Concrete									
Course Objective:									
At the end of this course the student shall be able to appreciate modular construction, industrialized construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.									
Course Outcomes:									
The student shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods in using these elements									
UNITS	Descriptions						Hrs.	CO's	
I	INTRODUCTION Need for prefabrication – Principles – Materials – Modular coordination Standardization – Systems – Production – Transportation – Erection.						8	CO1	
II	PREFABRICATED COMPONENTS Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls						8	CO1	
III	DESIGN PRINCIPLES Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.						8	CO1	
IV	JOINT IN STRUCTURAL MEMBERS Joints for different structural connections – Dimensions and detailing – Design of expansion joints						8	CO1	
V	DESIGN FOR ABNORMAL LOADS Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse						8	CO1	
Guest Lectures (if any)									
Total Hours						40			
Text Book-									
1. CBRI, Building materials and components, India, 1990 2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994									
Reference Books-									
1. CBRI, Building materials and components, India, 1990 2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994									

Modes of Evaluation and Rubric	
Quiz, Assignment, Mid term exam and End term exam. Rubric: End term exam.	
List/Links of e-learning resource	
https://nptel.ac.in/courses/124/105/124105013/ https://nptel.ac.in/courses/105/106/105106117/	
Recommendation by Board of studies on	16.12.2022
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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	OC-II (A)	Subject Code:	CE-1865-OC-II (A)	Subject Name:	Hydrology & Water Resource Engineering					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P		
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					3	-
70	20	10	-	-	100				3	
Prerequisites:										
Fluid mechanics and Engineering Mathematics.										
Course Objective:										
<ol style="list-style-type: none"> 1. Student will understand the Role of the Water resources in Development of human civilization and sustainability. Student will learn the concept, theory and principle related to Hydrological cycle and application of water for irrigation purpose. Student will learn Data Collection techniques related to various parameter like precipitation, Runoff and losses. 2. Student will learn Analysis of Data, its interpretation and use for forecasting and related problems. 3. Student will learn Design of the Structures for Flood control, Canals, Wells etc 										
Course Outcomes:										
After completion of the course, the student will be able to:										
<ol style="list-style-type: none"> 1. Understand the Role of the Water resources in human civilization and its development. Demonstrate concept, theory and principle related to Hydrological cycle and application of water for irrigation purpose. Understand the data Collection techniques related to various parameter like precipitation, Runoff and losses. 2. To acquire aptitude for Analysis of Data, its interpretation and use for forecasting related problems. 3. Design the Structures for Flood control, Canals, Wells.etc 										
UNITS	Descriptions						Hrs.	CO's		
I	Hydrology : Hydrological cycle, precipitation and its measurement, recording and non-recording rain gauges, estimating missing rainfall data, rain gauge networks, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.						15	CO1/CO2		
II	Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood						5	CO1/CO2		

	control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects. reclamation of water logged and salt affected lands.		
III	Water resources planning and management: Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.	8	CO1/CO2
IV	Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, economics. Canal falls & cross drainage works, - description and design, head and cross regulators. escapes and outlets, canal transitions.	7	CO1/CO3
V	Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.	5	CO1/CO2 CO3
Guest Lectures (if any)			
Total Hours		40	
Text Book-			
1. Hydrology Engg. Hydrology - J.NEMEC - Prentice Hall			
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.			
3. Engg. Hydrology by K. Subhramanya - Tata McGraw Hills Publ. Co.			
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers			
5. Engg. Hydrology by H.M. Raghunath			
6. A Text book of Hydrology-Dr.P.Jaya Rami Reddy-University Science press			
Reference Books-			
1. Irrigation & Water Power Engg. - Dr. B.C. Punmia, Dr. Pande, B.B. Lal			
2. Irrigation, Water Resources & Water Power by Dr. P.N. Modi			
3. Irrigation Engineering by Varshney			
4. Irrigation Engineering by Santosh Kumar Garg			
5. Irrigation, Water Power & Water Resources Engg. by K.R. Arora			
Modes of Evaluation and Rubric			
Quiz, Assignment, Mid-term exam and End term exam. Rubric: End term exam.			

