LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
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 HANDOUT

PART-A

PROGRAM	**:**	B.Tech., VI -Sem., CIVIL
ACADEMIC YEAR	**:**	2025-26
COURSE NAME & CODE	**:**	Design of Steel Structures (23CE15)
L-T-P STRUCTURE	**:**	2-1-0
COURSE CREDITS	**:**	3
COURSE INSTRUCTOR	**:**	Dr.C Rajamallu
COURSE COORDINATOR	**:**	Dr.C Rajamallu
PRE-REQUISITE	**:**	Strength of Materials-I, Strength of Materials-II, and Structural Analysis

Course Educational Objective:

This course serves as introduction to the concepts of structural steel design using IS 800 design code. It deals with the design of individual members and connections, such as, the design of tension members, compression members, beams, and beam columns; roof trusses and bolted, welded, and connections. The primary objective is to equip the students with the tools necessary for designing steel structures and to familiarize them with the relevant national design codes.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Identify the different types of connections and design the different types of connections in steel members like beams, purlins, columns, truss elements, their relevant guidelines listed in appropriate Code books and their connection details **(Understand-L2)**

CO2:Design the different types of beams, compression and tension members**(Apply-L3)**

CO3: Design the columns, column bases and built-up columns **(Apply-L3)**

CO4: Design of Plate Girder **and** roof trusses **(Apply-L3)**

COURSE ARTICULATION MATRIX (Correlation between Cos & POs, PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	2
CO2	2	-	3	-	-	-	-	-	-	-	-	1	1	-	1
CO3	2	-	3	-	-	-	-	-	-	-	-	1	1	-	1
CO4	2	-	3	-	-	-	-	-	-	-	-	1	1	-	1

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

BOS APPROVED TEXT BOOKS:

T1 N.Subramanian,"DesignofSteelStructures",OxfordUniversityPress,2nd Edition,2011

T2 S.K. Duggal, "DesignofSteelStructures",TataMcGrawHill,NewDelhi,3 rdEdition,2017

BOS APPROVED REFERENCE BOOKS:

1. S.S. Bhavikatti, "Design of Steel Structures", I.K. International Publishing House Pvt. Ltd, 4th Edition, 2014.
2. V.L. Shah and Veena Gore; "Limit State Design of steel structures IS: 800-2007"-, Structures Publications, 1st edition..
3. Design of Steel Structures, NPTEL video lectures and web notes

IS CODES:

1. IS-800–2007
2. IS-875(Part-III)
3. Steel Tables.

NOTE: These IS codes are permitted in the End Examinations

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Civil

UNIT-I: CONNECTIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Riveted connections – definition,	1	02-12-2025		TLM-1	CO1	
2.	rivet strength and capacity,	1	03-12-2025		TLM-1	CO1	
3.	Related problems	1	04-12-2025		TLM-1	CO1	
4.	Welded connections: Introduction	1	05-12-2025		TLM-1	CO1	
5.	Advantages and disadvantages of welding-	1	09-12-2025		TLM-1	CO1	
6.	Strength of Butt welds:	1	10-12-2025		TLM-1	CO1	
7.	Related problems	1	11-12-2025		TLM-1	CO1	
8.	Strength of fillet welds:	1	12-12-2025		TLM-1	CO1	
9.	Related problems	1	16-12-2025		TLM-1	CO1	
10.	Permissible stresses –	1	17-12-2025		TLM-1	CO1	
11.	IS Code requirements.	1	18-12-2025		TLM-1	CO1	
12.	Design of fillet weld subjected to moment acting in the plane	1	19-12-2025		TLM-1	CO1	
13.	Related problems	1	23-12-2025		TLM-1	CO1	
14.	Design of fillet weld subjected to moment acting at right angles to the plane of the joints.	1	25-12-2025		TLM-1	CO1	
15.	Related problems	1	25-12-2025		TLM-1	CO1	
No. of classes required to complete UNIT-I: 15					No. of classes taken:		

