LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

COURSE OUTOMES (R20) MAPPING WITH POs AND PSOs

I SEMESTER (I BTECH -I SEM)

20FE01	PROFESSIONAL COMMUNICATION I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Write sentences and paragraphs using proper grammatical structures and word forms (Remember: L1).	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
CO2	Comprehend the given text by employing suitable strategies for skimming and scanning and draw inferences (Understand: L2).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
CO3	Write summaries of reading texts using correct tense forms & appropriate structures (Remember: L1)	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
CO4	Write Formal Letters; Memos & E-Mails (Apply: L3).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
CO5	Edit the sentences/short texts by identifying basic errors of grammar/vocabulary/syntax (Understand: L2).	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
	Average value of CO	-	1.00	-	2.00	-	1.00	-	-	3.00	3.00	-	2.00	-	-	-
20FE03	**DIFFERENTIAL EQUATIONS**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Apply first order and first-degree differential equations to find orthogonal trajectories (Apply : L3).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO2	Distinguish between the structure and methodology of solving higher order differential equations with constant coefficients (Understand : L2).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-

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CO3	Apply various Numerical methods to solve initial value problem (Apply : L3).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO4	Generate the infinite series for continuous functions and investigate the functional dependence (Understand : L2).	2	1	-	1	-	-	-	-	-	-	-	1	-	-	-
CO5	Solve partial differential equations using Lagrange method (Apply : L3).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
	Average value of CO	2.80	1.80	-	1.80	-	-	-	-	-	-	-	1.00	-	-	-
20FE05	**APPLIED CHEMISTRY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications (Apply - L3).	3	2	1	2	-	2	1	-	-	-	-	2	-	-	-
CO2	Apply principles of corrosion for design and effective maintenance of various equipment (Apply - L3).	3	2	2	1	-	2	2	-	-	-	-	2	-	-	-
CO3	Analyse the suitability of advanced materials like nano materials in electronics and medicine (Understand - L2).	3	2	2	1	-	2	1	-	-	-	-	2	-	-	-
CO4	Identify the importance of liquid crystals, polymers in advanced technologies (Understand - L2).	3	3	2	1	-	2	1	-	-	-	-	2	-	-	-
CO5	Apply the principles of analytical techniques in chemical analysis (Apply - L3).	3	2	2	1	-	1	1	-	-	-	-	2	-	-	-
	Average value of CO	3.00	2.20	1.80	1.20	-	1.80	1.20	-	-	-	-	2.00	-	-	-
20CE01	**SURVEYING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the basic principles involved in linear and angular measurements, functioning of total station, levelling measurements and characteristic properties of simple curve	1	-	2	-	-	-	2	-	1	-	-	-	-	-	-

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO2	Develop the longitudinal, lateral and contour profiles of a given area using fundamental principles of levelling.	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	Calculate the area and volume of required boundaries. (Apply - L3)	1	1	-	-	-	-	2	-	-	-	-	-	-	-	-
CO4	Determine the distance and elevations of an object using tacheometer and EDM principles. (Apply - L3)	-	1	2	-	2	-	-	-	1	-	-	-	-	-	-
	Average value of CO	1.33	1.00	2.00	-	2.00	-	2.00	-	1.00	-	-	-	-	-	-
20CE02	**BUILDING MATERIALS AND CONSTRUCTION**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the preparation process and the composition of construction materials such as Stones, bricks and timber. (Understand - L2)	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	Describe the sources, constituents and storage of lime and cement for their appropriate usage as building materials based on their specific attributes. (Understand - L2)	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	Identify the different components in a building and their specific purpose in the building. (Remember - L1)	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO4	Classify the various types of mortars, masonry components and finishings used in the buildings. (Understand - L2)	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	Identify the uses, good and faulty characteristics of different building materials. (Remember - L1)	2	2	-	1	-	-	-	-	-	-	-	2	-	-	-
	Average value of CO	2.80	2.00	-	1.00	-	-	-	-	-	-	-	1.60	-	-	-
20CE52	**CIVIL ENGINEERING DRAFTING TECHNIQUES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Draw simple objects based on principles of geometry. (Understand - L2)software. (Understand - L2)	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO2	Sketch the projections of an object based on the angles of projection. (Understand - L2)	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO3	Draft simple objects using ArchiCAD	2	2	2	2	-	-	-	-	1	-	-	-	-	-	-
CO4	Develop, draw and edit simple objects related to civil engineering applications using ArchiCAD.	2	2	2	2	-	-	-	-	1	-	-	-	-	-	-
	Average value of CO	2.00	2.00	2.00	3.00	-	-	-	-	1.00	-	-	-	-	-	-
20FE52	**APPLIED CHEMISTRY LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Assess quality of water based on the procedures given (Understand - L2).	3	3	-	1	-	2	2	-	-	-	-	-	-	-	-
CO2	Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus (Understand - L2).	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Acquire practical knowledge related to preparation of polymers (Understand - L2).	2		1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Exhibit skills in performing experiments based on theoretical fundamentals (Understand - L2)	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
	Average value of CO	2.50	2.00	1.00	1.00	-	2.00	2.00	-	-	-	-	-	-	-	-
20ME51	**Engineering Workshop**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Develop different prototypes in the carpentry section.	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-
CO2	Fabricate various basic prototypes in fitting trade	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-
CO3	Demonstrate various operations related to plumbing, tin smithy and black smithy	1	2	1	1	-	2	-	-	3	1	-	3	-	-	-
CO4	Perform various basic house wiring techniques	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-
	Average value of CO	1.00	2.00	1.00	1.75	-	2.00	-	-	3.00	1.00	-	3.00	-	-	-
20CE51	**Surveying Lab**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Compute linear and angular measurements in the field using chain and compass	2	1	1	1	-	-	-	-	-	-	-	2	-	-	-
CO2	Plot a given area using plane table in the field	2	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	determine the elevations of different points on the ground using principles of leveling	2	2	1	2	-	-	-	-	-	-	-	2	-	-	-
	Average value of CO	2.00	1.67	1.33	2.00	-	-	-	-	-	-	-	2.00	-	-	-
	II SEMESTER (I BTECH -II SEM)															
20FE02	**PROFESSIONAL COMMUNICATION II**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Produce a coherent paragraph interpreting a figure / graph/ chart/ table (Understand:L2)	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
CO2	Comprehend the given texts thorughly by guessing the meanings of the words contextually. (Understand:L2)	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
CO3	Use language appropriately for describing / comparing / contrasting / giving directions and suggestions (Remember:L1)	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
CO4	Write formal /informal dialouges with an understanding of verabl / non verbal features of communication. guess measings of the words from the context.(Understand:L2)	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
CO5	Write well-structured essays ; Reports and Re'sume' (Apply - L3).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
	Average value of CO	-	1.00	-	2.00	-	1.00	-	-	3.00	3.00	-	2.00	-	-	-
20FE04	**LINEAR ALGEBRA AND TRANSFORMATION TECHNIQUES**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CO1	Investigate the consistency of equations and solve them.	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO2	Determine the Eigen Values, Inverse and Powers of a matrix using Cayley – Hamilton Theorem	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO3	Use the concepts of Laplace Transforms to various forms of functions	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO4	Solve Ordinary Differential Equations by using Laplace Transforms	2	1	-	1	-	-	-	-	-	-	-	1	-	-	-
CO5	Apply Z-Transforms to solve Difference Equations	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
	Average value of CO	2.80	1.80	-	1.80	-	-	-	-	-	-	-	1.00	-	-	-
20FE08	**ENGINEERING PHYSICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyse the different mechanical properties of materials (Understand – L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
CO2	Apply the lasers and optical fibres in different fields (Apply - L3).	3	2	1	1	-	-	-	-	-	-	-	1	-	-	-
CO3	Summarize the properties of sound waves (Understand – L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
CO4	Classify the different types of magnetic and dielectric materials(Understand - L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
CO5	Identify the properties of superconducting and nano materials (Understand – L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
	Average value of CO	3.00	2.80	1.00	1.00	-	-	-	-	-	-	-	1.00	-	-	-
20CS01	**PROGRAMMING FOR PROBLEM SOLVING USING C**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Familiar with syntax and semantics of the basic programming language constructs. (Understand : L2)	2	3	-	-	-	-	-	-	-	1	-	1	-	-	-
CO2	Construct derived data types like arrays in solving problem. (Apply: L3)	2	3	2	1	-	-	-	-	-	1	-	1	-	-	-

