

K L UNIVERSITY
SCHOOL OF CIVIL AND MECHANICAL SCIENCES
Department of Civil Engineering
Academic Year_2020-21

K L UNIVERSITY:

Vision

- To be a globally renowned university

Mission

- To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

VISION, MISSION, LONG TERM GOALS, SHORT TERM GOALS, PEO's PO's and GA's OF DEPARTMENT:

Vision

- To impart knowledge and excellence in Civil Engineering with global perspectives to the student community and to make them ethically strong engineers to build our nation.

Mission

- Our mission is to provide holistic development of student community to meet the ever changing needs of civil engineering industry and to be involved in forward looking research and consultancy useful to society.

M. Tech. (Structural Engineering) - Civil Engineering Programme

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

- Demonstrate knowledge in broad areas of Structural Engineering
- Demonstrate a depth of knowledge in a chosen/focus area of Structural Engineering
- Demonstrate knowledge of contemporary issues in their chosen/ focused area
- Demonstrate the ability to complete a technical project independently

PROGRAMME OUTCOMES (POs):

On completing the M. Tech. (Structural Engineering) – Civil Engineering Programme successfully the students will exhibit the following capabilities:

1. knowledge of a broad range of structural methodologies and underlying civil engineering, commonly used in the development and analysis of Structural Engineering systems.
2. Knowledge of fundamental design issues relevant to Structural Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts.

3. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques.
4. Knowledge of basic research and development principles and practices relevant to main stream engineering industry.
5. Knowledge of key professional, safety and ethical issues arising in modern engineering industry.
6. Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects.

M. Tech. (Construction Technology and Management) - Civil Engineering Programme

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

- Demonstrate knowledge in broad areas of Construction Technology and Management
- Demonstrate a depth of knowledge in a chosen/focus area of Construction Technology and Management
- Demonstrate knowledge of contemporary issues in their chosen/ focused area
- Demonstrate the ability to complete a technical project independently

PROGRAMME OUTCOMES (POs):

On completing the M. Tech. (Construction Technology and Management) – Civil Engineering Programme successfully the students will exhibit the following capabilities:

1. Knowledge of a broad range of Construction Technology methodologies and underlying civil engineering, commonly used in the development and analysis of Construction Technology and Management systems
2. Knowledge of fundamental design issues relevant to Construction Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts
3. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques
4. Knowledge of basic research and development principles and practices relevant to main stream engineering industry
5. Knowledge of key professional, safety and ethical issues arising in modern engineering industry
6. Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects

M. Tech. (Geo-Technical Engineering) - Civil Engineering Program

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

- Demonstrate knowledge in broad areas of **Geo-Technical Engineering**
- Demonstrate a depth of knowledge in a chosen/focus area of **Geo-Technical Engineering**
- Demonstrate knowledge of contemporary issues in their chosen/ focused area
- Demonstrate the ability to complete a technical project independently

PROGRAMME OUTCOMES (POs):

On completing the M. Tech. (**Geo-Technical Engineering**) – Civil Engineering Programme successfully the students will exhibit the following capabilities:

- 1 To mould the students to become effective global science students in the competitive environment of modern society.
- 2 To provide students with strong foundation in contemporary practices of Science, different functional areas and scientific environment
- 3 In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques
- 4 Knowledge of basic research and development principles and practices relevant to main stream engineering industry
- 5 Knowledge of key professional, safety and ethical issues arising in modern engineering industry
- 6 To pursue lifelong learning as a means of enhancing knowledge and skills necessary to Contribute to the betterment of profession

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF PEOs vs. Mission Statement (Structural Engineering)

Programme Educational Objectives		Mission Statement		
		To provide holistic development of student to meet the ever-changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
1	Demonstrate knowledge in broad areas of Structural Engineering	√	√	√
2	Demonstrate a depth of knowledge in a chosen/focus area of Structural Engineering	√	√	√
3	Demonstrate knowledge of contemporary issues in their chosen/focused area.	√		√
4	Demonstrate the ability to complete a technical project independently	√	√	√

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF PEOs vs. Mission Statement (Construction technology and Management)