UNIT-II: Beams:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
16.	Allowable stresses,	1	01-01-2026		TLM-1	CO2	
17.	design requirements as per IS Code-	1	02-01-2026		TLM-1	CO2	
18.	Design of simple and compound beams	1	06-01-2026		TLM-1	CO2	
19.	Related problems	1	07-01-2026		TLM-1	CO2	
20.	-Curtailment of flange plates,	1	08-01-2026		TLM-1	CO2	
21.	Related problems	1	09-01-2026		TLM-1	CO2	
22.	Beam to beam connection	1	16-01-2026		TLM-1	CO2	
23.	Related problems	1	20-01-2026		TLM-1	CO2	
24.	check for deflection, shear, buckling,	1	21-01-2026		TLM-1	CO2	
25.	Related problems	1	22-01-2026		TLM-1	CO2	
26.	check for bearing	1	23-01-2026		TLM-1	CO2	
27.	laterally unsupported beams.	1	27-01-2026		TLM-1	CO2	
28.	Related problems	1	28-01-2026		TLM-1	CO2	
No. of classes required to complete UNIT-II: 12					No. of classes taken:		

UNIT-III: Tension members, Compression members and Roof trusses:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
29.	Effective length of members	1	29-01-2026		TLM-1	CO2	
30.	slenderness ratio-permissible stresses	1	30-01-2026		TLM-1	CO2	
31.	Design compression members subjected to axial loading	1	3-02-2026		TLM-1	CO2	
32.	Related problems	1	3-02-2026		TLM-1	CO2	
33.	Design compression members subjected to eccentric loading.	1	4-02-2026		TLM-1	CO2	
34.	Related problems	1	5-02-2026		TLM-1	CO2	
35.	Design of members subjected to direct tension	1	6-02-2026		TLM-1	CO2	

36.	Related problems	1	10-02-2026		TLM-1	CO2	
37.	Design of members subjected to bending.	1	11-02-2026		TLM-1	CO2	
38.	Related problems	1	12-02-2026		TLM-1	CO2	
39.	Roof Trusses: Different types of roof trusses	1	13-02-2026		TLM-1	CO4	
40.	Design loads – Load combinations as per IS Code recommendations,	1	17-02-2026		TLM-1	CO4	
41.	structural details	1	18-02-2026		TLM-1	CO4	
42.	Design of purlins, members and joints.	1	19-02-2026		TLM-1	CO4	
43.	Related problems	1	20-02-2026		TLM-1	CO4	
No. of classes required to complete UNIT-III : 14					No. of classes taken:		

UNIT-IV: Design of Columns and Column Foundations

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
44.	Built up compression members	1	24-02-2026		TLM-1	CO3	
45.	Design of lacings and battens.	1	25-02-2026		TLM-1	CO3	
46.	Related problems	1	2-02-2026		TLM-1	CO3	
47.	Design Principles of Eccentrically loaded columns	1	26-02-2026		TLM-1	CO3	
48.	Related problems	1	27-02-2026		TLM-1	CO3	
49.	Splicing of columns.	1	3-03-2026		TLM-1	CO3	
50.	Related problems	1	3-03-2026		TLM-1	CO3	
51.	Design of Column Foundations:	1	5-03-2026		TLM-1	CO3	
52.	Related problems	1	6-03-2026		TLM-1	CO3	
53.	Design of slab base	1	10-03-2026		TLM-1	CO3	
54.	Related problems	1	11-03-2026		TLM-1	CO3	
55.	Design of gusseted base	1	12-03-2026		TLM-1	CO3	
56.	Related problems	1	13-03-2026		TLM-1	CO3	
57.	Column bases subjected to moment.	1	17-03-2026		TLM-1	CO3	
58.	Related problems	1	17-03-2026		TLM-1	CO3	
No. of classes required to complete UNIT-IV:14					No. of classes taken:		