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CO3	Decompose a problem into modules and reconstruct it using various ways of user-defined functions. (Apply: L3)	2	3	2	1	-	-	-	-	-	1	-	1	-	-	-
CO4	Define user-defined data types like structures and unions and its applications to solve problems. (Apply: L3)	2	3	2	-	-	-	-	-	-	1	-	1	-	-	-
CO5	Discuss various file I/O operations and its application. (Understand: L2)	2	3	2	-	-	-	-	-	-	1	-	1	-	-	-
	Average value of CO	2.00	3.00	2.00	1.00	-	-	-	-	-	1.00	-	1.00	-	-	-
20CS51	**PROGRAMMING FOR PROBLEM SOLVING USING C Lab**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply control structures of C in solving computational problems. (Apply – L3)	**2**	3	**1**	-	-	-	-	-	**1**	**1**	-	**2**	-	-	-
CO2	Implement derived data types & use modular programming in problem solving. (Apply – L3)	**2**	3	**1**	-	-	-	-	-	**1**	**1**	-	**2**	-	-	-
CO3	Implement user defined data types and perform file operations. (Apply – L3)	**2**	3	**1**	-	-	-	-	-	**1**	**1**	-	**2**	-	-	-
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values. (Apply – L3)	**2**	3	**1**	-	-	-	-	-	**1**	**1**	-	**2**	-	-	-
	Average value of CO	2.00	3.00	1.00	-	-	-	-	-	1.00	1.00	-	2.00	-	-	-
20FE51	**PROFESSIONAL COMMUNICATION SKILLS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Introduce oneself and others using appropriate language and details (Understand: L2).	-	-	-	-	3	-	-	-	-	3	3	-	-	-	-
CO2	Comprehend short talks and speak clearly on a specific topic using error free English (Understand : L2).	-	-	-	-	3	-	-	-	-	3	3	-	-	-	-
CO3	Report effectively after participating in informal discussions ethically (Remember : L1).	-	-	-	-	3	-	-	-	-	3	3	-	-	-	-

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO4	Interpret data aptly, ethically & make oral presentations (Apply : L3).	-	-	-	-	3	-	-	-	-	3	3	-	-	-	-
	Average value of CO	-	-	-	-	3.00	-	-	-	-	3.00	3.00	-	-	-	-
20FE55	**ENGINEERING PHYSICS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the wave characteristics of light(Understand – L2).	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
CO2	Determine the wavelength of laser source and width of slit(Apply - L3).	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
CO3	Estimate the magnetic field using Stewart's and Gee's apparatus and the rigidity modulus of material using Torsional Pendulum(Understand - L2).	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
CO4	Identify the phenomena of resonance in strings(Understand – L2).	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
CO5	Improve report writing skills and individual team work with ethical values(Understand – L2)	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
	Average value of CO	3.00	2.00	1.00	1.00	-	-	-	-	1.00	-	-	1.00	-	-	-
20CE03	**APPLIED MECHANICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Determine the resultant force and moment for a given system of forces.	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Calculate the unknown forces in members of planar systems by constructing free body diagrams and applying static equilibrium conditions.	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	Examine the motion/ impeding the motion of bodies on horizontal/inclined planes associated with frictional forces.	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	Analyze for the internal forces in the members of a pin jointed perfect frames subjected to horizontal, vertical and inclined loads.	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-

