

Civil Engineering Department

Semester - VIII

Teaching Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS 4002	Engineering Ethics ^s	3	0	0	4
CE 4502	B.Tech. Project	0	0	0	8
	Open Electives	3	0	0	4
	Total	6	0	0	16

Open Electives

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
CE 4004	Reinforced Soil Structure	3	0	0	4
CE 4005	Bridge and Tunnel Engineering	3	0	0	4
CE 4009	Geosynthetics for Infrastructure Applications	3	0	0	4
CE 4010	Prestressed Concrete	3	0	0	4
CE 5018	Pavement Design and Evaluation	3	0	0	4

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I	Course Code	CE 4502			
II	Course Title	B.Tech. Project			
III	Credit Structure	L	T	P	C
		0	0	0	8
IV	Prerequisite	—			
V	Instructor(s)	Respective student group supervisor(s)			
VI	Course Content	The B.Tech. project shall be the major project work focussing on developing practical and analytical skills of students by either working individually or preferably in a team on a problem that consist of any one or combination of various infrastructural aspects including experimentation, analysis and design of structures, geotechnical investigations, water supply distribution system, irrigation engineering and transportation systems.			
VII	Any other Remarks				

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I	Course Code	CE 4004			
II	Course Title	Open Elective - I Reinforced Soil Structure			
III	Credit Structure	L	T	P	C
		3	0	0	4
IV	Prerequisite	Soil Mechanics, Foundation Engineering			
V	Course Content	<p>1.Ground Anchor: Types, forces on an anchor, design of ground anchor</p> <p>2.Anchored Walls: Design of anchored bulkhead Free earth support method, fixed earth support method, design of anchor</p> <p>3.Reinforced Earth: Introduction, background of reinforced earth, mechanism and concepts, Basis of reinforced earth wall design, sustainability approach</p> <p>4.Reinforced Soil Retaining Walls: Different types of walls like wrap-around walls, full height panel walls, discrete-facing panel walls, modular block walls, design methods as per Codes, construction methods for reinforced soil retaining walls</p> <p>5.Analysis of Reinforced Soil Structures using Computation Tools</p>			
VI	Text/References	<ol style="list-style-type: none"> 1. FHWA-IF-99-015 Technical Manual 2. Koernar, R. M. (2005) Designing with geosynthetics, 5th Edition, Prentice Hall, New Jersey, USA. 3. Shukla, S. K. and Yin, J. H. (2006) Fundamentals of Geosynthetic Engineering, Taylor and Francis, UK. 4. Published literature in the field of Soil Mechanics and Foundation Engineering 			

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I	Course Code	CE 4005			
II	Course Title	Open Elective - II Bridge and Tunnel Engineering			
III	Credit Structure	L	T	P	C
		3	0	0	4
IV	Prerequisite	Nil			
V	Course Content	<p>Bridge Engineering: Introduction: Importance of bridges, Requirement for ideal bridges, Site investigation, Components of bridge, waterway calculations, scours depth, afflux, and economic span. Bridge Classification: Classification of superstructures with respect to structural behaviour and material used, types of substructures, flooring joints, bridge bearings, movable bridges, temporary bridges. Bridge Foundations: Requirements of good foundation, Subsoil exploration, types of foundation, Caissons and cofferdams. Bridge bearings and design loads: Functions and types of bearings, Types of design loads, forces acting on different components of bridges. Construction methods: Methods of erection of various types of bridges, Superstructures and substructures. Maintenance: Bridge failures, Testing and strengthening of bridges.</p> <p>Tunnel Engineering: General aspects of Tunnelling: Tunnel and open-cut, classification of tunnels, shape & size of tunnels. Alignment of Tunnel: Investigation of tunnel sight, alignment, blasting and excavation. Shafts and Portals: Location & Classification of shafts, Construction of shafts, Portals, Twin tunnels Tunnelling techniques in Hard Rock and soft ground: Sequence of tunnelling in rock, methods of tunnelling in rock, methods of tunnelling in soft grounds, Shield tunnelling. Tunnel lining: Need for lining, lining material and procedure. Miscellaneous topics: Lighting, Ventilation and dust control, Drainage system, safety in tunnel construction.</p>			
VI	Text/References	<ol style="list-style-type: none"> 1. Bernhard Maidl, Markus Thewes, Ulrich Maidl, Handbook of Tunnel Engineering, First Edition, Wiley & sons. 2. Kuesel, Thomas R., King, Elwyn H., Bickel, John O, Tunnel Engineering Handbook, Springer. 3. S.P. Bindra, Principles and Practice of Bridge Engineering, Dhanpat Rai & Sons, New Delhi 4. D.J. Victor, Essential of Bridge Engineering, Oxford & IBH Pub. Co. Ltd. Mumbai 5. Rangwala, Railway, Bridge and Tunnel Engineering (2nd Edition), Charotar Publishing House. 6. J.A.L. Waddell, Bridge Engineering, John Wiley & Sons. 7. S.C. Saxena, Tunnel Engineering, Dhanpat Rai & Sons, New Delhi. 			

