K L UNIVERSITY
SCHOOL OF CIVIL AND MECHANICAL SCIENCES
Department of Civil Engineering
Academic Year_2019-20

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. (Geospatial Technology) - Civil Engineering Programme

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

- 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

PROGRAMME OUTCOMES (POs):

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

1. Knowledge of a broad range of Geospatial Technology methodologies and underlying civil engineering, commonly used in the development and analysis of geo spatial systems.
2. Knowledge of fundamental design issues relevant to Geospatial Technology 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 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 (Geospatial Technology)

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 Geospatial Technology	√	√	√
2	Demonstrate a depth of knowledge in a chosen/focus area of Geospatial Technology	√	√	√
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 (Geospatial Technology)

Program Out Comes		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	Knowledge of a broad range of Geospatial Technology methodologies and underlying civil engineering, commonly used in the development and analysis of geo spatial systems.	√	√		√
2	Knowledge of fundamental design issues relevant to Geospatial Technology 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 Courses & Cos *vs.* POs (Structural Engineering)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2	Course Type	Rationale/Objective
18 CE 5101	Applied Mathematics	Understand the Laplace Transformations and Fourier Transformations concept	2						1		Retained	To Understand the Laplace Transformations, Elliptic Equation concept, Fourier Transformations concept and concept of Eigen value problems and numerical integration
		Understand the Elliptic Equation concept for both Laplace Transformations and Fourier Transformations	2						1			
		Understand the concept of Calculus of Variations	2						1			
		Understand the concept of Eigen value problems and numerical integration	2						1			
18CE 5102	Theory of Elasticity	Analysis of Two-dimensional problems in rectangular coordinates	2						2		Modified	To understand the energy principles and become familiar with analysis of two dimensional problems in rectangular and polar coordinates and torsion
		Analysis of Two-dimensional problems in polar coordinates	2						2			
		Understand the energy principles	2						2			
		Understand and analyse the torsion related problems	2						2			
18 CE 51A2	Design of Offshore Structures	Understand the Wave Theories and Forces on Offshore Structures	2						3		Retained	To understand basic concepts of the Wave Theories and Forces on Offshore Structures, analysis and design of various offshore structures
		Understand the Offshore Soil and Structure Modelling	2						3			
		Analysis of Offshore Structures	2						3			
		Design of Offshore Structures	2						3			
18 CE 51B2	Stability of Structures	Introduction to buckling of columns	2						3		Retained	To understand the deformation of structures and their analysis
		Analysis of lateral buckling of beams	2						3			
		Analysis of lateral buckling of plates and shells	2						3			
		Understanding the Mathematical treatment of stability problems	2						3			
18 CE 5103	Structural Dynamics	Solve response of free and forced vibrations			2				2		Modified	To become familiar with solving of response of free and forced vibrations, Arbitrary, Step and Pulse Excitations (SDOF), Earthquake Response of Linear Systems (SDOF)
		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)			2				2			

												and Multi -degree of freedom systems
18 CE 5104	Advanced Prestressed Concrete	Understand the concepts of prestressed concrete and analyze the prestressed concrete beams.	2			2	2		3		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		3			
		Design reinforcement for Ultimate shear, torsion and bending of prestressed concrete members.	3		3	2			3			
		Design end blocks as per IS 1343 recommendations.	3		3	2			3			
		Design of prestressed members, composite sections, continuous prestressed beams	3		3	2			3			
18 CE 5205	Finite Element Analysis	Understand the Basic Finite Element Concepts	2	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			2			
		Analysis of Higher order elements for one dimensional problems and Isometric quadrilateral elements and triangular elements	2	2		2			2			
		Analyse the applications based on general two-dimensional boundary value problem	2	2		2			2			
		Demonstrate the ANSYS software to develop the models using Finite element method				2		2	2			
18 CE 5206	Bridge Engineering	Introduction to different types of bridges and codal provisions for designing the bridge components.	1						3		Retained	To become familiar with basic concepts, analysis and design involved in Designing of Bridges
		Analysis and Design of slab Culvert.	2				2		3			
		Analysis and Design of T-Beam, sub-structure components and bearings	2				2		3			
		Understanding the designing of cable supported bridges.	2				2		3			
18 CE 5207	Earthquake Resistant Design of Structures	Understanding the designing of cable supported bridges.	1						3		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						3			
		Analyze a structure for earthquake forces onto the structure under static and dynamic behavior.		2					3			
		Design the structure for earthquake forces on 2 –storey building		2					3			
18 CE 5208		Derive the pure bending and curvature of plates	2	2		2			2		Retained	