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CO5	Determine the centroid and second moment of area of simple and composite areas.	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
	Average value of CO	3.00	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-
20ME51	**ENGINEERING WORKSHOP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Develop different prototypes in the carpentry section.	3	-	2	3	3	3	-	-	3	-	-	2	-	-	-
CO2	Fabricate various basic prototypes in fitting trade.	3	-	2	3	3	3	-	-	3	-	-	2	-	-	-
CO3	Demonstrate various operations related to plumbing, tin smithy and black smithy.	3	-	2	3	3	3	-	-	3	-	-	2	-	-	-
CO4	Perform various basic house wiring techniques.	3	-	2	3	3	3	-	-	3	-	-	2	-	-	-
	Average value of CO	3.00	-	2.00	3.00	3.00	3.00	-	-	3.00	-	-	2.00	-	-	-
20MC01	**Constitution of India**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand history and philosophy of constitution with reference to Preamble, Fundamental Rights and Duties.	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-
CO2	Understand the concept of Unitary and Federal Government along with therole of President, Prime Minister and Judicial System	-	-	-	-	-	3	2	3	-	2	-	3	-	-	-
CO3	Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-
CO4	Learn local administration viz. Panchayat, Block, Municipality and Corporation.	-	-	-	-	-	3	2	3	-	2	-	3	-	-	-
CO5	learn about Election Commission and the process and about SC, ST, OBC and women	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-
	Average value of CO	-	-	-	-	-	3.00	2.60	3.00	-	2.00	-	3.00	-	-	-
	III SEMESTER (II BTECH -I SEM)															

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20FE10	Numerical Methods and Integral Calculus	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Estimate the best fit polynomial for the given tabulated data using Interpolation.(Understand – L2)	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO2	Apply numerical techniques in solving of equations and evaluation of integrals. (Apply– L3)	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
CO3	Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes.(Apply– L3)	3	2	-	1	-	-	-	-	-	-	-	1	-	-	-
CO4	Generate the single valued functions in the form of Fourier series and obtain Fourier series representation of periodic function.(Apply– L3)	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	Evaluate the directional derivative, divergence and angular velocity of a vector function.(Apply– L3)	3	1	-	1	-	-	-	-	-	-	-	1	-	-	-
	Average value of CO	3.00	1.60	-	1.50	-	-	-	-	-	-	-	1.00	-	-	-
20CE05	Mechanics of Fluids	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the basic properties of fluids, and fundamental aspects of fluid mechanics such as pressure, types of flow, conservation of mass, energy, momentum, energy losses, dimensionless numbers & model laws (Understand – L2)	3	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	Determine the pressure at a point using pressure measuring devices and by applying hydrostatic pressure principles, and compute center of pressure for thee given conditions. (Apply-L3)	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1

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CO3	Determine the flow parameters using Continuity equation, Bernoulli equation and compute the forces acting on pipe bends. (Apply – L3)	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	Compute the energy losses in pipes and estimate the flow parameters in viscous flows using Hagen – Poiseuille equation. (Apply – L3)	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	Apply dimensional analysis as a tool in solving problems in the field of fluid mechanics and apply the laws of similarity. (Apply – L3)	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	3.00	2.00	-	-	-	-	-	-	-	-	-	1.00	1.00	-	1.00
20CE06	Solid Mechanics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Recall the terminology associated with the structural members viz. bars, beams, column, shafts which are subjected to practical loads (Remember-L1)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	2
CO2	Relate the required input parameters for finding the reactions / internal forces in the structural elements subjected to axial, shear, bending and torsional forces (Understand-L2)	2	-	-	-	-	-	-	-	-	-	-	1	-	-	2
CO3	Solve for the axial, shear, bending and twisting moment in columns/ Beams/ Shafts/ subjected to longitudinal, transverse and twisting loads and their combinations.(Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	1	-	-	2
CO4	Construct the shear, bending moment and stress variation diagrams at every cross section along the length of determinate structures subjected to applied loads. (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	1	-	-	2
CO5	Identify the maximum values of stresses/ moments in structural	3	-	-	-	-	-	-	-	-	-	-	1	-	-	2

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	members of various cross sections subjected to axial/ transverse/ torsional loads. (Apply-L3)														
	Average value of CO	2.40	-	-	-	-	-	-	-	-	-	-	1.00	-	-	2.00
20CE07	**Concrete Technology**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the basic ingredients of concrete, their role in the production of concrete and its behavior in the field. (Understand-L2)	1	-	-	-	2	-	2	-	-	-	-	-	2	-	2
CO2	Differentiate the fresh and hardened properties of concrete. (Understand-L2)	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-
CO3	Describe the main operations of concreting i.e., selection of materials and its proportional mixing towards mixing, placing, compaction, curing and finishing. (Understand-L2)	1	-	-	-	2	-	2	-	-	-	-	-	-	-	2
CO4	Perceiving & broadening the knowledge of new concrete types and concrete mix design methods. (Understand-L2)	1	-	-	3	1	2	2	-	-	-	-	3	-	-	3
	Average value of CO	1.00	-	-	-	-	-	-	-	-	-	-	1.00	2.00	-	-
20CE08	**Engineering Geology**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand and interpret fundamental geological processes and geological formations. (L2-Understand)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Differentiate various properties of minerals and rocks. (L2-Understand)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	Illustrate geological structural features. (L3-Apply)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	Apply geological principles in civil engineering applications. (L3-Apply)	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-
	Average value of CO	1.00	1.00	1.00	-	-	-	-	-	-	-	-	1.00	-	-	-
20MC02	**Environmental Science**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions. (Remember-L1)	3	3	-	-	-	3	3	3	-	-	-	3	-	-	-
CO2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.(Understand-L2)	3	3	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.(Understand-L2)	3	-	3	-	-	-	2	-	-	-	-	2	-	-	-
CO4	Acknowledge and prevent the problems related to pollution of air, water and soil. (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.(Understand-L2)	3	3	3	3	-	3	3	3	-	-	-	3	-	-	-
	Average value of CO	3.00	3.00	3.00	3.00	-	3.00	3.00	3.00	-	-	-	2.80	-	-	-
20CE54	**Solid Mechanics Lab**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Estimate compressive strength of wood, concrete, brick materials and decide their suitability for the construction purpose (Evaluate-L5)	-	-	-	3	-	-	-	-	-	2	-	-	-	3	-
CO2	Determine the tensile strength, hardness/ impact resistance of metals used in construction works comment on their usage (Evaluate-L5)	-	-	-	3	-	-	-	-	-	2	-	-	-	3	-
CO3	Determine the Rigidity /Young's modulus of wood/steel materials (Apply-L3)	-	-	-	3	-	-	-	-	-	2	-	-	-	3	-
	Average value of CO	-	-	-	3.00	-	-	-	-	-	2.00	-	-	-	3.00	-

