

B. Tech Civil Engineering

Program Education Objectives

The B.Tech program at IET, JKLU is designed to prepare students for continued learning and successful careers. Our alumni are expected to:

- PEO1: Apply their technical knowledge, complex problem solving and research skills in professional practice.
- PEO2: Continue their intellectual development through critical thinking, self-study, apprenticeship, higher education, professional development courses, as well as participation in research groups and professional networks.
- PEO3: Serve as ambassadors for engineering and sustainability by exhibiting high professional standards with a deep sense of civic responsibility.
- PEO4: Effectively communicate about technical and related issues.
- PEO5: Embrace the roles of team members and leaders in their careers.

Program Outcomes

The graduates of B.Tech. programs at IET, JKLU will have the following competencies:

- PO 1: Life-long learning: Demonstrate inquisitiveness, open mindedness, and the ability to engage in independent and life-long learning in the broadest context of technological, organizational, economic, and societal changes.
- PO 2: Citizenship, Sustainability, and Professional ethics
 - PO 2a: Demonstrate knowledge of constitutional values of liberty, equity, justice, and fraternity with an understanding of the impact of the engineering solutions in societal and environmental contexts as well as a sense of responsibility for sustainable development.
 - PO 2b: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, cultural, and environmental issues and the consequent responsibilities relevant to professional engineering practice.
 - PO 2c: Demonstrate commitment for professional integrity and excellence and respect for ethics, responsibilities and norms as prescribed for the engineering practice.
- PO 3: Engineering knowledge and Modern tool usage
 - PO 3a: Demonstrate a clear conceptual understanding of the fundamentals of engineering specialization and cognitive flexibility to appropriately ‘transfer’ what has been learned in a context, to different situations.
 - PO 3b: Apply engineering thinking, computational thinking, and the knowledge of mathematics, natural and social sciences, engineering fundamentals, information technology,

engineering specialization, and engineering management to the solution of complex engineering problems.

PO 3c: Create, select, modify, and apply appropriate techniques, best practices, standards, resources, and modern engineering and IT tools including prediction and modeling to engineering and social activities with an understanding of the limitations.

PO 4: Complex problem solving, Design and Research

PO 4a: Identify, formulate, review research literature, and analyze complex engineering problems to arrive at substantiated conclusions using critical thinking along with principles of mathematics, computing, engineering as well as natural and social sciences.

PO 4b: Use systems thinking and reflection to identify and consider underlying structures, patterns, volatility, uncertainties, complexities, ambiguities, complications, and risks to design and develop engineering solutions for complex problems to meet the specified and anticipated needs with appropriate concern for constraints, performance, sustainability, and professional ethics.

PO 4c: Use research-based knowledge and research methods including design of experiments, simulation, analysis and interpretation of data, and synthesis of the information to evaluate and improve the engineering solutions and practice.

PO 5: Individual & teamwork and Engineering management

PO 5a: Ability to work effectively as an individual and as a team member or a leader in diverse and distributed teams, and in multidisciplinary settings.

PO 5b: Ability to apply engineering management principles to one's own and team's work to manage engineering projects and operations and in multidisciplinary environment.

PO 6: Communication: Ability to communicate effectively on complex engineering and technology activities, situations, problems, and solutions using verbal, textual, and pictorial elements with the colleagues, engineering community, users, clients, policy makers, and society at large with intellectual honesty, clarity, empathy, and compassion.

PO 7: Innovation and entrepreneurship:

PO 7a: Demonstrate enthusiasm and understanding to identify opportunities and translate research in engineering and other disciplines to conceive and design innovative engineering solutions for business, industry, and societal problems.

PO 7b: Demonstrate enthusiasm and understanding to conceive and plan technology based new ventures either as independent start-up businesses or within existing corporate structures.

Program Specific Outcomes

B.Tech. (Civil Engineering)

The civil engineering graduates of JKLU will be able to:

CEPSO1: Conceive, design, implement and manage civil infrastructure systems, structures and processes by using principles of structural engineering, transportation engineering,

water management, geotechnical engineering, project management, computing, automation, sustainability, and contemporary materials and tools.

CEPSO2: Serve in fields of construction industry, infrastructure management or consultancy services.