	Theory of Plates and Shells	Derive the differential equation for laterally loaded rectangular plates				2		2	2			To understand theories involved in bending, deformation and curvature of plates and shells
		Derive the deformation of shells without bending	1						2			
		Understand the general theory of Cylindrical shells	2				2		2			
18 CE 51A1	Repair and Rehabilitation of structures	Understand the concept of Deterioration of structures with aging, Need for rehabilitation	1							2	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						2		
		Understand procedure of rehabilitation methods like Grouting; Detailing; Imbalance of structural stability	2	2						2		
		Understand the retrofitting methodology and procedure	2	2						2		
18 CE 51B1	Geotechnical Earthquake Engineering	Knowledge of the seismic phenomenon, its occurrence, tectonic theories, seismic waves and their motion in different media and measurement of ground motions. Analysis skills of 1-D ground responses using linear and non-linear approaches	1						2		Retained	To become familiar with understanding of ground motion due to seismic waves, seismic hazards and soil structure interaction
		Ability to analyze the seismic hazard through deterministic and probabilistic approaches. Ability of modifying the actual ground motion records and their time and frequency domain generation.		2					2			
		Knowledge of dynamic soil properties and their measurements using field and laboratory tests.	2	2					2			
		Knowledge of the liquefaction phenomenon and its effects and the remedial measures to be taken for soil improvement.	1						2			
18 CE 52C1	Industrial Structures	Understand the Planning and Functional Requirements of Industrial Building				2		2	2		Retained	To understand the functional requirements, analysis and design of various industrial structures
		Analysis and Design of different type of Industrial Buildings	1						2			
		Design of Power plant and transmission Structures	2				2		2			
		Design of Auxiliary Structures				2		2	2			
18 CE 52C2	Design of Tall Structures	Understanding the design criteria of Tall structures	1						3		Retained	To understand the behaviour, analysis and design of various tall structures
		Understanding the Loadings On Tall Structures	2				2		3			
		Understanding the behaviour of Rigid-Frame Structures and Shear Wall Structures		2					3			
		Understanding the behaviour of Tubular Structures		2					3			
		Dynamic analysis on Tall structures		2					3			
18 CE 52C3	Optimization of Structures	Understanding the Basics of engineering analysis and design	1						2		Retained	To understand the basic concepts and methods
		Understanding the optimization methods	1						2			

		Introduction to variational methods of sensitivity analysis, shape sensitivity		2					2			involved in optimization of structures and analysis
		Introduction to genetic algorithm and simulated annealing		2					2			
18 CE 52D1	Advanced Design of structures	Analysis and design of portal frames, Design example for hinged and fixed frame and Design of Reinforced concrete deep beams	1						3		Retained	To understand the concepts involved in designing of RC structures using advanced methods and softwares
		Design of Elevated water tanks; Earthquake resistant design	1						3			
		Introduction to plastic analysis		2					3			
18 CE 52D2	Fracture Mechanics	Understanding the basic concepts of Fracture and Linear Elastic Fracture Mechanics (LEFM)	1						2		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						2			
		Understanding the concept Elastic Plastic Fracture Mechanics (EPFM)		2					2			
		Understanding the concept of Fatigue Crack Growth and practical problems of fracture mechanics		2					2			
18 CE 52D3	Green Buildings	Understanding the concept of green buildings and practices	1							1	Retained	To Understand the Requirements for Green Buildings &methods of rating
		Understanding the Green Building Opportunities and Benefits and Green Building Design	1							1		
		Understanding the concept of optimal air conditioning	1							1		
		Understanding the concept of Material Conservation and Indoor Environment Quality and Occupational Health:	1							1		
18 CE 5148	Seminar							2	2		Retained	To improve the skills of presentation
18 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
18 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 (Construction Technology and Management)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2	Course Type	Rationale/Objective
18CE5117	Green Buildings	Understanding the concept of green buildings and practices	1							1	Retained	To Understand the Requirements for Green Buildings &methods of rating
		Understanding the Green Building Opportunities and Benefits and Green Building Design	1							1		
		Understanding the concept of optimal air conditioning	1							1		
		Understanding the concept of Material Conservation and Indoor Environment Quality and Occupational Health:	1							1		
18CE5118	Construction Materials & Concrete Technology	Understanding and knowing about the different construction materials properties	1						1		Retained	To become familiar with various important Construction materials and concepts of CC Mix Design
		Knowing about the special concretes	1						1			
		Knowing about the Tests on Concrete	1						1			
		Understanding the concept of Precast Concrete structures	1						1			
		Site visit and preparation of report	1					2	1			
18CE 5119	Construction Planning Scheduling and Control	Understand the Project Management, Project manager, organization structures, organizing and staffing the project office and team	1	1					1		Retained	To become familiar with basic concepts of project management, scheduling, planning and CPM & PERT
		Understand the Management functions, Directing, controlling, project authority, interpersonal influences, barriers, team building, communication, time management, conflicts	1	1					1			
		Understand and explain Construction Planning milestone schedules, WBS, Network Techniques, CPM, PERT and Prima Vera, Resources leveling and smoothing.	2	2					1			