UNIT-V: Design of Plate Girder

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
59.	Design consideration	1	18-03-2026		TLM-1	CO4	
60.	IS Code Recommendations	1	18-03-2026		TLM-1	CO4	
61.	Design of plate girder-Welded	1	20-03-2026		TLM-1	CO4	
62.	Related problems	1	20-03-2026		TLM-1	CO4	
63.	Curtailment of flange plates,	1	24-03-2026		TLM-1	CO4	
64.	Related problems	1	25-03-2026		TLM-1	CO4	
65.	stiffeners	1	27-03-2026		TLM-1	CO4	
66.	Related problems	1	31-03-2026		TLM-1	CO4	
67.	splicing and connections.	1	01-04-2026		TLM-1	CO4	
68.	Related problems	1	02-04-2026		TLM-1	CO4	
No. of classes required to complete UNIT-V:09					No. of classes taken:		

Teaching Learning Methods					
TLM1	Chalk and Talk	TLM4	Problem Solving	TLM7	Seminars or GD
TLM2	PPT	TLM5	Programming	TLM8	Lab Demo
TLM3	Tutorial	TLM6	Assignment or Quiz	TLM9	Case Study

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
CIE-I (Mid-I, Assignment-I. Quiz-I)	30
CIE-II (Mid-II, Assignment-II. Quiz-II)	30
Cumulative Internal Examination (CIE): 80% best and 20% least	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problem
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering.
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands.
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
(Dr. C Rajamallu)	(Dr. C Rajamallu)	(Dr. C.Rajamallu)	(Dr.KV Ramana)

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : P. Keerthi
Course Name : HIGHWAY ENGINEERING
Course Code : 23CE16
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE., VI-Sem., A.Y : 2025-26

PRE-REQUISITE: NIL

COURSE LEARNING OBJECTIVES :

The objectives of this course are:

- To impart different concepts in the field of Highway Engineering.
- To acquire design principles of Highway Geometrics and Pavements
- To acquire design principles of Intersections

COURSE OUTCOMES (COs):
Upon the successful completion of this course, the students will be able to:

CO 1	Plan highway network for a given area.
CO 2	Determine Highway alignment and design highway geometrics
CO 3	Design Intersections and prepare traffic management plans.
CO 4	Judge suitability of pavement materials and design flexible and rigid pavements.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	2	-	1	-	1	1
CO2	-	-	2	-	-	-	-	-	-	1	-	-	1	-	-
CO3	1	-	-	1	-	-	1	-	-	-	-	-	-	-	1
CO4	-	2	1	-	-	-	-	-	-	-	-	1	1	-	-

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2** – Moderate (Medium), **3** - Substantial (High).

TEXT BOOKS:

T1 "Highway Engineering", S.K. Khanna, and Justo C.E.G and Veeraragavan A, Nem Chand and Bros, Roorkee.

T2 "Traffic Engineering and Transport Planning", L.R. Kadiyali, Khanna Publishers, New Delhi.

REFERENCES:

R1 "Principles of Highway Engineering", KadiyaliL.R, Khanna Publishers New Delhi.

R2 "Principles of Transportation Engineering", Partha Chakraborty and animesh Das, PHI Learning Private Limited, Delhi.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: HIGHWAY PLANNING AND ALIGNMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Highway development in India- Classification of Roads	1	01.12.2025		TLM2	
2.	Road Network Patterns	1	05.12.2025		TLM2	
3.	Necessity for Highway Planning	1	06.12.2025		TLM1	
4.	Different Road Development Plans– First, second, third road development plans,	1	08.12.2025		TLM1	
5.	Road development vision 2021, Rural Road Development Plan – Vision 2025	1	12.12.2025		TLM2	
6.	Planning Surveys- Highway Alignment- Factors affecting Alignment	1	15.12.2025		TLM1	
7.	Engineering Surveys – Drawings and Reports.	1	19.12.2025		TLM2	
No. of classes required to complete UNIT-I: 07				No. of classes taken:		