List/Links of e-learning resource

<https://nptel.ac.in/courses/105/104/105104103/>

<https://nptel.ac.in/courses/105/105/105105110/>

Recommendation by Board of studies on

16.12.2022

Approval by Academic council on

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

Semester/Year		VI/III	Program		B.Tech				
Subject Category	OC-II (B)	Subject Code:	CE-1865-OC-II (B)	Subject Name:	Building Services				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10	-	-	100	3	-	-	3
Prerequisites:									
Building Planning and Architecture									
Course Objective:									
The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following objectives:									
<ol style="list-style-type: none"> 1. Plan various types of services required for different types of buildings. 2. Supervise installation and testing of services such as lift, fire protection, elevators, escalators, acoustic and sound insulations, lightings, air conditioning and allied services. 									
Course Outcomes:									
The theory should be taught and exercises should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.									
<ol style="list-style-type: none"> 1. Manage building services provisions in big construction sites. 2. Synchronize the construction activities with installation of building services 3. Select the suitable electrical as well mechanical services for particular requirements of buildings. 4. Ensure green building applications to the new constructions. 									
UNITs	Descriptions					Hrs.	CO's		
I	Introduction to Building Services Definitions, Objective and uses of services, Applications of services for different types building considering, Classification of building services, Types of services and selection of services, Natural and artificial lighting- principles and factors, Arrangement of luminaries, Distribution of illumination, Utilization factors. Necessity of Ventilation Types – Natural and Mechanical Factors to be considered in the design of Ventilation.					9	CO1		
II	Electrical Services and Layout Electrical services in the building technical terms and symbols for electrical installations and Accessories of wiring, Systems of wiring like wooden casing, cleat wiring, CTS wiring conduit wiring. Types of insulation, electrical layout for residence, small work shop, show room, school building, etc.					9	CO2		
III	Mechanical Services in Buildings Introduction of mechanical services. Lift: Definition, Types of Lifts, Design Considerations, Location, Sizes, Component parts- Lift Well, Travel, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car,					6	CO3		

	<p>Landing Door, Call Indicators, Call Push</p> <p>Elevators & Escalators: (a) Different types of elevators and Escalators, Freight elevators, Passenger elevators, Hospital elevators, (b) Uses of different types of elevators Escalators.</p> <p>Dumbwaiters: (a) Different types of Dumbwaiters, (b) Uses of different types of Dumbwaiters.</p> <p>Conveyors: (a) Different types of Conveyors, (b) Uses of different types of Conveyors</p> <p>Air Conditioning: (a) Definition, Purpose, Principles, Temperature Control, Air Velocity Control, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers, Electric preceptors, (b) Types of Air Conditioners, (Central type, Window Type, Split Unit).</p>		
IV	<p>Fire Protection, Acoustic and Sound Insulations</p> <p>Introduction, causes of fire and Effects of fire, General Requirements of Fire Resisting building as per IS and NBC 2005, Characteristics of Fire resisting materials. Maximum Travel Distance, Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs, Requirement of good Acoustic, Various sound absorber, Factors to be followed for noise control in residential building.</p>	9	CO3
V	<p>Miscellaneous Services and Green Buildings Provisions</p> <p>Rain water harvesting for buildings, Concept of GREEN buildings, Components of GREEN building, Introduction and Significance to Grey water, Components of Grey water system, Management of Grey water system.</p>	7	CO4
Guest Lectures (if any)			
Total Hours		40	
Text Book-			
Reference Books-			
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/105/102/105102176/			
https://onlinecourses.nptel.ac.in/noc20_ce09/preview			
Recommendation by Board of studies on	16.12.2022		
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 -----**CIVIL ENGINEERING**-----

Semester/Year		VI/III	Program		B.Tech				
Subject Category	OC-II (C)	Subject Code:	CE-1865-OC-II (C)	Subject Name:	Operation Research				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work				L	T
70	20	10	-	-	100	3	-	-	3

Prerequisites:

Operations Research now a day widely used in the area of decision making for the real-life problems. Managers and decision makers get idea for optimizing and approximating industrial problems. They not only strive to devise appropriate measures for problem solving but also apply scientific techniques to monitor the organizations ongoing activities such as production mix, transportation, queuing, assignment, dynamic, Integer, goal and game problem.