		Understand Cost Control, operating cycles, cost account codes, Job cost report, Projected Cost Estimates, status reporting, variance and earned value and Project Management System, MIS reporting, Daily, Weekly and monthly reporting, Actual vs. Planned cost reports, Planning & Cost control document, Quality & Safety	1	1					1			
18CE 5120	Statistical Methods for Management	Understanding the concept of One Dimensional Random Variable		2					1		Retained	To understand the basic concepts of one dimensional random variable, Theory and Testing of Hypothesis and Queueing Models
		Understanding the Estimation Theory and Testing of Hypothesis		2					1			
		Design of Experiments		2					1			
		Understanding the Queueing Models		2					1			
18CE 5221	Mechanized Construction and Machinery	Understanding the Standard types of Equipment	2						1		Retained	To understand the mechanization to place in construction industry and machinery used for automation in construction industry
		Knowing the Earthmoving Equipment-I	2						1			
		Knowing the Earthmoving Equipment- II	2						1			
		Knowing the Pumping Equipments	2						1			
		Preparation of report on Different equipment types and their usage	2						1			
18CE 5222	Project Formulation Appraisal	To study elements of project formulation and appraisal	1						1		Modified	To become familiar with costing, formulation, appraisal and financing
		Gain knowledge on project costing and appraisal	2				2		1			
		To understand the financial aspects of projects.	1						1			
		To study the scope and applications of private sector participation in construction projects.	1						1			
18CE 5223	Construction Laws and Regulations	Understanding the Construction Contracts	1						1		Retained	To become familiar with various laws, regulations and statutory requirements in construction industry
		Understanding the Tenders		2					1			
		Understanding the concept of Arbitration		2					1			
		Understanding the Legal Requirements and Labour Regulations		2					1			

18CE 5224	Quality Management and Safety Management Systems in Construction	Understand concepts of quality management, system requirements and documentation.	1						1		Retained	To become familiar with the concepts and systems related to management of quality and safety in construction industry
		Understand quality planning and programs in construction industry.	1						1			
		Understand objectives, techniques for testing and analysis and application of tools for improvement of quality	2						1			
		Understand the fundamentals of safety management systems in construction industry	1						1			
		Demonstrate procedures and quality assurance systems and safety management systems in construction projects.		2					1			
18CE 51I1	High Performance Buildings	Introduction to High Performing Buildings	2						1		Modified	To understand the basic concepts involved in designing and execution of buildings that give comfortable environment
		Understanding the High-Performance Building Concepts and Practices	2						1			
		Understanding the High-Performance Building Design and Air Conditioning	2						1			
		Understanding the Material Conservation and Indoor Environment Quality and Occupational Health	2						1			
18CE 51I2	Precast Concrete Structure	Introduction to Precast Concrete Structures	3						1		Retained	To understand the basic concepts involved in design principles of precast concrete structures
		Knowing about the Prefabricated components	3						1			
		Understanding the Design Principles	3						1			
		Understanding the Joint in Structural Members and Design for abnormal loads	3						1			
18CE 51I3	Special Concrete	Understand the manufacturing process and additional ingredients of concrete	1							1	Retained	To understand the need of special concretes and methods adopted in designing of special concrete mix designs
		Recognize different types of special concretes	1							1		
		Calculate the different mix designs of concrete	2				2			1		
		Thoroughly know the mechanical properties and durability of concrete	1							1		
18CE 51I4	Structural Health Monitoring	Understanding the Static Field Testing				2			1		Retained	To understand various methods of monitoring of structural health
		Dynamic Field Testing				2			1			
		Understanding the Periodic and Continuous Monitoring of structures				2			1			