JK LakshmiPat University, Jaipur
Institute of Engineering and Technology
Department of Civil Engineering
Course Structure for the B. Tech (Batch 2019-2023)

Semester	Courses							Credits
I	Computational Data Analysis	Design and Prototyping	Experimental Science-I	Fundamentals of Communication				
	ES1101	ES1102	AS1101	CC1101				
	(10s 2 0)	(6s 0 0)	(1 0 4)	(2 0 1)				
	10	6	3	2				21
II	Calculus and Applied Mechanics	Fundamentals of Automation Engineering	Object Oriented Programming	Energy and Environmental Studies	Critical Thinking and Storytelling	Scientific Perspectives		
	ES1103	ES1104	CS1101	ES1105	CC1102	AS1102		
	(6s 2 0)	(6s 2 0)	(1 0 4)	(1 0 0)	(2 0 0)	(Science Week)		
	6	6	3	1	2	2		20
III*	Civil Engineering Materials	Computational Engineering Analysis-I	Engineering Measurements and Machines	Fluid Mechanics and Hydraulic Engineering	Perspectives on Contemporary Issues	Management Perspectives		
	CE1101	ES1106	ES1107	CE1103	CC1103	IL1101		
	(3 0 2)	(3 1 2)	(3 0 4)	(3 0 2)	(2 0 1)	(Management Week)		
	4	5	5	4	2	2		22
IV*	Construction Project Management	Computational Engineering Analysis-II	Structural Analysis	Construction Technology	Civil Engineering CAD Lab	Communication and Identity	Introduction to Design	
	CE1112	ES1109	CE1104	CE1105	CE1106	CC1104	IL1102	
	(3 0 2 0)	(3 1 2 0)	(3 0 0 0)	(3 0 2 0)	(0 0 2 0)	(2 0 1 0)	(Design Week)	
	4	5	3	4	1	2	2	21
Practice School - I (PS1101) – (4 to 6 Weeks Duration)								4
V*	Design of RCC and Steel Structures	Geotechnical Engineering	DE	Open Elective	Understanding and Managing Conflict	Introduction to IoT	Automation Project	
	CE1107	CE1108			CC1105	EE1111	PR1101	
	(3 0 2 0)	(3 0 2 0)			(2 0 0 0)			
	4	4	4	4	2	2	2	22
VI*	Transportation Engineering	Digital Surveying and Mapping	DE	DE/OE/Minor Project	Critical Thinking for Decisions at Workplace	Emerging Tech Week		
	CE1113	CE1102			CC1106			
	(3 0 2)	(3 0 2)			(2 0 0 0)			
	4	4	4	4	2	2		20
VII*	DE	DE	DE	OE	Minor Project			
					PR1103			
	4	4	4	4	4			20
VIII*	Practice School - II /Entrepreneurial Project/Research Project/Semester at a Partner University							
	16							16
	Total Credits							166

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Course Code: ES1101

Course Name: Computational Data Analysis

Course Outcomes: After course completion, the student will be able to

- ES1101.1. Write Simple Python programs using various datatypes, control structures, decision statements, libraries, functions (M1)
- ES1101.2. Develop Python programs using Objects, Classes and Files (M1, M2)
- ES1101.3. Develop Programs for analyzing and interpreting Complex situations in various domains including sustainable development by combining various Linear Algebra, Statistics and Other Problem-Solving Techniques (M3)
- ES1101.4. Model Complex systems as Linear simultaneous equations and analyze the same using Matrix methods (M1)
- ES1101.5. Model Data as matrices and Find Eigen Values and Eigen Vectors and Apply the same for problem solving, e.g., ranking and performance analysis (M1)
- ES1101.6. Summarize and Visualize different datasets (M2)
- ES1101.7. Analyze and interpret different datasets using Discrete and Continuous Probability Distributions and Apply the same for problem solving, e.g., Goodness of Fit (M2)
- ES1101.8. Formulate and validate hypothesis with reference to different datasets (M2)
- ES1101.9. Apply correlation, regression, least square method and time series analysis for modeling, analysis, interpretation, and forecasting (M2)