Programme Educational Objectives		Mission Statement		
		To provide holistic development of student to meet the ever-changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
		√	√	√
1	Demonstrate knowledge in broad areas of Construction Technology and Management	√	√	√
2	Demonstrate a depth of knowledge in a chosen/focus area of Construction Technology and Management	√	√	√
3	Demonstrate knowledge of contemporary issues in their chosen/focused area.	√		√
4	Demonstrate the ability to complete a technical project independently	√	√	√

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF PEOs vs. Mission Statement (Geo-Technical Engineering)

Programme Educational Objectives		Mission Statement		
		To provide holistic development of student to meet the ever changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
1	Demonstrate knowledge in broad areas of Geo-Technical Engineering	√	√	√
2	Demonstrate a depth of knowledge in a chosen/focus area of Geo-Technical Engineering	√	√	√
3	Demonstrate knowledge of contemporary issues in their chosen/focused area	√		√
4	Demonstrate the ability to complete a technical project independently	√	√	√

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF POs vs. PEOs (Structural Engineering)

Program Outcomes		Programme Educational Objectives			
		Demonstrate knowledge in broad areas of Structural Engineering	Demonstrate a depth of knowledge in a chosen/focus area of Structural Engineering	Demonstrate knowledge of contemporary issues in their chosen/ focused area.	Demonstrate the ability to complete a technical project independently
1	knowledge of a broad range of structural methodologies and underlying civil engineering, commonly used in the development and analysis of Structural Engineering systems	√	√		√
2	Knowledge of fundamental design issues relevant to Structural Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts	√	√		√
3	In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques	√	√		√
4	Knowledge of basic research and development principles and practices	√	√		√

	relevant to main stream engineering industry.				
5	Knowledge of key professional, safety and ethical issues arising in modern engineering industry.	√	√		√
6	Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects.	√	√		√

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF POs vs. PEOs (Construction Technology and Management)

Program Outcomes		Programme Educational Objectives			
		Demonstrate knowledge in broad areas of Construction Technology and Management	Demonstrate a depth of knowledge in a chosen/focus area of Construction Technology and Management	Demonstrate knowledge of contemporary issues in their chosen/ focused area.	Demonstrate the ability to complete a technical project independently
1	Knowledge of a broad range of Construction Technology methodologies and underlying civil engineering, commonly used in the development and analysis of Construction Technology and Management systems	√	√		√
2	Knowledge of fundamental design issues relevant to Construction Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts	√	√		√
3	In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering	√	√		√

	systems, design methods, modeling techniques				
4	Knowledge of basic research and development principles and practices relevant to main stream engineering industry.	√	√		√
5	Knowledge of key professional, safety and ethical issues arising in modern engineering industry.	√	√		√
6	Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects.	√	√		√

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF POs vs. PEOs (Geo-Technical Engineering)

Program Outcomes		Programme Educational Objectives			
		Demonstrate knowledge in broad areas of Geospatial Technology	Demonstrate a depth of knowledge in a chosen/focus area of Geospatial Technology	Demonstrate knowledge of contemporary issues in their chosen/ focused area	Demonstrate the ability to complete a technical project independently
1	To mould the students to become effective global science students in the competitive environment of modern society.	√	√		√
2	To provide students with strong foundation in contemporary practices of Science, different functional areas and scientific environment	√	√		√
3	In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques	√	√		√
4	Knowledge of basic research and development principles	√	√		√

	and practices relevant to main stream engineering industry				
5	Knowledge of key professional, safety and ethical issues arising in modern engineering industry	√	√		√
6	To pursue lifelong learning as a means of enhancing knowledge and skills necessary to Contribute to the betterment of profession	√	√		√