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20CE55	**Building Materials and Concrete Technology Lab**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Differentiate bricks and tiles based on physical properties. (Understand-L2)	-	-	-	3	1	3	2	-	-	2	-	-	-	3	-
CO2	Determine the properties of concrete making materials. (Apply-L3)	-	-	-	3	1	3	2	-	-	2	-	-	-	3	-
CO3	Identify the properties of concrete. (Remember-L1)	-	-	-	3	1	3	2	-	-	2	-	-	-	3	2
	Average value of CO	-	-	-	3.00	1.00	3.00	2.00	-	-	2.00	-	-	-	3.00	2.00
20CE56	**Engineering Geology Lab**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Demonstrate the importance of geological principles. (L3-Apply)	1	1	-	-	-	-	-	-	1	2	-	1	-	-	-
CO2	Distinguish various types of minerals and rocks based on physical properties and physical observations. (L2-Understand)	1	-	-	-	-	-	-	-	1	2	-	1	-	-	-
CO3	Interpret structural patterns of various geological structures. (L2-Understand)	1	1	-	-	-	-	1	-	1	2	-	1	-	-	-
	Average value of CO	1.00	1.00	-	-	-	-	1.00	-	1.00	2.00	-	1.00	-	-	-
	IV SEMESTER (II BTECH -II SEM)															
20FE09	**PROBABILITY AND STATISTICS**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand various probabilistic situations using the various laws of probability and random variables. (Understand-L2)	3	2	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems. (Apply - L3)	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on the sample data. (Apply - L3)	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-

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CO4	Analyse the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis. (Analyze-L4)	3	3	3	3	-	-	-	-	-	-	-	2	-	-	-
CO5	Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data. (Evaluate-L5)	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
	Average value of CO	3.00	2.20	2.00	2.60	-	-	-	-	-	-	-	2.00	-	-	-
20CE09	**HYDRAULICS AND HYDRAULIC MACHINERY SYSTEMS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the various types of flows, specific energy curves, hydraulic jumps and working of hydraulic machines in fluid flows. (Understand-L2)	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-
CO2	Apply the basic principles to design the open channels and determine the energy losses due to formation of hydraulic jump. (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-
CO3	Apply the impulse-momentum equation to determine the force exerted by a jet on different configurations of vanes. (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-
CO4	Apply the working principle to draw the velocity triangles and determine the efficiencies of hydraulic machines. (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-
	Average value of CO	3.00	-	-	-	-	-	-	-	-	-	-	-	2.00	1.00	-
20CE10	**GEO TECHNICAL ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the engineering and index properties of soil. (Understand-L2)	2	3	-	-	-	-	-	-	-	-	-	1	-	-	2

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO2	Classify the soils based on ISC system and grain size distribution. (Understand-L2)	2	3	-	-	-	-	-	-	-	-	-	1	-	-	2
CO3	Evaluate the permeability, shear strength and consolidation properties of soil. (Apply-L3)	2	3	-	-	-	-	-	-	-	-	-	1	2	-	2
CO4	Illustrate the stress distribution of soil subjected to different loading conditions. (Apply-L3)	2	3	-	-	-	-	-	-	-	-	-	1	2	-	2
	Average value of CO	2.00	3.00	-	-	-	-	-	-	-	-	-	1.00	2.00	-	2.00

20CE11	STRUCTURAL ANALYSIS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Show the reactions at the supports and joints as well as interior forces of Members subjected to different loads and Boundary Conditions (Understand-L2).	3	3	2	2	1	2	2	-	1	2	2	-	3	3	2
CO2	Solve for the internal forces in determinate structures viz/ namely arches, cables. (Apply-L3)	3	3	2	2	1	2	2	-	1	2	2	-	3	3	2
CO3	Identify the appropriate method for determining the deflections of beams (Apply-L3)	3	3	2	2	1	2	2	-	1	2	2	-	3	3	2
CO4	Solve for the internal forces in indeterminate structures viz/ namely propped cantilevers/fixed and continuous beams (Apply-L3)	3	3	2	2	1	2	2	-	1	2	2	-	3	3	2
CO5	Identify the appropriate method of analysis for computing internal forces, stresses in beams/ Trusses subjected to all practical load combinations (Apply-L3)	3	3	2	2	1	2	2	-	1	2	2	-	3	3	2
	Average value of CO	3.00	3.00	2.00	2.00	1.00	2.00	2.00	-	1.00	2.00	2.00	-	3.00	3.00	2.00