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO -1	PSO-2
ES1101.1																	
ES1101.2											1						
ES1101.3					1	1					1			1			
ES1101.4			1		1	1				1	1						
ES1101.5			1		1	1				1	1			1			
ES1101.6					1	1		1			1		2				
ES1101.7		1	1		1	1		1			1		1	1			
ES1101.8		1	1		2	1		2			1		1	1			
ES1101.9		1	1		2	1		2		1	1		1	1			

Course Code: ES1102

Course Name: Design and Prototyping

Course Outcomes: After course completion, the student will be able to

- ES1102.1. Approach design challenges from the perspective of the user and offer innovative solutions effectively.
- ES1102.2. Communicate and work in team towards a common goal.
- ES1102.3. Think creatively towards a fun based, desirable solution.
- ES1102.4. Develop the projection views of the products with dimensions and scales.
- ES1102.5. Create the schematic diagram and isometric view of the parts using AutoCAD.
- ES1102.6. Fabricate prototype by combining the different parts.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
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ES1102.2											1	1	1				
ES1102.3	2				2	1	1	1						2			
ES1102.4					1	1	1										
ES1102.5	1				2	1	1										
ES1102.6	2				2	1	1				1	1	1				

Course Code: AS1101

Course Name: Experimental Science-I

Course Outcomes: On successful completion of this course, the students will be able to:

- AS1101.1. analyze ferromagnetic properties of any magnetic material and differentiate Soft and hard materials.
- AS1101.2. analyze thermoelectric effect of metal junctions due to temperature differences.
- AS1101.3. analyze nuclear radiation with respect to distance and thickness of absorbing media.
- AS1101.4. measure electrical properties e.g., specific resistance, time constant of various electrical components.
- AS1101.5. use Schrodinger equation and quantum mechanical approach to analyze behavior of the quantum particle under different potentials.
- AS1101.6. differentiate hard and soft water by determining its hardness of different water samples.
- AS1101.7. analyze conductivity of samples by different techniques such as volumetric titrations and conductometric.
- AS1101.8. determine properties of the lubricant/oil samples by Pensky-Martens and Red Viscometer.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
AS1101.1	1				1									1			
AS1101.2	1																
AS1101.3	1										1						
AS1101.4	1				1						1						
AS1101.5	1																
AS1101.6	1		1		1	1	1				1		1		1		
AS1101.7	1		1				1				1		1				
AS1101.8	1																

Course Code: CC1101

Course Name: Fundamentals of Communication

Course Outcomes: After course completion, the student will be able to:

- CC1101.1. Identify different cultural differences and their impact on communication.
- CC1101.2. Compose grammatically correct sentences and paragraphs.
- CC1101.3. Deliver effective oral presentations following appropriate kinesics and paralinguistic features.
- CC1101.4. Identify impact of cultural differences on communication.
- CC1101.5. Apply appropriate communication skills across settings, purposes, and audiences.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CC1101.1									1		1		1				
CC1101.2																	
CC1101.3	1										1						
CC1101.4																	
CC1101.5	1										1		1				

Course Code: ES1103

Course Name: Calculus and Applied Mechanics

Course Outcomes: After course completion, the student will be able to

- ES1103.1. apply analytical techniques to determine forces in structures
- ES1103.2. use commercial software (STAAD Pro.) to simulate a structure/frame and determine force in the members
- ES1103.3. model physical phenomena using calculus and solve using appropriate method
- ES1103.4. apply Newton’s laws of motion and understand the concepts of dynamics concepts (force, momentum, work and energy)
- ES1103.5. interpret the geometrical significance of differential and integral calculus
- ES1103.6. solve problems of vector differentiation and integration
- ES1103.7. calculate the buoyant forces of objects with various shape and carryout the stability analysis
- ES1103.8. apply the concept of partial differentiation to solve optimization problems

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
ES1103.1						2					1		2				
ES1103.2						2	2				1						
ES1103.3	1				1	2	2		1		2		1				
ES1103.4	2				1	2	2				1						
ES1103.5	1				1	2	2										
ES1103.6						1	1										
ES1103.7						1	1		1		1		2				
ES1103.8						2	1				1		1				

Course Code: ES1104

Course Name: Fundamentals of Automation Engineering

Course Outcomes: On successful completion of this course, the students should be able to:

- ES1104.1 Analyze electrical circuits using network theorems,
- ES1104.2 Measure electrical parameters of passive as well as active electrical components,
- ES1104.3 Design rectifier circuit using semiconductor devices,
- ES1104.4 Design filters for power conditioning,
- ES1104.5 Design and test a linear power supply for given specifications
- Es1104.6 Design and build Printed Circuit Boards,
- ES1104.7 Use electrical safety practices while working on electrical projects,
- Es1104.8 Formulate mathematical models for basic electro-mechanical systems,
- ES1104.9 Design and simulate a basic analog open-loop control system,
- ES1104.10 Evaluate and simplify Boolean functions and design the minimized logic using logic gates.
- ES1104.11 Design basic combinational and sequential circuits with minimum complexity,
- ES1104.12 Implement combinational circuit using simulation tools.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
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ES1104.2						2								1			
ES1104.3					1			1									
ES1104.4					2							1		1			
ES1104.5					1							1		1			
ES1104.6							1		1			1		1			
ES1104.7	2						2						1				
ES1104.8	2				2			2						2			
ES1104.9					1							1		1			
ES1104.10																	
ES1104.11	2				2							1					
ES1104.12						2			2			1	1	1			

Course Code: CS1101

Course Name: Object Oriented Programming

Course Outcomes: On successful completion of this course, the students should be able to:

- CS1101.1. Develop Java Programs with the concepts of primitive data types, strings and arrays.
- CS1101.2. Develop Java Programs using Object Oriented Programming Principles such as Classes, Objects, Data Abstraction, Data Encapsulation, Overloading, Overriding, Polymorphism, Inheritance, and Interfaces.
- CS1101.3. Design, develop and debug programs in Core Java using coding and documentation standards.
- CS1101.4. Incorporate exception handling in Java Programs.
- CS1101.5. Use JDBC API connectivity in between Java Programs and database.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CS1101.1					1	1	1							1			
CS1101.2																	
CS1101.3					1	1					1	1		1			
CS1101.4																	
CS1101.5											1	1					

Course Code: ES1105

Course Name: Energy and Environment Studies

Course Outcomes: On successful completion of this course, the student should be able to:

ES1105.1. Relate renewable energy with ecology & environment

ES1105.2. Explain the climate change and threat to biodiversity

ES1105.3. Describe the various pollution sources and their impacts on Environment

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes		
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2	
ES1105.1	1					1												
ES1105.2		1									1							
ES1105.3	1				1													

Course Code: CC1102

Course Name: Critical Thinking and Storytelling

Course Outcomes: On successful completion of this course, the student should be able to:

- CC1102.1. Formulate intelligent questions to investigate.
- CC1102.2. Evaluate information and argument for correctness, consistency, relevance, and validity.
- CC1102.3. Compose well-structured and well-reasoned arguments.
- CC1102.4. Articulate and evaluate the impact of narratives.
- CC1102.5. Distinguish between facts, assumptions and opinion.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes		
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2	
CC1102.1			1					1										
CC1102.2			1			1							1					
CC1102.3											1							
CC1102.4													1					
CC1102.5													1					

Course Code: AS1102

Course Name: Scientific Perspectives

Course Outcomes: After course completion, the student will be able to

- AS1102.1. Distinguish between science, pseudo-science and other forms of knowledge.
- AS1102.2. Distinguish between science, engineering, technology and mathematics and also identify the opportunities for integrating these disciplines.
- AS1102.3. Use the scientific approach to identify and understand the societal problems
- AS1102.4. Explain, Design and carry out Scientific studies

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
AS1102.1	1												1				
AS1102.2					1	1											
AS1102.3		1			1												
AS1102.4	1												1				

Course Code: CE1101

Course Name: Civil Engineering Materials

Course Outcomes: On successful completion of this course, the students will be able to:

CE1101.1. characterize the construction materials.

CE1101.2. determine the basic material properties and establish relationship between various elastic constants.

CE1101.3. draw shear force and bending moment diagrams of beams.

CE1101.4. determine the bending and shear stresses generated at various structural components.