Course Objective:

Operations Research now a day widely used in the area of decision making for the real-life problems. Managers and decision makers get idea for optimizing and approximating industrial problems. They not only strive to devise appropriate measures for problem solving but also apply scientific techniques to monitor the organizations ongoing activities such as production mix, transportation, queuing, assignment, dynamic, Integer, goal and game problem.

Course Outcomes:

- After completion of the course, the student will be able to:
1. Students will be able to describe characteristics and scope of OR.
 2. Students will be able to define and formulate mathematical problems.
 3. Students will be able to select optimal problems solving techniques for a given problem using LP.
 4. Students will be able to formulate and solve transportation, travelling sales man and trans-shipment problems.
 5. Students will be able to formulate and solve optimization problems related to job/ work assignments.

UNITs	Descriptions	Hrs.	CO's
I	Operations Research: Origin of Operation Research, Historical Standpoint, Methodology, Different Phases, Characteristics, Scope and Application of Operations Research Linear Programming Problem: Introduction, Requirement of LP, Basic Assumptions, Formulation of LP, General Statement of LP, Solution techniques of LP: Graphical Methods, Analytical Methods: Simplex, Big M and Two Phase, Sensitivity Analysis, Primal and Dual Problems, Economic Interpretation.	9	CO1
II	Transportation and Assignment: Transportation Problems definition, Linear form, Solution methods: North west corner	9	CO2

	<p>method, least cost method, Vogel's approximation method. Degeneracy in transportation, Modified Distribution method, Unbalanced problems and profit maximization problems. Transshipment Problems. Assignment Problems and Travelling sales man Problem.</p> <p>Queuing Theory: Basis of Queuing theory, elements of queuing theory, Kendall's Notation, Operating characteristics of a queuing system, Classification of Queuing models, Preliminary examples of M/M/1: ∞/FCFA.</p>		
III	<p>Inventory Control: Inventory classification, Different cost associated to Inventory, Economic order quantity, Inventory models with deterministic demands, ABC analysis.</p> <p>Replacement theory: Introduction, Replacement of capital equipment which depreciated with time, replacement by alternative equipment, Group and individual replacement policy.</p>	7	CO3
IV	<p>Game Theory: Introduction, Characteristics of Game Theory, Two Person, zero sum games, Pure strategy. Dominance theory, Mixed strategies (2x2, mx2), Algebraic and graphical methods.</p> <p>Decision Theory: Introduction, Decision under certainty, Decision under risk, Decision under uncertainty: Laplace criterion, Maxi Min criterion, Mini Max criterion, savage Mini Max regret criterion, hurwicz criterion, Decision tree.</p>	8	CO4
V	<p>Project Management: Introduction to PERT and CPM, critical Path calculation, float calculation and its importance. Cost reduction by Crashing of activity.</p>	7	CO5
Guest Lectures (if any)			
Total Hours		40	
Text Book-			
<ol style="list-style-type: none"> 1. Operations Research: An Introduction by Hamdy Taha, Pearson 2. Operations Research by A M Natarajan, P Balasubramani, A Tamilarasi, Pearson Education Inc 3. Operations Research by P Mariappan, Pearson 4. Operations Research by H N wagner, Prentice Hall. 			
Reference Books-			
<ol style="list-style-type: none"> 1. Optimization in Operations Research by Ronald Rardin, Pearson Education Inc. 2. Operations Research by R. Paneerselvam, Prentice Hall of India Pvt. Ltd. 3. Quantitative Techniques in Management by N D Vohra, Tata McGraw-Hill 			
Modes of Evaluation and Rubric			
<p>Quiz, Assignment, Mid-term exam and End term exam. Rubric: End term exam.</p>			

List/Links of e-learning resource	
https://nptel.ac.in/courses/110/106/110106062/ https://nptel.ac.in/courses/111/107/111107128/	
Recommendation by Board of studies on	16.12.2022
Approval by Academic council on	
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-----CIVIL ENGINEERING-----

Semester/Year		VI/III	Program		B.Tech				
Subject Category	DLC	Subject Code:	CE-1866	Subject Name:	Minor Project -I				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					-
-	-	-	30	20	50	-	-	4	
Modes of Evaluation and Rubric									
Practical Viva. Rubric: Practical: 50% Quiz and 50% Viva.									
Recommendation by Board of studies on				16.12.2022					
Approval by Academic council on									
Compiled and designed by									
Subject handled by department				Civil Engineering					