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF Courses & Cos vs. POs (Structural Engineering)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	Course Type	Rationale/Objective
20CE5101	Advanced Mechanics of Solids	Interpret the theory of elasticity including strain/displacement and Hooke's law relationships in two dimensional planes	3		2	2	2	2	Added	To Understand about the Advanced Mechanics of Solids for analyzing the structures
		Able to analyse the two-dimensional problems in polar coordinates	3	2		2	2	2		
		Able to analyse the Three-dimensional problems in polar coordinates	3	2		2	2	2		
		Able to analyse the Plasticity deformations of stress and strain.	3	2		2	2	2		
20CE5102	Advanced Prestressed Concrete Design	Understand the concepts of prestressed concrete and analyze the prestressed concrete beams.	2			2	2		Retained	To understand the concepts, analysis and design of prestressed concrete members
		Analyze losses in prestressed concrete and deflection of the prestressed concrete members	2			2	2			
		Design reinforcement for Ultimate shear, torsion and bending of prestressed concrete members.	3		3	2				
		Design end blocks as per IS 1343 recommendations.	3		3	2				
		Design of prestressed members, composite sections, continuous prestressed beams	3		3	2				
20CE5103	Advanced Concrete Technology	Able to analyse the Characteristics of the Concrete Making Materials	3	2	3	1	3	3	Added	To Understand about the Advanced Concrete Technology for analyzing the structures
		Able to design Concrete Mixes as per the Different Codal Provisions	3	2	3	1	3	3		
		Able to design Concrete Mixes for Special Concretes	3	2	3	1	3	3		
		Able to analyse the Durability Issues of Concrete and the Service Life of Concrete.	3	2	3	1	3	3		
		Able to Design the Concrete Mix for various structures and able to cast and test the structural elements	3	2	3	1	3	3		
20CE52D2	Stability of Structures	Introduction to buckling of columns	2						Retained	To understand the deformation of structures and their analysis
		Analysis of lateral buckling of beams	2							
		Analysis of lateral buckling of plates and shells	2							
		Understanding the Mathematical treatment of stability problems	2							

20CE5104	Structural Dynamics	Solve response of free and forced vibrations	2	2					Retained	To become familiar with solving of response of free and forced vibrations, Arbitrary, Step and Pulse Excitations (SDOF), Earthquake Response of Linear Systems (SDOF) and Multi - degree of freedom systems
		Solve response to Arbitrary, Step and Pulse Excitations (SDOF)			2	2				
		Solve Earthquake Response of Linear Systems (SDOF)			2	2				
		Build Generalized Single Degree of Freedom Systems		2		2				
		Solve response of Multi -degree of freedom systems (MDOF)				3		3		
20CE5206	Finite Element Analysis	Understand the Basic Finite Element Concepts	2	2		2			Retained	To understand the basic concepts of finite element and analysis of various structural elements using FEM
		Analysis of Trusses, Beam Bending, Structural Frames and Column buckling using Finite Element Methods	2	2		2				
		Analysis of Higher order elements for one dimensional problems and Isometric quadrilateral elements and triangular elements	2	2		2				
		Analyse the applications based on general two-dimensional boundary value problem	2	2		2				
		Demonstrate the ANSYS software to develop the models using Finite element method				2		2		
20CE5207	Bridge Engineering	Introduction to different types of bridges and codal provisions for designing the bridge components.	1						Retained	To become familiar with basic concepts, analysis and design involved in Designing of Bridges
		Analysis and Design of slab Culvert.	2				2			
		Analysis and Design of T-Beam, sub-structure components and bearings	2				2			
		Understanding the designing of cable supported bridges.	2				2			
20CE5208	Earthquake Resistant Design of Structures	Understanding the designing of cable supported bridges.	1						Retained	To become familiar with basic concepts involved in designing of Structures against to earth quake
		Understand the system of base isolation in structures for resistance towards earthquakes and general detailing requirements of ductile structure.	1							
		Analyze a structure for earthquake forces onto the structure under static and dynamic behavior.		2						
		Design the structure for earthquake forces on 2 –storey building		2						
20CE5205	Theory of Plates and Shells	Derive the pure bending and curvature of plates	2	2		2			Retained	To understand theories involved in bending, deformation and curvature of plates and shells
		Derive the differential equation for laterally loaded rectangular plates				2		2		
		Derive the deformation of shells without bending	1							
		Understand the general theory of Cylindrical shells	2				2			