CE1101.5. carry out analysis of beams and columns and determine deflection.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1101.1			1		2	1				1	1				1	1	1
CE1101.2					2	1						1				1	1
CE1101.3	1		1		1				1						1	2	2
CE1101.4	1		1		1				1						1	1	2
CE1101.5	1		1		1				1						1	1	2

Course Code: ES1106

Course Name: Computational Engineering Analysis–I

Course Outcomes: On successful completion of this course, the students will be able to:

- ES1106.1. Solve ordinary differential equations through various techniques.
- ES1106.2. Determine the structural behavior of the body by determining the stresses, strains produced by the application of load.
- ES1106.3. Analyze the concept of buckling and be able to solve the problems related to column and struts.
- ES1106.4. Model the problems of column and struts mathematically in terms of ordinary differential equations and solve them using the appropriate method.
- ES1106.5. Simulate the solutions of the above-mentioned models of columns and struts.
- ES1106.6. Analyze a function of complex variables in terms of analyticity, poles and zeroes.
- ES1106.7. Find Laplace and inverse Laplace transforms of given function and use Laplace transform to solve ordinary differential equations.
- ES1106.8. Design and Evaluate the LC, RC & RL Networks using Foster's and Cauer Forms
- ES1106.9. Analyze stability criteria for electrical network using pole zero plot and Routh-hurwitz polynomials
- ES1106.10. Model and simulate electrical networks using Proteus simulator/ Virtual lab.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
ES1106.1					2	2	2	1	1		1	1					
ES1106.2					2			2									
ES1106.3					1			1							1		
ES1106.4		1			1	2	2	1	1	1	2	1					
ES1106.5							2	1		1							
ES1106.6					2												
ES1106.7					2	2	1	1	1		1	2					
ES1106.8					2	2		2			1	1		1			
ES1106.9					2	2		1			1	1					
ES1106.10	1						1		1								

Course Code: ES1107

Course Name: Engineering Measurements and Machines

Course Outcomes: On successful completion of this course, the students be able to:

- ES1107.1. Evaluate suitable electrical and non-electrical instruments for measuring physical quantities.
- ES1107.2. Analyze the construction, characteristics and applications of various types of rotating machines.
- ES1107.3. Analyze the working of any mechanical and electrical machine using mathematical model.
- ES1107.4. Integrate the sensors for monitoring and automation of electrical and mechanical systems.
- ES1107.5. Design electro-mechanical machines as per Indian standards.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
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ES1107.1	2				2	1	1				1	1	1	1			
ES1107.2		1			1	1	1	1									
ES1107.3					1	2	1	1	1		1						
ES1107.4	1	1	1		1	1	1	1	1		1		1				
ES1107.5	1		1	1	1	1	1	1	1		1	1					

Course Code: CE1103

Course Name: Fluid Mechanics and Hydraulics Engineering

Course Outcomes: On successful completion of this course, the students should be able to:

CE1103.1. Identify, measure, and compute fluid properties and establish relationship between them.

CE1103.2. Compute force of buoyancy on a partially or fully submerged body and analyze the stability of a floating body.

CE1103.3. Evaluate pressure drop in pipe flow using Hagen-Poiseuille’s equation for laminar flow in a pipe.

CE1103.4. Apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in pipes, pipe networks, and open channels.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
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CE1103.1	1	1	1		1	1	1	1	1				1	1		1	1
CE1103.2					1	1	1	1	1							1	
CE1103.3				1	1	1		1									
CE1103.4				1	1	1	1					1				2	2

Course Code: CC1103

Course Name: Perspectives on Contemporary Issues

Course Outcomes: After course completion, the student will be able to

- CC1103.1. Identify different perspectives objectively.
- CC1103.2. Explain interconnectedness of the issues and their impact at micro and macro levels.
- CC1103.3. Recognize their own beliefs, biases, claims and assumptions.
- CC1103.4. Evaluate sources, argue and defend effectively.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO -1	PSO -2
CC1103.1	1		1					1			1	1					
CC1103.2						1					1	1	1				
CC1103.3											1	1	1				
CC1103.4	1		1									1	1				

Course Code: IL1101

Course Name: Management Perspectives

Course Outcomes: After course completion, the student will be able to

- IL1101.1. Comprehend the importance of management and its functional areas in businesses and also its interaction with technology.
- IL1101.2. Highlight specific external and internal issues impacting businesses.
- IL1101.3. Integrate and analyze multiple dimensions of management aspects to solve business problems.
- IL1101.4. Evaluate the aspects that management might consider when evaluating technical and engineering projects such as planning and scheduling, personnel management, cost control etc. from a management perspective