		Understanding the different types Structural Cracks				2			1			
18CE 51J1	Construction Personnel Management	Understanding about Manpower Planning						1	1		Retained	To understand the basic concepts involved in human resources management in civil engineering projects
		Understanding about the Organisation						1	1			
		Understanding about Human Relations and Organizational Behaviour						1	1			
		Understanding the Welfare Measures, Management and Development Methods						1	1			
18CE 51J2	Building Services, Maintenance Management	Understanding the Water Supply and Electric Services	2						1		Retained	To understand the basic concepts and systems related to servicing and maintenance of buildings
		Understanding the Drainage and Solid Waste Disposal methods	2						1			
		Understanding the Fire Fighting Services, Plumbing and Firefighting Layout of simple building	2						1			
		Understanding the Illumination and lighting design	2						1			
18CE 51J3	Infrastructure Valuation	Understand the fundamentals of Value, worth and value engineering and also understand the general techniques in infraction valuation.	1				1		1		Retained	To acquire the skills required for valuation of infrastructures
		Gain knowledge on the various special techniques in infrastructure valuation.	1				1		1			
		Understand the different numeric analysis techniques in value engineering and study life cycle cost.	2				2		1			
		Recognize the applications of value engineering	1				1		1			
18CE 51J4	Construction Economics & Finance	Understanding the Construction accounting	1						11		Retained	To understand basic concepts involved in accounting, benefit to cost analysis and financing of construction projects
		Understanding the Benefit-cost analysis	1						1			
		Understanding the Turnkey activities	1						1			
		Understanding the International finance	1						1			
18CE 52K1	Environmental Impact	To acquire the Knowledge of Environmental Technology.	1							2	Retained	

	Assessment on built Environment	To attain Strong base of knowledge of EIA		2						2		To become familiar with methodologies of assessment of impact on the built environment
		To obtain the Knowledge of EIA Methodologies		2						2		
		To know the Risks to Environment and Human, Health to solve societal problems			1					2		
18CE 52K2	Deep Excavations and ground water control methods	Understanding about the Deep Excavation	2						1		Retained	To become familiar with various methods and systems adopted in deep excavations and ground water seepage
		Understanding about the Roads, Tunnels and Dewatering	2						1			
		Understanding about the Grouting Methods	2						1			
		Understanding about the Piling & Coffer dams and Caisson	2						1			
18CE 52K4	Form Work for Construction Structures	Understanding about Planning, site equipment and plant for form work	1						1		Retained	To become familiar with various systems and accessories available for formwork and shoring and their design
		Understanding about Materials accessories proprietary products and pressures	1						1			
		Understanding the Design of forms and shores	1						1			
		Understanding the building and erecting the form work methods and forms for domes and tunnels, slip forms and scaffoldings	1						1			
18CE 52L1	Emerging construction Technologies	Knowing and understanding about the emerging construction technologies	1							1	Retained	To become familiar with various Emerging Technologies in construction industry
		Knowing and understanding about the Modular FRP Composite Bridge Deck construction procedures	1							1		
		Understanding the Post-Tensioned Steel Structure construction procedure	1							1		
		Understanding the behaviour of Low Temperature Concrete Admixture	1							1		
18CE 52L2	Building Envelopes	Understanding the Building envelop systems	1						1		Retained	
		Understanding about foundation construction	1						1			

		Understanding about wall construction and roof construction	1						1			To understand various building envelopes adopted
		Understanding about window, door installation and ventilation system; building envelope best practices	1						1			
18CE 52L3	Construction and fire safety	Understanding about the Classification of fire					1		1		Retained	To become familiar with various fire safety systems adopted in construction industry
		Understanding about the Site planning and housekeeping					1		1			
		Understanding about the Safety in scaffolding					1		1			
		Understanding about the Road work and pilling operation					1		1			
18CE 52L4	Resource Management and Control in Construction	Understanding about the Resource Planning				2			1		Retained	To understand the basic concepts related to management of resources in construction industry
		Understanding about the Labour Management				2			1			
		Understanding about the Materials and Equipment				2			1			
		Understanding about the Time Management, Resource Allocation and Leveling				2			1			
18 IE 5148	Seminar							2	2		Retained	To improve the skills of presentation
18 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
18 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