20CE51B2	Repair and Rehabilitation of structures	Understand the concept of Deterioration of structures with aging, Need for rehabilitation	1						Retained	To understand the concept of Deterioration of structures with aging, need for rehabilitation, retrofitting methods and procedures
		Understand the damage level of structures affected due to seismic loads, Damage assessment and evaluation models	1	1						
		Understand procedure of rehabilitation methods like Grouting; Detailing; Imbalance of structural stability	2	2						
		Understand the retrofitting methodology and procedure	2	2						
20CE51A1	Pre-Engineered structures	Introduction to PES	2					2	Added	To understand the behavior, analysis Pre-Engineered structures
		Design Of Industrial Buildings And Shell Roofs	2					2		
		Design Of Pre-Engineered Structures	2					2		
		Applications & Pratical Orientation	2					2		
20CE51A2	Design of offshore structures	Analysis of Wave theories	2					2	Added	To understand the behavior, analysis Design of offshore structures
		Analysis Forces of offshore structures	2					2		
		Design of offshore structure & Analysis of offshore structures	2					2		
		Design of offshore structures	2					2		
20CE52C2	Design of Tall Structures	Understanding the design criteria of Tall structures	1						Retained	To understand the behaviour, analysis and design of various tall structures
		Understanding the Loadings On Tall Structures	2				2			
		Understanding the behaviour of Rigid-Frame Structures and Shear Wall Structures		2						
		Understanding the behaviour of Tubular Structures		2						
		Dynamic analysis on Tall structures		2						
20CE51B1	Design and detailing of RC Structures	Design of RC members	2	2	2	2	2	2	Retained	To understand the basic concepts and methods involved in Design and detailing of RC Structures
		Analysis, design and detailing of flat slab, grid slab	2	2	2	2	2	2		
		Design and detailing of Elevated water tanks, cantilever and counterfort retaining walls	2	2	2	2	2	2		
		Earthquake resistant design, Ductile detailing	2	2	2	2	2	2		
20CE52C1	Fracture Mechanics	Understanding the basic concepts of Fracture and Linear Elastic Fracture Mechanics (LEFM)	1						Retained	Understanding the basic concepts of Fracture and Linear Elastic Fracture Mechanics (LEFM), Crack Tip Plasticity, Elastic Plastic Fracture Mechanics (EPFM) and Fatigue Crack Growth
		Understanding the concept of Crack Tip Plasticity	1							
		Understanding the concept Elastic Plastic Fracture Mechanics (EPFM)		2						
		Understanding the concept of Fatigue Crack Growth and practical problems of fracture mechanics		2						

20 CE 5149	Seminar						2	2		To improve the skills of presentation
20 IE 5250	Term Paper						2	2		To become Familiarize with collection of Published papers, Articles and Reports, understanding the format of standard publications and how to prepare a research publication
20 IE 6050	Dissertation						2	2		To become Familiarize with collection of Published papers, Articles and Reports, apply the knowledge gained to come up with a innovative ideas in materials, systems, designs and analysis & failures of Structures

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF Courses & Cos vs. POs (Construction Technology and Management)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	Course Type	Rationale/Objective
20CE5121	Construction Planning Scheduling and Control	Understand the concepts of project management for practical application			2				Added	The main objective of the course is to understand the Project Management, Management functions, Construction planning, Scheduling and controlling of a Project and project Management System.
		Apply mathematical logic in the planning and scheduling of a project					3			
		Apply concepts to estimate the project cost by using tools					3			
		Apply concepts to maintain the construction documents in the project		2						
		Plan, schedule, and control large-scale programs and individual projects by using Primavera/MS Project Tool				3				
20CE5122	Sustainable Construction Materials and Methods	Understand concepts of sustainable construction practices			2			2	Added	The objectives of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as concrete, bricks, and achieving the same through lower carbon cements, superior brick kilns and recycled aggregate minimizing consumption of natural resources including water. The course also explores the evaluation process of sustainable construction by using LCA tools.
		Understand basics of sustainable construction materials			2			2		
		Design the product's process to achieve sustainability features	2		2			2		
		Calculate Life Cycle Assessment of building			2		2			
		Investigate Sustainability aspects of the buildings by using LCA tools	2					2		
20CE5123	Lean Construction Practices	Understand the elements of traditional construction management				2			Added	The course aims to provide learners with an understanding of lean construction management and how these can be applied to construction projects from design phase through to construction. Furthermore, helps to understand, apply and analyse the productivity measurement systems, lean principles, practices in the construction projects. Additionally, explains the integrated application of lean with various tools and techniques through case studies.
		Understand the integrated applications of various IT tools and case studies	2	2	2					
		Apply and analyse construction productivity measuring and improving techniques	3			3				
		Implement lean principles in order to improve the customer value for sustainable project business			2	2				