UNIT-II: GEOMETRIC ELEMENTS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10	Importance of Geometric Design	1	20.12.2025		TLM1	
11	Design controls and Criteria- Highway Cross Section Elements-	1	22.12.2025		TLM1	
12	Sight Distance Elements- Stopping Sight Distance	1	26.12.2023		TLM1	
13	Overtaking Sight Distance and Intermediate Sight Distance	1	27.12.2025		TLM1	
14	Design of Horizontal Alignment	1	29.12.2025		TLM1	
15	Design of Super elevation	1	02.01.2026		TLM1	
16	Design of Extra widening	1	03.01.2026		TLM1	
17	Problems- Design of Transition Curves	1	05.01.2026		TLM1	
19	Problems	1	09.01.2026		TLM1	
20	Design of Vertical Alignment- Gradients	1	19.01.2026		TLM1	
22	Vertical curves	1	23.01.2026		TLM1	
23	Problems	1	24.01.2026		TLM1	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: TRAFFIC ENGINEERING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
48	Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies, Speed studies –spot speed and speed & delay studies;	1	02.02.2026		TLM2	
50	Parking Studies; Road Accidents-Causes and Preventive measures	1	06.02.2026		TLM2	
51	Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting;	1	07.02.2026		TLM2	
52	LOS Concepts; Road	1	09.02.2026		TLM2	

	Traffic Signs; Road markings; Types of Intersections					
54	At-Grade Intersections – Design of Plain, Flared Intersections - Rotary and Channelized Intersections	1	13.02.2026		TLM2	
55	Design of Traffic Signals –Webster Method – IRC Method.	1	16.02.2026		TLM2	
No. of classes required to complete UNIT-V: 06				No. of classes taken:		

UNIT IV: HIGHWAY MATERIALS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23	Sub grade soil: classification	1	20.02.2026		TLM1	
24	–Group Index– Subgrade soil strength – California Bearing Ratio	1	21.02.2026		TLM1	
25	Modulus of Subgrade Reaction	1	23.02.2026		TLM1	
27	Stone aggregates: Desirable properties - Tests for Road Aggregates	1	27.02.2026		TLM4	
28	Bituminous Materials: Types–Desirable properties	1	28.02.2026		TLM4	
30	Tests on Bitumen - Bituminous paving mixes: Requirements - Marshall Method of Mix Design	1	06.03.2026		TLM4	
No. of classes required to complete UNIT-III:06				No. of classes taken:		

UNIT-V: DESIGN OF PAVEMENTS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36	Types of pavements	1	07.03.2026		TLM1	
37	Functions and requirements of different components of pavements; Design Factors	1	09.03.2026		TLM1	
39	Flexible Pavements: Design factors– Flexible Pavement - Design Methods–CBR method–IRC method	1	13.03.2026		TLM1	
40	Burmister method– Mechanistic method	1	16.03.2026		TLM1	
42	Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses	1	20.03.2026		TLM1	
43	Frictional stresses – Combination of stresses	1	23.03.2026		TLM1	
45	Design of slabs - Design of Joints–IRC method	1	27.03.2026		TLM2	
46	Rigid pavements for low volume roads- Continuously Reinforced Cement Concrete Pavements	1	28.03.2026		TLM2	
48	Roller Compacted Concrete Pavements.	1	04.04.2026		TLM2	
No. of classes required to complete UNIT-IV:09				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Objective Examination (Units-I & II)	O1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Objective Examination (Units-III, IV & V)	O2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =80% of Max(M1,M2)+20% of Min(M1,M2)	M=15
Objective Marks =80% of Max(O1,O2)+20% of Min(O1,O2)	O=10
Cumulative Internal Examination (CIE) : A+M+O	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	Course Coordinator	Module Coordinator	HOD
(P.Keerthi)	(P.Keerthi)	(B.Narasimha Rao)	(Dr.K.V.Ramana)

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L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr V. Ramakrishna**
Course Name & Code : 23CE22: Environmental Engineering
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE., VI-Sem., Sections- A A.Y : 2025-26

PRE-REQUISITE: Environmental Studies, Mechanics of Fluids.