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF Courses & Cos *vs.* POs (Geospatial Technology)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2	Course Type	Rationale/Objective
18CE5109	Fundamentals of Geospatial Technology	Understanding the fundamentals of geospatial technology		1					1		Retained	To understand the basic concepts of geospatial technology
		Understanding about physics of remote sensing		1					1			
		Understanding about remote sensing platforms and sensors		1					1			
		Understanding about Visual Image Interpretation and Image Analysis		1					1			
18CE5110	Geographical Information System	Understanding about the Geographical information system	2						1		Modified	To understand the basic concepts of Geographical information system
		Understanding about GIS data management	2						1			
		Understanding about the GIS data input and data editing	2						1			
		Understanding about data quality of GIS	2						1			
		Report preparation on GIS	2						1			
18CE5111	Advanced Computer Programming & Statistics	Understanding about the Computer basics and Arithmetic operators	2		1				1		Retained	To understand concepts of the computer basics and Arithmetic operators
		Understanding about the Constructors	2		1				1			
		Understanding about the Concept of Random variables	2						1			
		Understanding about the Concept of testing of hypothesis critical region	2						1			
18CE5112	Photogrammetry	Knowing and Understanding about basic concept of Photogrammetry	2						1		Retained	To understand about basic concept of Photogrammetry
		Understanding about the Stereo Photogrammetry	2						1			
		Understanding about the control for Arial photography	2						1			
		Understanding about the aerial triangulation	2						1			
18CE51E1	Principles of Earth & Environment Sciences	Knowing and understanding the Fundamentals of Earth Sciences	2							1	modified	To become familiar with Fundamentals of Geomorphology and ecology in environmental management
		Knowing and understanding the Fundamentals of Geomorphology	2							1		
		Understanding about the Scope of ecology in environmental management	2							1		
		Understanding about the Structure and Function of Ecosystem	2							1		
18CE51F2	Environmental Geoinformatics	Knowing and understanding about Fundamentals & Management	1							1	Retained	To understand the concepts of wetlands, watershed and Rain Water-Harvesting Methods
		Understanding about the Rain Water-Harvesting Methods	1							1		
		Understanding the concept of Wetlands	1							1		
		Understanding the concept of watershed	1							1		
18CE5213	Digital Image Processing	Knowing and understanding about data base management systems		1					1		modified	To understand the database design &
		Understanding about database design & data queries		1					1			

		Understanding about forms, reports and applications of Digital Image Processing		1					1			data queries, forms, reports and applications of Digital
		Understanding the concept of data base administration		1					1			
18CE5214	GIS Data Analysis and Modelling	Understanding the concept of topographical surveying							1		Retained	To understand the topographical surveying and Project Planning concept
		Understanding the concept of Advanced Surveying							1			
		Knowing and understanding about Topographical Surveying							1			
		Understanding the Project Planning concept							1			
18CE5215	Geodesy and GPS	Understanding the fundamental of geodesy and GPS							1		modified	To understand the basic concepts of geodesy and GPS
		Understand the concept of computation or ellipsoid							1			
		Knowing and understanding the concept of global positioning system (GPS)							1			
		Knowing and understand about GPS Mathematical and GPS application							1			
18CE5216	Geospatial Applications	Knowing about Plant Sciences				1			1		Retained	To understand the fundamental of Earth Sciences and Hydrosphere Sciences
		Knowing about Earth Sciences and Hydrosphere Sciences				1			1			
		Understand the concept of Land Use and Land Cover				1			1			
		Understand the concept of Global Remote Sensing				1			1			
18CE52G3	Engineering Survey Methodology and Instrumentation	Understand the fundamentals of engineering drawing				1			1		modified	To understand the techniques of depth sounding & ranging and concept of Digital Elevation Models
		Knowing about techniques of depth sounding and ranging				1			1			
		Understand the concept of Digital Elevation Models				1			1			
		Knowing about Electronic theodolites and levels and their applications				1			1			
18CE52H4	Urban Water Management using Geomatics	knowing and understanding about the urbanization and its effect on water cycle						1	1		Retained	To understand about the Master drainage plans and drainage systems
		Knowing and understand about Master drainage plans						1	1			
		Understand about Elements of drainage systems						1	1			
		Knowing and understand about Best Management Practices						1	1			