		Apply and analyse the lean practices				2	2			
20CE5124	Building Information Modeling	Become familiar with the trends, concepts of Building Information Modeling	2			2			Modified	This course covers the essential knowledge a project manager should have to manage projects that are designed, delivered and constructed using Building Information Modeling tools, including Autodesk Revit. A project manager must know the differences between CAD and BIM and how to harness the power of BIM and the opportunities it creates for better design, collaboration, coordination and delivery.
		Learn about Project BIM Execution Planning				2				
		Design the BIM execution process by creating process maps				2	2			
		Develop BIM information exchanges				2	2			
		Developing BIM Model using Revit Software and submission of project report				2	2			
20CE5225	Mechanized Construction and Machinery	Understanding the basic concepts of Equipment Management and tools	2						Modified	To develop the skills to understand about the mechanized construction machinery, through standard types of equipment, earthmoving equipment, pumping equipment, pumping equipment and all certain construction handling equipment. Every project has one specific purpose, it starts at some specific moment and it is finished when its objectives have been fulfilled. Similarly management increases the productivity through equipment and skill.
		Understand various construction equipment and study the efficient utilization of the same using scientific principles	2							
		Apply the knowledge for the selection of appropriate equipment	2							
		Understand the operation of Earthwork and various functions of machinery used for Earth moving, compaction, etc.	2							
		Write field report on machinery operation, cost and productivity by using project management tools like primavera/Candy/SAP etc	2							
20CE5226	Project Formulation Appraisal	Understand the concept of project and Identification of best Project by understanding the different feasibility studies	1						Modified	The objectives of this course are to: <ul style="list-style-type: none"> introduce students to the concept of project and idea formulation; enhance the understanding of students on project management and appraisal
		Estimating the cash flows by considering the time value of money.	2				2			
		Identify the best project by analyzing facts related economic, commercial and financial aspects.	1							
		Understand in detail about Private sector partnership in construction projects.	1							
20CE5227		Understand the concept of construction laws and regulations.	1						Retained	The objective of the course is to expose students in understanding contract laws and regulations so that

	Construction Laws and Regulations	Study the current trend toward alternative project delivery systems via contractual arrangements such as design-build and construction management at risk		2								adequate knowledge on formulating and managing construction contracts is gained. Course includes the elements of concluding and administering contracts also it will make student achieve awareness on arbitrations and legal procedures. Students will be gaining knowledge of labour regulations and their impact on managing of contracts
		Investigate how to avoid the possibilities of construction disputes via alternative dispute resolution (ADR)		2								
		Understand the Labor regulations and review construction contracts and specifications		2								
20CE5228	Quality Management and Safety Management Systems in Construction	Understand the concepts of quality management and the factors influencing construction quality	1								Retained	This course provides complete understanding on quality planning, quality assurance, quality control and safety management. The fundamental reason for the course is to impart knowledge and skill for the construction students to achieve success in quality management system (QMS) by understanding and evaluating quality management principles as a formalized system that has documents, processes, procedures, and authorities, responsibilities and for achieving quality policies and objectives
		Understand quality planning and programs in construction industry	1									
		Acquire knowledge of quality management systems and ISO 9000 family of standards.	2									
		Understand and analyses quality circle (QC) concepts for possible implementation to solve construction productivity and quality problems	1									
		Understand and evaluate safety management principles in construction	2									
20CE51E1	Material Procurement Management	Understand the significance of material management	2		2						Retained	The main objective of this course to create procurement plan for a project and effective material management in the construction by using material management tools.
		Integrate important materials functions to both products and services & use MRP, ERP, & PLM managing materials				3						
		Apply various purchasing method and inventory controlling techniques into practice.				3						
		Use the Material Management tools like TALLY, ERP, SAP in materials planning, procurement, inventory, control, cost control etc.				3						
20CE51E2	Green Buildings	Understand Necessity and importance of Sustainable/ Green Buildings, Grasp the construction practices of a sustainable Buildings.						2	2		Retained	The objective of this course is to expose the student to concepts of embodied, operational and life cycle energy, minimizing energy consumption by optimal design. The course also intends to make student aware of ECBC, LEED, GRIHA etc.