Course Learning Objectives:

The course will provide an outline in planning the water supply and sewage treatment systems for a community/town/city. It will provide knowledge of water quality and design the water treatment system, provide knowledge of sewage quality, its quantity and design the sewage treatment system. The course further identifies the appropriate secondary treatment systems required and categorize the various sewage disposal options.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

CO1	Recognize the basic aspects involved in the estimation of water demand, water conveyance and distribution approaches for a community and classify the appropriate water sources **(Understand-L2)**
CO2	Establish the proper water and wastewater quality parameters and the associated environmental impacts on the receptors **(Understand – L2)**
CO3	Identify the appropriate water and wastewater treatment system and sludge disposal options to be adopted based on the fundamental principles **(Understand- L2)**
CO4	Design the appropriate treatment units for the treatment of water and wastewater **(Apply-L3)**

Course Articulation Matrix: (Correlation between COs, POs, & PSOs)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										1	3		1
CO2	3					3						1	3		1
CO3	3	2	2									1	3		1
CO4	3	3	3									1	3		1
1 - Low						**2 –**Medium							**3 -** High		

TEXT BOOKS:

T1 B.C. Punmia, A.K. Jain and A.K. Jain, "Water Supply Engineering", Laxmi Publications, 2nd edition, 1995, Reprint 2005.

T2 B.C. Punmia, A.K. Jain and A.K. Jain, "Wastewater Engineering", Laxmi Publications, 2nd edition, 1996, Reprint 2014.

REFERENCE BOOKS:

R1 S.K. Garg, "Water Supply Engineering", Khanna Publishers, 26th Revised edition, New Delhi, 2010.

R2 S.K. Garg, "Sewage Disposal and Air Pollution Engineering", Khanna Publishers, 36th Revised edition, New Delhi, 2017.

R3 G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publications.

R4 Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi.

R5 Peavy H.S, D.Rowe, and G. Tchobanglous, Environmental Engineering, McGraw Hill Publications

R6 NPTEL Courses on Water and Wastewater Treatment

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT–I: WATER DEMAND, WATER SOURCES AND CONVEYANCE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Objectives of Protected Water Supply systems and its components	1	1.12.25		TLM1	
2.	Per capita demand and factors influencing it	1	3.12.25		TLM1	
3.	Types of water demands and its variations	1	6.12.25		TLM1	
4.	Factors affecting water demand	1	8.12.25		TLM1	
5.	Population Forecasting	1	10.12.25		TLM1	
6.	Population Forecasting	1	13.12.25		TLM1	
7.	Population Forecasting	1	15.12.25		TLM1	
8.	Sources of water and their quality	1	17.12.25		TLM1	
9.	Overview of gravity and pressure conduits	1	20.12.25		TLM1	
No. of classes required to complete UNIT-I: 9				No. of classes taken:		

UNIT-II: WATER QUALITY AND DISTRIBUTION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Physical parameters of water	1	22.12.25		TLM1	
2.	Chemical parameters of water	1	24.12.25		TLM1	
3.	Chemical parameters of water	1	27.12.25		TLM1	
4.	Chemical parameters of water	1	29.12.25		TLM1	
5.	Bacteriological parameters	1	31.12.25		TLM1	
6.	Water borne diseases, IS 10500	1	3.1.26		TLM1	
7.	Methods of Distribution systems	1	5.1.26		TLM1	
8.	Layouts of Distribution systems	1	7.1.26		TLM1	
No. of classes required to complete UNIT-II: 8				No. of classes taken:		