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO -1	PSO -2
IL1101.1	0.5				0.2												
IL1101.2	0.5	1											0.5				
IL1101.3	1		0.2		0.2						1		0.5				
IL1101.4	1			0.2							1	2					

Course Code: CE1112

Course Name: Construction Project Management

Course Outcomes: After course completion, the student will be able to

- CE1112.1. Calculate the estimated cost of the project
- CE1112.2. Compute the Benefit cost ratio of various type of projects.
- CE1112.3. Asses the risks in various Civil Engineering projects.
- CE1112.4. Analyze the project schedule by CPM and PERT.
- CE1112.5. Evaluate various types of contracts.
- CE1112.6. Develop various methods of safety in various construction projects.
- CE1112.7. Incorporate sustainability in project planning and execution.
- CE1112.8. Develop project scheduling using M S project.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1112.1	1				1	1	1		1							1	1
CE1112.2	1				1		1	1					1			1	1
CE1112.3		2			1			1									1
CE1112.4	1				2	1		2				1	1			2	2
CE1112.5	1		1		1	1		2					2			1	1
CE1112.6		2	2		1				1				1				
CE1112.7	1	2		1	1				1				1				
CE1112.8	1	1				1	1	1					1			1	2

Course Code: ES1109

Course Name: Computational Engineering Analysis–II

Course Outcomes: After course completion, the student will be able to

- ES1109.1. Classify various types of partial differential equations and solve them through various analytical and numerical methods.
- ES1109.2. Formulate and analyze differential equations especially Navier stokes and energy equations and use numerical methods for solving the same.
- ES1109.3. Use Numerical method for solving partial differential equations using finite difference method.
- ES1109.4. Find Fourier and inverse Fourier transforms of given function and use Fourier transform to solve partial differential equations.
- ES1109.5. Find Z-transform and inverse Z-transforms of given functions and use them to analyze control systems.
- ES1109.6. Design and analyse various types of filters and attenuators to minimize power losses and improve signal quality.
- ES1109.7. Solve problems involving vertex and edge connectivity, planarity and crossing numbers.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
ES1109.1	1				1	1		1			1						
ES1109.2	2		2		2	2	1	2			1		1	2			
ES1109.3						1	2										
ES1109.4					2	2		1			1						
ES1109.5	1		1		2	2		1			1			1			
ES1109.6		1				1	2			2				1			
ES1109.7						1	2	2						1			

Course Code: CE1104

Course Name: Structural Analysis

Course Outcomes: On successful completion of this course, the students will be able to:

CE1104.1. identify statically determinate and indeterminate structures and determine forces in members of trusses.

CE1104.2. determine the bending moment at any section and reaction at support of arches.

CE1104.3. determine tension in cables taking into considerations the temperature variation and support slippage.

CE1104.4. draw influence line diagrams for beams, floor girders, arches and trusses.

CE1104.5. analyze and determine force and displacement response of any given structure subjected to various loads.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1104.1			1		1	1										1	1
CE1104.2			1		1	1			1							1	1
CE1104.3			1		1	1										1	1
CE1104.4					1	1			1							1	1
CE1104.5			1		1	1			1		1				1	1	2

Course Code: CE1105

Course Name: Construction Technology

Course Outcomes: After course completion, the student will be able to

CE1105.1 Develop the basic knowledge of building components, types of foundations, dead and live loads and design of strip footing for buildings

CE1105.2 Apply knowledge in the selection of appropriate type of masonry, mortar, damp proof course, stair, plumbing, form work and building finishing items

CE1105.3 Design concrete mixes as per guidelines of Indian Standards

CE1105.4 Assess the behavior of concrete at fresh and hardened state

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1105.1	1				1		1	1				1		1		1	1
CE1105.2	1			1		1		1				1		1		1	1
CE1105.3	1		1	1		1		1	1	1		1				2	1
CE1105.4	1				1						1				1		1