		Understanding the Green Building Rating Systems, Water & Energy efficiencies, Reduction in waste material during construction and Building Design	3	3				3			
		Understanding Air Conditioning and HVAC system design, Salient features of CII Godrej Green Business Center						3	3		
		Understanding Indoor Environment Quality and Occupational Health, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,		3							
20CE51F1	Construction Personnel Management	Understand Overview of manpower planning and roles of HR		2	2					Modified	Primary objective of this course is to Introduce the elements of human behavior and their impact on construction personnel management and to explore fundamentals of human behavior under varying stress conditions and apply the studied behavior pattern to manpower planning in organizational setups
		Understand Detail about the organizations and structure variance for organizations		2	2			2			
		Understand human relations and organizational behavior for working in an organization				2	2				
		Understand welfare measures and laws related to welfare measures and Detail overview of management and development methods	2	2							
20CE51F2	Pre-Engineering Construction and Technology	Understand the type of prefabricated elements and its importance			2			2		Added	The main objective of the course is to understand production, construction design and stability of precast concrete structures. Various design and construction aspects considered in this course is precast beams, columns, shear walls and roof girder and connections
		Understand the precast construction procedure			2			2			
		Understand the modular construction practices and its limitations and advantages			2			2			
		Apply knowledge in the choice of production setup and manufacturing methods			2	2		2			

20CE52G1	Statistical Methods in Construction	Apply discrete and continuous probability distribution including requirements mean and variance and making decisions					2	Modified	The objective of this course is to collect, process, summarize, and analyze valid, scientific data for various aspects of construction requirements. The implementation of the statistical data either correlation or simulation can be applicable to predict and mitigate uncertainties in construction
		Use the concepts of standard deviation, coefficient variance in different types samples and apply the tests					3		
		Perform the correlation analysis in various civil engineering projects					2		
		Apply simulation techniques for analysis and mitigation of construction project risks					3		
20CE52G2	Project Risk Management	Identify the stages involved in a project and analyze the obligatory services to be taken up while performing a construction activity	2		2			Modified	This course covers the area of risk management in the project context. It highlights the importance of risk management and the need for project managers to think ahead in this regard. It contains essential risk management theory and concepts as applicable to project environments including project risk planning, preparation and response. It also overviews the areas of risk identification, assessment, monitoring and control. Qualitative and quantitative risk analysis techniques will be presented to students within this course.
		Cultivate an idea on effective resource utilization and identify factors affecting job productivity	2				2		
		Apply the professional skills acquired in managing a construction project.			2				
		Gain the ability to attain an equilibrium among Innovation, Technology and Economic feasibility			2				
20CE52H1	Emerging Construction Technologies	Understand the modern construction techniques used in the sub structure construction			2			Modified	This course covers the complete understanding of advanced construction techniques in sub structure super structure and repair construction Course will create awareness on tall structure construction elements and techniques used for large span structures. Course also covers about the recent and advancement in construction techniques. The course also covers the recent
		Understand the concepts used in the construction of special structures			2				

		Apply mechanism/technique for strengthening and repair methods for different cases.			2	2				advancement in concrete manufacturing and its application.
		Demonstrate knowledge and understanding of the principles and concepts relevant to super structure construction for buildings			2	2				
20CE52H2	Resource Management and Control in Construction	Understand overview of the resource planning and management of resources in construction			2	2			Modified	This course studies the resources required for construction like material, equipment, labour and time and comprehend the effective management of the same towards fruitful completion of the project and understanding of various systems and methods related to management of resources and levelling of resources.
		Understand in detail about the labor management and optimization	2			2				
		Understand equipment management and effective utilization of the material resources	2			2	2			
		Understand detail about the allocation and levelling of resources with time management			2	2				
19 IE 5148	Seminar					2	2	Retained	To improve the skills of presentation	
19 IE 5250	Term Paper					2	2	Retained	To become Familiarize with collection of Published papers, Articles and Reports, understanding the format of standard publications and how to prepare a research publication	
19 IE 6050	Dissertation					2	2	Retained	To become Familiarize with collection of Published papers, Articles and Reports, apply the knowledge gained to come up with a innovative ideas in materials, systems, designs and analysis & failures of Structures	