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20HS01	UNIVERSAL HUMAN VALUES 2: UNDERTANDING HARMONY	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	CO1: Apply the value inputs in life and profession (Apply – L3)	-	-	-	-	-	3	2	3	1	-	-	3	-	-	-
CO2	CO2: Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body (Understand – L2)	-	-	-	-	-	1	2	3	3	-	-	2	-	-	-
CO3	CO3: Understand the role of a human being in ensuring harmony in society (Understand – L2)	-	-	-	-	-	3	2	1	1	-	-	2	-	-	-
CO4	CO4: Understand the role of a human being in ensuring harmony in the nature and existence. (Understand – L2)	-	-	-	-	-	3	3	2	2	-	-	2	-	-	-
CO5	CO5: Distinguish between ethical and unethical practices (Apply – L3)	-	-	-	-	-	2	2	3	1	-	-	3	-	-	-
	Average value of CO	-	-	-	-	-	2.40	2.20	2.40	1.60	-	-	2.40	-	-	-
20CE57	HYDRAULICS AND HYDRAULIC MACHINERY LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Develop knowledge on the fundamental principles of fluid flow. (Apply-L3)	2	-	-	3	-	-	-	-	-	2	-	-	1	2	-
CO2	Apply the laws of conservation of mass, energy, and momentum to solve practical problems in fluid mechanics. (Apply-L3)	2	-	-	3	-	-	-	-	-	2	-	-	1	2	-
CO3	Practically visualize the functioning and performance of hydraulic turbines and pumps. (Understand-L2)	2	-	-	3	-	-	-	-	-	2	-	-	1	2	-
	Average value of CO	2.00	-	-	3.00	-	-	-	-	-	2.00	-	-	1.00	2.00	-
20CE58	GEO TECHNICAL ENGINEERING LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Identify the tools, equipment required, and experimental procedures used in soil investigations (Understand-L2)	2	-	-	-	3	-	-	-	-	2	-	1	-	3	1

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO2	Determine the index and engineering properties of soils (Apply-L3)	2	-	-	-	3	-	-	-	-	2	-	1	-	3	1
CO3	Perform field and laboratory tests for soil investigations to compute desired parameters (Apply-L3)	2	-	-	-	3	-	-	-	-	2	-	1	-	3	1
CO4	Apply field conditions for computing and analyzing the experimental data. (Understand-L2)	2	3	-	-	-	-	-	-	-	2	-	1	3	-	1
	Average value of CO	2.00	3.00	-	-	3.00	-	-	-	-	2.00	-	1.00	3.00	3.00	1.00
20CE59	**ADVANCED SURVEYING LAB**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Obtain angular measurements in the field using theodolite. (Apply-L3)	2	3	2	2	-	2	-	-	-	1	-	-	-	2	2
CO2	Determine the coordinates/elevations/distances of different points in the field using theodolite and total stations. (Apply-L3)	2	2	-	-	-	2	-	-	-	1	-	-	-	2	2
CO3	Operate the total station to take out the measurements for desired objectives. (Apply-L3)	3	2	-	2	-	2	-	-	-	-	-	-	-	-	-
	Average value of CO	2.33	2.33	2.00	2.00	-	2.00	-	-	-	1.00	-	-	-	2.00	2.00
	V SEMESTER (III BTECH -I SEM)															
20CE12	**DESIGN OF REINFORCED CONCRETE STRUCTURES**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the fundamental procedures and guidelines given in relevant IS Codes for design of various RCC elements such as beams, columns, foundations, slabs, shear reinforcement, under Working stress and Limit State methods (Understand-L2)	1	1	1	-	-	1	-	-	-	-	-	1	1	-	2
CO2	Design the RCC beams using both working stress and limit state methods (Apply-L3)	1	1	3	-	-	1	-	-	1	-	-	1	1	-	1

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CO3	Design the shear reinforcement and Columns subjected to axial load, uni-axial and bi-axial moments using Limit state of collapse theory (Apply-L3)	1	1	3	-	-	1	-	-	1	-	-	1	1	-	1
CO4	Design the different types of shallow foundations, the one way and two-way slabs with different end conditions using appropriate design guidelines (Apply-L3)	1	1	3	-	-	1	-	-	1	-	-	1	1	-	1
	Average value of CO	1.00	1.00	2.50	-	-	1.00	-	-	1.00	-	-	1.00	1.00	-	1.25
20CE13	**HYDROLOGY AND WATER RESOURCES ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the basic concepts and factors affecting in hydrology such as Hydrologic cycle, Precipitation, Rain gauges, Runoff, Abstractions, Hydrographs, ground water geology and its occurrence. (Understand-L2)	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	Compute the average rainfall occurring in an area and estimate the abstractions for a given data (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO3	Estimate the groundwater potential based on available data, develop different hydrographs and analyze them for the required information (Apply-L3)	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO4	Understand the fundamental and functional components of Irrigation, Irrigation canals and Canal lining (Understand – L2)	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	Estimate the water requirements, irrigation efficiencies using fundamental principles of Irrigation, and sizing of irrigation channels using	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1