K L UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
MAPPING OF Courses & Cos *vs.* POs (Energy and Environmental Technology)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2	Course Type	Rationale/Objective
19CE5141	Environmental Quality Monitoring	Understanding the General principles for collection of representative sample		1					1		Added	To understand Gravimetric methods for water and wastewater, determination of various physicochemical parameters, working principles of electrodes, different types of electrodes.
		Understanding about Gravimetric methods for water and wastewater, determination of various physicochemical parameters, working principles of electrodes, different types of electrodes.		1					1			
		Understanding about Principles, techniques and applications of GC, GC-MS		1					1			
		Principles, techniques and applications of NDIR analyzer for CO, chemiluminescent analyzer for NOx, Fluorescent analyzer for SO2-Particulates analysis		1					1			
19CE5142	Renewable Energy Technologies	Understanding about the Energy chain and common forms of usable energy	2						1		Added	To understand the Renewable Energy Technologies
		Understanding about Thermal applications -Introduction to Solar thermal collectors	2						1			
		Understanding about the Energy through various processes - Energy through fermentation	2						1			
		Understanding about Power generation through OTEC systems - various types	2						1			
19CE5143	Technical English	Understanding about Listening	2		1				1		Added	To understand concepts of the Technical English
		Understanding about the Speaking	2		1				1			
		Understanding about the Concept of Reading	2						1			
		Understanding about the Concept of Instructions Paragraph Transcoding	2						1			
19CE5144	Physicochemical, Biological Principles and Processes	Knowing and Understanding about basic concept of Resource management and chemistry	2						1		Added	To understand about basic concept of Physicochemical, Biological Principles and Processes
		Understanding about the Chemical kinetics and isotherm models	2						1			
		Understanding about the control for Biochemistry of wastewater treatment	2						1			
		Understanding about the Principles of biological processes	2						1			
19CE5145		Knowing and understanding the Fundamentals of Earth Sciences	2							1	Added	

	Advanced Statistical Methods	Knowing and understanding the Fundamentals of Geomorphology	2							1		To Knowing about Advanced Statistical Methods
		Understanding about the Scope of ecology in environmental management	2							1		
		Understanding about the Structure and Function of Ecosystem	2							1		
19CE51Q1	Advanced statistical Methods	Knowing and understanding about Statistical inference	1							1	Added	To understand the concepts of Advanced statistical Methods
		Understanding about the Basic Statistical Tools for Analysis	1							1		
		Understanding the concept of Modeling and Forecasting Methods	1							1		
		Understanding the concept of Design of Experiments	1							1		
19CE51Q2	Alternative Fuels	Knowing and understanding about Hydrogen		1					1		Added	To understand the database design & Alternative Fuels
		Understanding about Organic gaseous fuels		1					1			
		Understanding about forms, reports and applications Alcohols and ethers		1					1			
		Understanding the concept of Clean Technology		1					1			
19CE51R1	Air and Noise Pollution Control	Understanding the concept of topographical surveying							1		Added	To understand the Air and Noise Pollution Control
		Understanding the concept of Advanced Surveying							1			
		Knowing and understanding about Topographical Surveying							1			
		Understanding the Project Planning concept							1			
19CE51R2	Solid and Hazardous Waste Management	Understanding the fundamental of geodesy and GPS							1		Added	To understand the basic concepts of Solid and Hazardous Waste Management
		Understand the concept of computation or ellipsoid							1			
		Knowing and understanding the concept of global positioning system (GPS)							1			
		Knowing and understand about GPS Mathematical and GPS application							1			
19CE5246	Energy Auditing and Conservation Techniques	Knowing about Plant Sciences				1			1		Added	To understand the fundamental of Energy Auditing and Conservation Techniques
		Knowing about Earth Sciences and Hydrosphere Sciences				1			1			
		Understand the concept of Land Use and Land Cover				1			1			
		Understand the concept of Global Remote Sensing				1			1			
19CE5247	Design of Water and Wastewater Treatment Systems	Understand the fundamentals of engineering drawing				1			1		Added	To understand the techniques of Design of Water and Wastewater Treatment Systems
		Knowing about techniques of depth sounding and ranging				1			1			
		Understand the concept of Digital Elevation Models				1			1			
		Knowing about Electronic theodolites and levels and their applications				1			1			
19CE5248	Environmental Impact Assessment	knowing and understanding about the EIA Methodologies						1	1		Added	To understand about the
		Knowing and understand about Assessment of Impact of Developmental activities and Land Use						1	1			

		Understand about Elements of Environmetnal Impact Assessment on Water and Air						1	1			Environmental Impact Assessment
		Knowing and understand about Environmental Audit						1	1			