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DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF Courses & Cos vs. POs (Geo-Technical Engineering)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	Course Type	Rationale/Objective
20CE5161	Advanced Soil Mechanics	Analyze effective stress for different field conditions.	2	2					Added	To understand and knowledge about the basic concepts of Advanced Soil Mechanics
		Calculate settlement of soils using one dimensional and three-dimensional consolidation theories.			2					
		Estimates shear strength of saturated and partially saturated soils.	2	2	2					
		Develop stress path diagrams for different load conditions.	2	2	2					
		Analyze soil properties by conducting various laboratory/field tests.			3					
20CE5162	Sub-Surface Investigations	Analyze effective stress for different field conditions.	2	2	2				Added	To understand and knowledge about the basic concepts of Sub-Surface Investigations using different methods
		Calculate settlement of soils using one dimensional and three dimensional consolidation theories.	2	2	2					
		Estimate shear strength of saturated and partially saturated soils.	2	2	2					
		Develop stress path diagrams for different load conditions.	2	2	2					
		Analyze the various sub-surface investigations by conducting various field or laboratory tests.	3			3	3			
20CE5163	Geo-Environmental Engineering	Consider possible susceptibility of soil properties to environmental effects.	2	2	2	2			Added	To understand and knowledge about the basic concepts of Geo-Environmental Engineering
		Identify contaminant transport mechanisms in soils	2	2	2					
		Estimate environmental influences on engineering properties of soil to be used in design.	2	2	2			2		
		Apply environmental changes to soil stabilization and landfill engineering	2	2	2			2		
		Analyze Geoenvironmental engineering characteristics by conducting various laboratory tests.	3	3	3	3				
20CE5164	Ground Improvement Techniques	Identify difficult ground conditions in engineering practice.	2	2	2				Added	To understand and knowledge about the basic concepts of Ground improvement techniques using different methods
		Identify different ground improvement techniques.	2	2	2					
		Select Site specific method of improvement and its design	2	2	2					
		Promote wider use of techno – economical construction	2	2	2					

		techniques such as Reinforced soil structures, Gabion walls, Crib walls and fabric form work.										
		Analyze different ground improvement techniques by conducting various laboratory/ field tests or software tools			3	3						
20CE5265	Soil Dynamics & Geotechnical Earthquake Engineering	Apply theory of vibrations to solve dynamic soil problems	2	2	2					Added	To become familiar with Fundamentals of Soil Dynamics & Geotechnical Earthquake Engineering	
		Calculate the dynamic properties of soils using laboratory and field tests	2	2	2							
		Analyze and design behavior of a machine foundation resting on the surface, embedded foundation and foundations on piles by elastic half space concept.	2	2	2							
		Analyze and design vibration isolation systems	2	2	2							
		Analyze the various soil dynamic properties by conducting various laboratory and field test.	3			3	3					
20CE5266	Geosynthetics & Design of Retaining wall	Able to compute the various parameters of the geo-synthetics ,demonstrate the different testing techniques of of geo-synthetics	3						3	Added	To understand the concepts of Geosynthetics & Design of Retaining wall	
		Able to design soil reinforced retaining walls as per BS-8006 and FHWA regulations	3						3			
		Able to compute soil reinforcement for steep slopes	3						3			
		Able to demonstrate application of geo-synthetics in drainage ,filtration ,pavement design and in landfills	3						3			
		Designing of the retaining wall	2	2	2				3			
20CE5267	Design of Earth & Earth Retaining Structures	Analyze Earth pressure theories for different field conditions.	2	2	2					Added	To understand the Design of Earth & Earth Retaining Structures using different earth retaining structures	
		Designing the earth retaining structures at different conditions.	2	2	2							
		Designing the sheet piles and cofferdam.	2	2	2							
		Analyze and design the stability of slopes .	2	2	2							
		Analyze the various earth retaining characteristics by conducting filed/lab/ software tools or spread sheets.	3			3	3					
20CE5268	Advanced Foundation Engineering	Select different types of foundations based on site conditions.	2	2	2	2				Added	To understand Advanced Foundation Engineering using various civil engineering structures	
		Analyze bearing capacity and settlement of foundations	2	2	2	2						
		Design shallow and deep foundations.	2	2	2	2						
		Analyze and suggest remedial measures against foundation failures.	2	2	2	2						
		Analyze different foundation techniques by conducting various laboratory/ field tests/software tools				3	3					
		Analyze the basic soil models.	2	2	2					Added		