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	Lacey's, & Kennedy theories. (Apply-L3).															
	Average value of CO	3.00	-	-	-	-	-	-	-	-	-	-	-	2.00	-	1.00
20CE14	**ENVIRONMENTAL ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Estimate the water demand for the community and assess the significance of water/wastewater, sludge quality parameters and fundamental aspects of water and wastewater treatment, sludge handling (Understand - L2)	3	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	Evaluate the various unit operations and design the elements in sedimentation/coagulation -based water treatment systems (Apply - L3).	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	Illustrate the working of filtration and disinfection systems and design them for water treatment systems (Apply - L3)	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	Analyze the various unit operations and design the primary treatment units for wastewater treatment (Apply - L3)	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	Analyze the salient operational considerations in secondary biological systems and sludge handling systems and design them for wastewater treatment (Apply - L3)	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	2.20	2.00	-	-	-	-	-	-	-	-	-	1.00	1.00	-	1.00
20CE15	**REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Interpret the concepts of Photogrammetry and its applications such as determination of heights of objects on terrain. (Understand-L2)	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO2	Illustrate the Electromagnetic spectrum and utilize the energy interactions of EMR with atmosphere and earth surface features for GIS data generation. (Understand-L2)	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO3	Analyze the methods of map projections and understand coordinate systems on GIS Software packages to produce high resolution thematic maps.(Understand-L2)	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO4	Apply the concepts of vector and raster data model for representation of topological earth features and its importance.(Understand-L2)	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	Apply the RS & GIS techniques for solving civil engineering applications(Apply-L3)	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
	Average value of CO	2.00	-	-	-	-	-	-	-	-	-	-	-	2.00	-	1.00
20CE16	TOWN PLANNING AND ARCHITECTURE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Enumerate the historical back ground of town planning (Remembering-L1)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
CO2	Perceive the modern town-planning and zoning system (Understanding-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
CO3	Describe the principles of planning as per building bye-laws(Understanding-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
CO4	Categorize the history of architecture with different ages(Understanding-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
CO5	Describe the principles of architecture. (Understanding-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
	Average value of CO	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
20CE17	SAFETY ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Remember the concepts of safety measures undertaken in a manufacturing organization and in project construction. (Remember-L1)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
CO2	Describe the safety and control measures for industries. (Understand-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
CO3	Understand the concepts of Ergonomics for improvement in workplace. (Understand-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
CO4	Interpret the controlling measures during fire accidents (Understand-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
	Average value of CO	-	-	-	-	-	**1**	-	-	-	-	-	**1**	-	-	**1**
20CE60	**ENVIRONMENTAL ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the underlying principles of operation, perform the different laboratory techniques for examining the raw water quality parameters and comment on the results obtained (Apply-L3)	1	-	2	-	1	-	-	-	-	2	-	-	-	1	-
CO2	Understand the underlying principles of operation and perform the different laboratory techniques for examining the wastewater quality parameters and comment on the results obtained. (Apply-L3)	1	-	2	-	1	-	-	-	-	2	-	-	-	1	-
	Average value of CO	1.00	-	2.00	-	1.00	-	-	-	-	2.00	-	-	-	1.00	-
20CE61	**GIS AND COMPUTER APPLICATIONS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Digitize and create thematic map and extract important features using GIS software.(Apply-L3)	-	-	-	-	2	-	-	-	-	2	-	1	-	1	1
CO2	Analyze and Interpret the maps created using GIS for specific applications.(Apply-L3)	-	-	-	-	2	-	-	-	-	2	-	1	-	1	1

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO3	Develop coding for civil engineering problems and analyze the results.(Apply-L3)	-	-	-	2	2	-	-	-	-	2	-	1	-	1	1
	Average value of CO	-	-	-	2.00	2.00	-	-	-	-	2.00	-	1.00	-	1.00	1.00
20CES2	**COMPUTER AIDED BUILDING DRAWING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Sketch the different sign conventions used in building drawing (Apply-L3)	1	-	-	-	2	-	-	-	-	1	-	-	-	1	-
CO2	Draw different views of buildings with a suitable scale (Apply-L3)	1	-	-	-	2	-	-	-	-	1	-	-	-	1	-
CO3	Develop 3-D view of building and staircase. (Apply-L3)	1	-	-	-	2	-	-	-	-	1	-	-	-	1	-
VI SEMESTER (III BTECH -II SEM)															
20CE18	**HIGHWAY ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the basic parameters of highway planning, geometric elements of highway and traffic studies (Understand-L2)	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	Determine the geometric elements of highway alignment and pavement like flexible and rigid pavement. (Apply-L3)	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	Identify the suitability of appropriate highway materials based on their properties(Understand-L2)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Design the pavement thickness and elements of highway (Apply-L3)	2	-	2	-	-	-	-	-	-	-	-	1	1	-	-
CO5	Understand the fundamentals of highway maintenance and traffic management (Understand-L2)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1
	Average value of CO	1.40	-	2.00	-	-	-	-	-	-	-	-	1.00	1.00	-	1.00
20CE19	**DESIGN OF STEEL STRUCTURES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify the different structural steel elements such as steel members, loads on steel members, various steel	1	-	-	-	-	-	-	-	-	-	-	1	1	-	2

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	connections, beams, tension and compression members, purlins, columns, truss elements, their relevant guidelines listed in appropriate Code books and their connection details (Understand-L2)															
CO2	Design the different types of connections in steel members, compression and tension members.(Apply-L3)	2	-	3	-	-	-	-	-	-	-	-	1	1	-	1
CO3	Design the beams, column bases and built-up columns (Apply-L3)	2	-	3	-	-	-	-	-	-	-	-	1	1	-	1
CO4	Design the roof trusses and their components (Apply-L3)	2	-	3	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	1.75	-	3.00	-	-	-	-	-	-	-	-	1.00	1.00	-	1.25
20CE20	ESTIMATION AND QUANTITY SURVEYING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO011	PO12	PSO1	PSO2	PSO3
CO1	Understand the different items of work in Estimation of buildings, Deductions, Depreciations/Net values, RCC works and Roads. (Understand-L2)	1	-	-	-	-	-	-	-	-	-	-	1	3	-	2
CO2	Estimate the quantities of buildings, RCC works, Roads and canals. (Apply-L3)	2	2	-	-	-	-	-	1	-	-	-	1	3	-	2
CO3	Compute the rates of items of work and write the specifications of the civil works. (Apply-L3)	2	2	-	-	-	-	-	1	-	1	1	1	3	-	2
CO4	Analyze and document the value of property as per the prevailing regulations and PWD procedures. (Apply-L3)	1	2	-	-	-	-	-	-	-	1	1	1	3	-	2
	Average value of CO	1.50	2.00	-	-	-	-	-	1.00	-	1.00	1.00	1.00	3.00	-	2.00