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I	Course Code	CE 4009			
II	Course Title	Open Elective - III Geosynthetics for Infrastructure Applications			
III	Credit Structure	L	T	P	C
		3	0	0	4
IV	Prerequisite	Soil Mechanics, Foundation Engineering			
V	Instructor(s)	Dr. Trudeep N. Dave			
VI	Course Content	<p>Introduction: Geosynthetics classification - on the bases of functions, applications, raw materials used, types, manufacturing, system, design and sustainability; Background of reinforced earth, mechanism and concepts, Basis of reinforced earth wall design</p> <p>Reinforced Soil Retaining Walls: Different types of walls like wrap-around walls, full height panel walls, discrete-facing panel walls, modular block walls, design methods as per Codes, construction methods for reinforced soil retaining walls</p> <p>Geosynthetics - Reinforced Slope Application: Guidelines for design of reinforced slopes, Basal reinforcement for construction on soft clay soils, construction of steep slopes with reinforcement layers, different slope stability analysis methods like planar wedge method, bi-linear wedge method, circular slip methods, erosion control on slopes using geosynthetics</p> <p>Geosynthetics - Drainage and Filtration Applications: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles, estimation of flow of water in retaining walls, pavements, etc. and selection of geosynthetics</p> <p>Geosynthetics - Pavement Application: Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics</p> <p>Use of Computational tools to analyse Effectiveness of Geosynthetics Application</p>			
VII	Text / References Books:	<ol style="list-style-type: none"> 1. Koernar, R. M. (2005) Designing with geosynthetics, 5th Edition, Prentice Hall, New Jersey, USA. 2. Shukla, S. K. and Yin, J. H. (2006) Fundamentals of Geosynthetic Engineering, Taylor and Francis, UK. 3. Shukla, S. K. (2002) Geosynthetics and Their Applications, Thomas Telford, London. 4. Recently Published Technical Literature 			