20CE51M1	Soil structure interaction	Analyzing beam and winkler foundations	2	2	2					To understand the basic concepts of Soil structure interaction.
		Estimate shear Beams on Elastic continuum	2	2	2					
		Analyzing path Pile on Winkler foundation.	2	2	2					
20CE51M2	Finite Element Methods	Understand the fundamentals of Finite element method.	2	2	2				Added	To understand the fundamental of Finite Element Methods using various geotechnical aspects
		Analyze Principles of discretization, element stiffness and mass formulation based on different techniques.	2	2	2					
		Analyze Displacement formulation for different shapes	2	2	2					
		Analyze the settlement analysis in different mediums	2	2	2					
20CE51N1	Stability Analysis of Slopes	Understand about the stability of slopes	2	2	2				Added	To understand the techniques of Stability Analysis of Slopes using various civil engineering structures.
		Analyzing the different types of soil and slopes conditions.	2	2	2					
		Analyzing the stability of slopes by using the contaminated soil filling.	2	2	2					
		Analyzing the slopes using different geo synthetics materials by filling soil.	2	2	2					
20CE51N2	Design of Highways and Airfield pavements	Understand different types of pavements	2	2	2				Added	To understand the techniques of Design of Highways and Airfield pavements using various civil engineering structures
		Design flexible pavements as per codal provisions	2	2	2					
		Design rigid pavements as per codal provisions	2	2	2					
		Design joints, pavement overlay and analyze pavement condition in all weather conditions	2	2	2					
20CE52O1	Rock Mechanics and Tunneling	Conduct laboratory and field testing for a given project / construction	2	2	2				Added	To understand the techniques of Rock Mechanics and Tunneling using various civil engineering structures.
		Choose appropriate methods to improve stability of rock mass	2	2	2					
		Estimate foundation capacity of rock mass.	2	2	2					
		Analyze the different rock properties by conducting various filed/laboratory tests..	2	2	2					
20CE52O2	Offshore Geotechnical engineering	Analyze index and engineering properties of marine clays.	2	2	2	2			Added	To understand the techniques of Offshore Geotechnical engineering using various civil engineering structures.
		Adopt suitable investigation method and sampling techniques for these marine deposits	2	2	2					
		Analyze loads on offshore structures and select appropriate foundation for these structures.	2	2	2	2				
		Implement required ground improvement technique for these structures	2	2	2			2		
20CE51P1	RS & GIS Applications in Civil Engineering	Understanding and Applying the Basics of Remote Sensing	2	2	2				Added	To understand the techniques of RS & GIS Applications in Civil Engineering
		Understanding and analysing the Basic elements of image interpretation	2	2	2					
		Understanding and analysing about the GIS	2	2	2					

		Understanding and analysing about Land use /Land cover studies	2	2	2					
20CE52P2	Constitutive Modeling in Geo-techniques	Analysing the soil fundamental and modelling.	2	2	2				Added	To understand the techniques of Constitutive Modeling in Geo-techniques in Civil Engineering
		Determining the soil plasticity characteristics	2	2	2					
		Analyzing the soil Elastic and plastic characterizes	2	2	2					
		Analyzing the clay model: critical state line, shear strength, stress-dilatancy, index properties, and prediction of conventional soil tests. Applications	2	2	2					
20 IE 5148	Seminar						2	2	Retained	To improve the skills of presentation
20 IE 5250	Term Paper						2	2	Retained	To become Familiarize with collection of Published papers, Articles and Reports, understanding the format of standard publications and how to prepare a research publication
20 IE 6050	Dissertation						2	2	Retained	To become Familiarize with collection of Published papers, Articles and Reports, apply the knowledge gained to come up with a innovative ideas in materials, systems, designs and analysis & failures of Structures