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20CE21	ADVANCED DESIGN OF REINFORCED CONCRETE STRUCTURES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the prevailing IS Code provisions for the design of Pile grouping and Foundations, different Slabs, Stairs, Cantilever Retaining Walls, and Water Tanks (Understand – L2).	1	-	-	-	-	-	-	-	-	-	-	1	1	-	2
CO2	Design the different components under Pile Foundations (Apply-L3).	2	1	3	-	-	-	-	-	-	-	-	1	1	-	1
CO3	Design the different components of different slabs and Stairs (Apply-L3).	2	1	3	-	-	-	-	-	-	-	-	1	1	-	1
CO4	Design the different components of cantilever retaining walls and Water tanks. (Apply-L3).	2	1	3	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	1.75	1.00	3.00	-	-	-	-	-	-	-	-	1.00	1.00	-	1.25
20CE22	CONSTRUCTION MANAGEMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Identify the project characteristics, planning, organization and various stages of a project. (Remember-L1)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	2
CO2	Develop the abilities in project scheduling, controlling & evaluation techniques like PERT, CPM etc. while dealing with a project (Apply-L3)	1	-	1	-	-	1	-	-	-	-	2	1	-	-	2
CO3	Discern the principles of material management, equipment and labour management, inventory and productivity. (Understand-L2)	-	-	-	-	-	1	1	-	-	-	-	1	-	-	2
CO4	Describe the fundamental elements of contracts and material procurement. (Understand-L2)	-	-	-	-	-	1	-	-	-	-	-	1	-	-	2
	Average value of CO	1	-	1	-	-	1	1	-	-	-	2	1	-	-	2
20CE23	LOW COST ECO FRIENDLY BUILDING TECHNIQUES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Recall the concepts of traditional building materials and identify the appropriate eco-friendly building materials for construction. (Remember-L1)	-	-	-	-	-	1	2	-	-	-	-	1	-	-	2
CO2	Understand the current developments of building technologies in foundations, walls and roofs. (Understand-L2)	-	-	-	-	-	1	2	-	-	-	-	1	-	-	2
CO3	Describe prefabrication techniques and assess the wind effects on low rise buildings. (Understand-L2)	-	-	-	-	-	-	2	-	-	-	-	1	-	-	2
CO4	Illustrate the construction of houses in rural areas and disaster-prone areas. (Understand-L2)	-	-	-	-	-	1	2	-	-	-	-	1	-	-	2
	Average value of CO	-	-	-	-	-	**1**	**2**	-	-	-	-	**1**	-	-	**2**
20CE62	**QUANTITY ESTIMATION AND PROJECT MANAGEMENT LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Compute and document the quantities for different items of civil engineering using software tools. (Apply-L3)	1	1	-	1	1	-	-	-	-	1	1	1	-	-	2
CO2	Implement the project for execution of civil engineering projects through systematic planning. (Apply-L3)	1	1	-	1	1	-	-	-	-	1	2	1	1	-	2
	Average value of CO	1.00	1.00	-	1.00	1.00	-	-	-	-	1.00	1.50	1.00	1.00	-	2.00
20CE63	**HIGHWAY ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Categorize and analyze the properties of road aggregates (Apply-L3)	1	-	-	-	-	-	1	-	-	1	-	-	-	2	1
CO2	Determine and analyze the properties of bitumen (Understand-L2)	1	-	-	-	-	-	1	-	-	1	-	-	-	2	-
CO3	Determine the suitability of aggregates and bitumen for pavement designs (Understand-L2)	1	-	-	-	-	-	1	-	-	1	-	-	-	2	-
	Average value of CO	1	-	-	-	-	-	1.00	-	-	1.00	-	-	-	2.00	1.00

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20CE64	**COMPUTER AIDED ANALYSIS AND DESIGN LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply structural analysis software to analyze and design the beams, 2D and 3D frames (Apply-L3)	-	-	3	-	2	-	-	-	-	2	-	1	-	3	2
CO2	Design the retaining walls and foundations using STAAD Pro (Apply-L3)	-	-	3	-	2	-	-	-	-	2	-	1	-	3	-
CO3	Draw the details of RCC and steel structural elements suing AutoCAD. (Apply-L3)	-	-	3	-	2	-	-	-	-	2	-	1	-	3	2
	Average value of CO	-	-	3.00	-	2.00	-	-	-	-	2.00	-	1.00	-	3.00	2.00

VII SEMESTER (IV BTECH -I SEM)

20CE24	**PRE-STRESSED CONCRETE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Describe the basic concepts and general mechanical behavior of prestressed concrete, available IS Codes, and various methods of prestressing. (Understand - L2)	3	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	Perform analysis and compute various types of losses (Apply - L3).	3	3	-	-	-	-	-	-	-	-	-	-	-	-	1
CO3	Design the prestressed members for flexural resistance (Apply - L3)	3	3	-	-	-	-	-	-	-	-	-	-	-	-	1
CO4	Design the prestressed members for shear and torsional resistance. (Apply - L3)	3	3	-	-	-	-	-	-	-	-	-	-	-	-	1
CO5	Estimate the transfer of prestresses in pre tensioned members as per Codal provisions (Understand - L2)	2	2	-	-	-	-	-	-	-	-	-	-	-	-	1
	Average value of CO	**2.80**	**2.40**	-	-	-	-	-	-	-	-	-	-	-	-	**1.00**
20CE25	**ENVIRONMENTAL POLLUTION CONTROL**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Describe the fundamentals aspects associated with the generation of air, noise, and solid waste pollution in the society (Understand – L2).	3	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	Illustrate the technical aspects of hazardous waste generation and environmental management issues (Understand-L2).	3	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	Compute the air pollutant levels from various sources, their dispersions, and calculate the sizing of air pollution control equipment (Apply-L3).	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	Compute the noise pollution levels from various sources and apply the basic principles to control noise pollution (Apply-L3).	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	Compute the solid waste generation from various sources and calculate the properties, sizing for treatment and disposal options from solid waste (Apply-L3).	3	2	-	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	3.00	2.00	-	-	-	-	-	-	-	-	-	1.00	1.00	-	1.00
20CE26	BUILDING SERVICES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Identify the services like lift, elevators, conveyors and escalators, etc. &plan various types of mechanical services as per requirements of building (Understand-L2)	2	-	-	-	-	1	-	-	-	-	-	-	-	-	1
CO2	Explain the electrical services requirement and Layout of a building (Understand-L2)	2	-	-	-	-	1	-	-	-	-	-	-	-	-	1
CO3	Analyze the basic principles of illumination for different types of buildings. (Understand-L2)	2	-	-	-	-	1	-	-	-	-	-	-	-	-	1