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I	Course Code	CE 4010			
II	Course Title	Open Elective - IV Prestressed Concrete			
III	Credit Structure	L	T	P	C
		3	0	0	4
IV	Prerequisite	Nil			
V	Instructor(s)	Dr. Mamta Sharma			
VI	Course Content	<p>Introduction: Theory and Behavior Basic Concepts, Advantages, Materials of Prestressed Concrete, classification of types of Prestressing, Concepts of prestressing, analysis of sections, Applications of prestressed concrete, High strength concrete, High tensile steel, Prestressing Methods and devices, Concepts of load balancing, Tendons and cables, deflections of prestressed concrete members, Effect of tendon profile on deflections, factors influencing deflections, short term and long term deflections, losses of prestress, Estimation of crack width</p> <p>Design Concepts (Flexure and Shear): Analysis of flexure, Behaviour of prestressed concrete elements in flexure, Simplified codal procedures (IS 1343), strain compatibility method, shear and torsional behaviour of prestressed concrete members, Transmission of prestressing force through bond, concepts of limit states, Design of post tensioned and pre tensioned beams (IS 1343)</p> <p>Deflections and Design of Anchorage Zone: Factors influencing deflections, short term deflections of uncracked members, long term deflections due to creep and shrinkage, check for serviceability of limit states, anchorage zone stresses in posttensioned beams; Mangnel's method, Guyon's method, and IS 1343, design of anchorage zone reinforcement, check for transfer bond length in pretensioned beams</p> <p>Composite Construction: Analysis and design of composite beams, methods of achieving continuity in Continuous beams, analysis of secondary moments, calculations of stresses, principles of design</p> <p>Miscellaneous Prestressed Concrete Structures: Design of tension and compression members, tanks, pipes, slabs, poles, and sleepers, construction, maintenance and rehabilitation of prestressed concrete structures, introduction of prestressed high performance concrete and prestressed nano concrete</p>			
VII	Text/References	<ol style="list-style-type: none"> 1. N Krishna Raju, Prestressed Concrete, Mc Graw Hill Education (India) Private Limited, Chennai. 2. N. Rajagopalan, Prestressed Concrete, Alpha Science International Limited, Pangbourne England. 3. T. Y. Lin, Design of Prestressed Concrete Structures, John Wiley & Sons. 			

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I	Course Code	CE 5018			
II	Course Title	Open Elective - V Pavement design and evaluation			
III	Credit Structure	L	T	P	C
		3	0	0	4
IV	Prerequisite	Transportation Engineering			
V	Course Content	<p>Introduction to Pavement Design: Definition: Pavement, Desirable Characteristics Of Pavement, Pavement Types Flexible and Rigid, Pavement Courses and its Function, Comparison: Flexible and Rigid Pavement, Comparison: Highway and Runway Pavements, Factors affecting pavement design, Pavement materials: Soil subgrade, Bitumen, Aggregates, Bituminous Mix Stresses and strains in Flexible Pavements: Layered System Concepts, One-layer, Two-layer, Three-layer system.</p> <p>Design of Flexible Pavements: Design of flexible pavements as per IRC 37 and other methods for stabilized and un-stabilized base and subgrade layers.</p> <p>Stresses and Deflections in Rigid Pavements: Stresses due to loading, Stresses due to temperature changes (Curling), Stresses due to friction, Stresses due to reinforcement, Design of Joints.</p> <p>Design of Rigid Pavements: Design of rigid pavements as per IRC 58 for stabilized and un-stabilized base and subgrade layers.</p> <p>Pavement Management System : Pavement Distresses, Pavement Evaluation, Strengthening of Existing Pavement Overlay design using IRC 81 & IRC: SP76</p>			
VI	Text/References	<ol style="list-style-type: none"> 1. Y.H. Huang. Pavement Analysis and Design, 2nd Edition, 2004, Pearson Prentice Hall, USA 2. E.J. Yoder & M.W. Witczak. Principles of Pavement Design, 2nd Edition, 2011, John Wiley & Sons. 3. L.R. Kadiyali & N.B. Lal. Principles and Practices of Highway Engineering, 6th Edition 2013, Khanna Publishers, New Delhi. 4. MORT&H- Specifications for Roads and Bridges, 5th Revision, 2013. 5. IRC: 37-2012. Tentative Guidelines for the Design of Flexible Pavements, Indian Road Congress, Delhi. 6. IRC: 58-2011. Tentative Guidelines for the Design of Rigid Pavements, Indian Road Congress, Delhi. 7. IRC: 81-2012. Guidelines for Strengthening of Flexible Road Pavements Using Benkelman Beam Deflection Technique, Indian Road Congress, Delhi 8. IRC: SP: 76-2015. Guidelines for Conventional and Thin White-topping, Indian Road Congress, Delhi. 			
VII	Any other Remarks				