Course Code: CE1106

Course Name: Civil Engineering CAD Lab

Course Outcomes: After course completion, the student will be able to

- CE1106.1 Interpret conventional sign, symbols and working drawings of various civil engineering structures.
- CE1106.2 Develops basic drawing skills; create multilayer architectural and working drawings.
- CE1106.3 Plan and draw Civil Engineering Buildings as per aspect and orientation.
- CE1106.4 Use the AutoCAD commands for drawing 2D & 3D building drawings required for different Civil engineering applications.
- CE1106.5 Use software (AutoCAD) to prepare detailed drawing of residential and public buildings.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1106.1	1																
CE1106.2					1				1								
CE1106.3													1				
CE1106.4																1	2
CE1106.5							1									1	1

Course Code: CC1104

Course Name: Communication and Identity

Course Outcomes: After course completion, the student will be able to

- CC1104.1. Analyse their personal identities, both private and social
- CC1104.2. Identify their different values, strengths and areas of professional interest
- CC1104.3. Articulate their personal statement and use it to craft an influential pitch
- CC1104.4. Express themselves through various communication formats on different platforms

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CC1104.1													1	1			
CC1104.2	1		2	1										2			
CC1104.3													1				
CC1104.4													2				

Course Code: IL1102

Course Name: Introduction to Design

Course Outcomes: After course completion, the student will be able to

- IL1102.1. Identify the user and build persona of the
- IL1102.2. Sketch their ideas on paper to visualize and assess viability.
- IL1102.3. Create a plan for process and management to materialize the desired idea.
- IL1102.4. Test the material for possibilities and capabilities.
- IL1102.5. Develop skills of joinery, material manipulation and various hand tools.
- IL1102.6. Develop technical and narrative skills useful for both film and animation.
- IL1102.7. Develop troubleshooting and problem-solving skills.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
IL1102.1	1								1	1			1	1			
IL1102.2	2						1						2				
IL1102.3	1						1	1						2			
IL1102.4	1						1	1									
IL1102.5							1	1									
IL1102.6	2						1						1				
IL1102.7	1		1			1	1										

Course Code: CE1107

Course Name: Design of RCC and Steel Structures

Course Outcomes: After course completion, the student will be able to

CE1107.1: Understand material properties and design methodologies for Concrete and Steel structures

CE1107.2: Analyse and design reinforced concrete elements like beam and slab

CE1107.3: Analyse and design steel elements like tension member and compression member

CE1107.4: Design different type of connections for steel members

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1107.1	1	1			2		1			1		2			1	1	2
CE1107.2	1			1		1			1	1	1	1		2	1	2	1
CE1107.3	1			1		1			1	1	1	1		2	1	2	2
CE1107.4	1		1		2				1	1				1		1	1

Course Code: CE1108

Course Name: Geotechnical Engineering

Course Outcomes: On successful completion of this course, the students will be able to:

- CE1108.1. assess index properties of different soil types.
- CE1108.2. evaluate the effect of pore water and seepage on the soil strength.
- CE1108.3. estimate vertical stress distribution beneath the foundation on account of superstructure load, up to certain depth.
- CE1108.4. calculate the shear strength of soil under different configurations of principal and shear stresses.
- CE1108.5. determine the compaction characteristics, optimum water content and maximum dry density of soil.
- CE1108.6. determine the consolidation characteristics of different type of soils and estimate the settlement under superstructure loads.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1108.1					2	1				1				1	1	1	1
CE1108.2					1	1	1	1	1	1				1	1	1	1
CE1108.3			1		2	1	2	1	1	1				1	1	1	2
CE1108.4	1		2	1	2	1	1	2	1	1	1			1	1	1	2
CE1108.5					1				2					1	1	1	1
CE1108.6	1		2	1	1	1		1		1	1	1		1	1	1	2

Course Code: CC1105

Course Name: Understanding and Managing Conflict

Course Outcomes: After course completion, the student will be able to

CC1105.1. Define a group and explain the stages of group development

CC1105.2. Describe conflict and explain types and causes of conflict

CC1105.3. Use inquiry and advocacy to engage with groups

CC1105.4. Give and receive feedback effectively

CC1105.5. Identify sources of conflict and manage them using difference conflict handling styles

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CC1105.1	1										2		1				
CC1105.2	1						1										
CC1105.3	1		1						1		2	1	1				
CC1105.4	1										1		1				
CC1105.5	1										1	1	1				