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO4	Analyze the refrigeration principles & applications for different types of buildings. (Understand-L2)	2	-	-	-	-	1	-	-	-	-	-	-	-	-	1
CO5	Describe the damage caused by fire & exercise due care for fire safety. (Understand-L2)	2	-	-	-	-	1	-	-	-	-	-	-	-	-	1
	Average value of CO	2.00	-	-	-	-	1.00	-	-	-	-	-	-	-	-	1.00
20CE27	**WATERSHED MANAGEMENT**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Determine watershed parameters and analyse watershed characteristics to take appropriate management action. (Understand-L2)	3	-	-	-	-	-	2	-	-	-	-	-	2	-	1
CO2	Quantify soil erosion and design control measures. (Understand-L2)	3	-	-	-	-	-	2	-	-	-	-	-	2	-	1
CO3	Recommend suitable harvesting techniques for better watershed management. (Understand-L2)	3	-	-	-	-	-	2	-	-	-	-	-	2	-	1
CO4	Describe the land grading techniques for proper land management. (Understand-L2)	3	-	-	-	-	-	2	-	-	-	-	-	2	-	1
CO5	Discuss theappropriate models for watershed management. (Understand-L2)	3	-	-	-	-	-	2	-	-	-	-	-	2	-	1
	Average value of CO	3.00	-	-	-	-	-	2.00	-	-	-	-	-	2.00	-	1.00
20CE28	**RAILWAYS AND AIRPORT ENGINEERING**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Describe the basic terminology used in railways, airport, and harbour engineering (Understand-L2)	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	Identify the key aspects to be considered in the track junctions, Signals and interlocking system of railways (Understand-L2)	2	-	-	-	-	-	1	-	-	-	-	1	1	-	1
CO3	Categorize the technical issues related to planning and design of airports (Understand-L2).	2	-	-	-	-	-	1	-	-	-	-	1	1	-	1

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CO4	Illustrate the importance of providing different components of harbor and ports (Understand-L2).	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	2.00	-	-	-	-	-	1.00	-	-	-	-	1.00	1.00	-	1.00
20CE29	GREEN BUILDINGS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Explain the basic terminology used, different types, benefits of a green building and its rating concept (Understand – L2).	2	-	-	-	-	-	1	-	-	-	-	1	-	-	1
CO2	Assess the impact of climate on a building and identify the appropriate materials for constructing a cost-effective green building (Understand – L2)	2	-	-	-	-	-	2	-	-	-	-	1	-	-	1
CO3	Plan the various options for energy and resource conservation in a green building. (Understand – L2)	2	-	-	-	-	-	2	-	-	-	-	1	-	-	1
CO4	Identify the ways for optimal use of renewable energy resources in the green building (Understand – L2)	2	-	-	-	-	-	1	-	-	-	-	1	-	-	1
	Average value of CO	2.00	-	-	-	-	-	1.50	-	-	-	-	1.00	-	-	1.00
20CE30	REPAIR AND REHABILITATION OF STRUCTURES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Illustrate the causes for distress and deterioration of structures (Understand – L2)	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1
CO2	Describe the various Non Destructive Tests for condition assessment of structures (Understand – L2)	3	2	-	-	-	-	-	-	-	-	-	1	-	-	1
CO3	Select appropriate repair material and rehabilitation strategy (Understand – L2)	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1
CO4	Conduct survey and apply suitable repair methods for cracks (Understand – L2)	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1
	Average value of CO	2.25	1.25	-	-	-	-	-	-	-	-	-	1.00	-	-	1.00

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20CE31	ENVIRONMENTAL HYDRAULICS AND ADVANCED WATER TREATMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the fundamentals of water distribution system, sewer design and its appurtenances (Understand – L2).	3	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	Comprehend the basic concepts of self-purification systems, advanced water, wastewater and industrial wastewater treatment (Understand-L2).	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO3	Design the water distribution and sewer design systems (Apply-L3).	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO4	Analyze and solve the problems related to natural purification systems (Apply-L3).	2	2	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	Apply the basic principles of advanced water, wastewater and industrial wastewater treatment to develop solutions (Understand-L2).	2	1	-	-	-	-	-	-	-	-	-	1	1	-	1
	Average value of CO	2.20	1.75	-	-	-	-	-	-	-	-	-	1.00	1.00	-	1.00
20CE32	FOUNDATION ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Describe the different types of site investigation methods for different site conditions. (Understand-L2)	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1
CO2	Determine the safe bearing capacity and pile group capacity (Apply-L3).	2	3	-	-	-	-	-	-	-	-	-	1	2	-	1
CO3	Explain the different earth pressure theories (Understand-L2).	2	3	-	-	-	-	-	-	-	-	-	1	2	-	1
CO4	Illustrate the different conditions for stability analysis of slopes and retaining walls (Apply-L3).	2	2	-	-	-	-	-	-	-	-	-	1	2	-	1
CO5	Describe the various types of foundations and their suitability (Understand-L2).	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1

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	Average value of CO	**2.00**	**2.40**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**2.00**	**-**	**1.00**
20CES3	**IOT APPLICATIONS IN CIVIL ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand the basics of Microcontroller, Arduino-Uno, RaspberryPi and Internet of Things (Understand-L2)	1	2	2	2	2	-	-	-	-	-	-	1	-	-	-
CO2	Apply the steps of the design methodology in developing IoT Applications using Arduino-Uno, RaspberryPi (Understand-L2)	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-
CO3	Design the interfacing of various sensors with Arduino and Raspberry Pi (Apply-L3)	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-
	Average value of CO	1.67	2.67	2.67	2	2.7	-	-	-	-	-	-	1.667	-	-	-

Head of the Department