Course Code: EE1111

Course Name: Introduction to IoT

Course Outcomes: On successful completion of this course, the students should be able to:

- EE1111.1. Interface the Analog and Digital sensors to Node-MCU
- EE1111.2. Develop Embedded C programs to read sensor data and upload to public cloud platform.
- EE1111.3. Use Python-based IDE (integrated development environments) for the Raspberry Pi
- EE1111.4. Interface Raspberry Pi with I/O devices.
- EE1111.5. Visualize sensor data uploaded on public cloud.
- EE1111.6. Apply standard protocol(s) for implementation of IoT Systems.
- EE1111.7. Analyze and Improve existing systems with innovative IoT based approaches.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
EE1111.1								1		1	1						
EE1111.2							1	1	1		1						
EE1111.3								1		1							
EE1111.4								1	1	1	1		1	1			
EE1111.5							1	1		1	1			1			
EE1111.6									1	1			1	1			
EE1111.7									1	1	1						

Course Code: PR1101

Course Name: Automation Project

Course Outcomes: On successful completion of this course, the students should be able to:

- PR1101.1. Design and implement a complete project in IoT/Automation using microcontroller/SOC interfaced with sensors or any other automation hardware/tools.
- PR1101.2. Apply anyone/more standard data communication/IoT protocol(s).
- PR1101.3. Use cloud servers for data streaming/logging and analytic techniques.
- PR1101.4. Implement algorithms/signal processing using the data at edge/cloud.
- PR1101.5. Deploy techniques to conserve bandwidth/energy/other resources and achieve cost economy for project.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
PR1101.1	2				2					2		2		3			
PR1101.2						2											
PR1101.3							2										
PR1101.4	2								2								
PR1101.5					2		2										

Course Code: CE1113

Course Name: Transportation Engineering

Course Outcomes: On successful completion of this course, the students should be able to:

CE1113.1: Plan and design the alignment of highway

CE1113.2: Characterize highway construction materials

CE1113.3: Design geometric features of highway

CE1113.4: Design runway lengths

CE1113.5: Design super elevation and turnout of railway track

CE1113.6: Apply urban transport management plan for cities

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1113.1	2			1	2	1			1			2	1			1	2
CE1113.2	1	2		1				1	1	1	1			1		1	2
CE1113.3	1		1		3				1			1		1		3	
CE1113.4	1		1		1							1		1		2	2
CE1113.5	1		1		1							1		1		2	
CE1113.6	2	2		2				1			1	1	1		1	1	2

Course Code: CE1102

Course Name: Digital Surveying and Mapping

Course Outcomes: On successful completion of this course, the students should be able to:

CE1102.1: Operate modern survey equipment in the field for various civil engineering applications

CE1102.2: Apply the basic principles of surveying and mapping

CE1102.3: Use mathematical and computational skills for surveying and mapping

CE1102.4: Interpret survey data and compute areas and volumes

CE1102.5: Select the type of remote sensing technique / data for required purpose

CE1102.6: Use principles of Remote sensing, GIS and GPS to collect, map and retrieve spatial information.

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CE1102.1	1		1	1			1				1			1		2	2
CE1102.2	1		1	1	2		2			2					1	1	1
CE1102.3	1	1		2	1	1	2		2		1			1		2	2
CE1102.4	1	1		2				1		1	1	1	1			1	1
CE1102.5	1	1	2		1											2	1
CE1102.6	1	2	1		1		1	2			1	1		1	1	2	1

Course Code: CC1106

Course Name: Critical Thinking for Decisions at Workplace

Course Outcomes: After course completion, the student will be able to

- CC1106.1. Apply techniques of Critical Thinking to analyse organisational problems through positive inquiry
- CC1106.2. Describe and analyse appropriate problem-solving and ethical decision-making processes
- CC1106.3. Choose the most effective and logical decision among multiple alternatives
- CC1106.4. Evaluate solutions and anticipate likely risks based on purpose, context and ethics

Course Outcome	Correlation with program outcomes															Correlation with program specific outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO-1	PSO-2
CC1106.1	1										2		2				
CC1106.2	2					1		2					1				
CC1106.3									1		1	2	1				
CC1106.4							1	2				2					