Mid-1: 26.1.26-31.1.26

UNIT-III: WATER TREATMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Screens, aeration, applications	1	10.1.26		TLM1	
2.	Adsorption - applications	1	19.1.26		TLM1	
3.	Sedimentation analysis	1	21.1.26		TLM1	
4.	Plain sedimentation	1	24.1.26		TLM1	
5.	Problems	1	2.2.26		TLM1	
6.	Coagulation-concept, factors	1	4.2.26		TLM1	
7.	Problems	1	7.2.26		TLM1	
8.	Filtration mechanism	1	9.2.26		TLM1	
9.	RSF	1	11.2.26		TLM1	
10.	SSF, Comparison	1	14.2.26		TLM1	
11.	Problems	1	16.2.26		TLM1	
12.	Disinfection, Chlorination	1	18.2.26		TLM1	
13.	Forms of chlorination, chlorine demand	1	21.2.26		TLM1	
No. of classes required to complete UNIT-III: 13				No. of classes taken:		

UNIT-IV: SEWERAGE SYSTEM AND PRIMARY TREATMENT OF SEWAGE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sewage, sullage and storm water	1	23.2.26		TLM1	
2.	Physical parameters of sewage	1	25.2.26		TLM1	
3.	Chemical parameters of sewage	1	7.3.26		TLM1	
4.	BOD, COD, Importance	1	9.3.26		TLM1	
5.	BOD rate equation, Problems	1	11.3.26		TLM1	
6.	Treatment flow patterns	1	14.3.26		TLM1	
7.	Screens, Skimming tanks	1	16.3.26		TLM1	
8.	Grit channels, Problems	1	18.3.26		TLM1	
9.	Plain sedimentation	1	21.3.26		TLM1	
10.	Problems	1	23.3.26		TLM1	
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT–V: SECONDARY TREATMENT OF SEWAGE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Activated sludge process	1	25.3.26		TLM2	
2.	Complete mix and Diffused aeration treatment	1	28.3.26		TLM2	
3.	Simple calculations for estimation of operating parameters of ASP	1	30.3.26		TLM1	
4.	Problems	1	30.3.26		TLM1	
5.	Secondary Sedimentation tank	1	1.4.26		TLM1	
6.	Sludge properties	1	3.4.26		TLM1	
7.	Anaerobic digestion	1	1.4.26		TLM2	
8.	Sludge dry beds	1	3.4.26		TLM2	
No. of classes required to complete UNIT-V: 8				No. of classes taken:		

Mid-2:06.4.26-11.4.26

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Internal Examination	30
Semester End Examination	70
Total Marks:	**100**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory test required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
(Dr V. Ramakrishna)	**(Dr V. Ramakrishna)**	**(J. Rangaiah)**	**(Dr K.V. Ramana)**

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: K HARISH KUMAR
Course Name & Code : LOW-COST AND ECO-FRIENDLY BUILDING TECHNIQUES &23CE19
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech, VI SEM, CE **A.Y.:** 2025-26

PREREQUISITE: NILL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course provides the knowledge on traditional and eco-friendly materials, Eco friendly and cost-effective technologies, Eco-friendly building materials, rural housing approaches in disaster prone areas

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Illustrate the concepts of traditional building materials and eco-friendly building materials for construction. (Understand - L1)
CO2	Understand the developments of building technologies in foundations, walls and roofs. (Understand-L2)
CO3	Describe prefabrication techniques and assess the wind effects on low rise buildings. (Understand-L2)
CO4	Demonstrate the construction of houses in rural areas and disaster prone areas. (Understand-L2)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	1	1	1	-	-	-	-	1	-	-	2
CO2	1	-	-	-	1	-	1	-	-	-	-	1	-	-	2
CO3	1	-	-	-	1	1	1	-	-	-	-	1	-	-	2
CO4	1	-	-	-	1	1	1	-	-	-	-	1	-	-	2
1 - Low					**2 –**Medium						**3 -** High				

TEXTBOOKS:

T1 A.G.Madhavrao, D.S.Ramachandramurthy –Appropriate technologies for low cost housing-oxford & IBH Publishing, 1996.

T2 A K Lal, "Hand Book of Low Cost Housing", New Age Publishing, 1995.

REFERENCE BOOKS:

R1 N. Kumara Swamy and A. Kameswara Rao, "Building Planning and Drawing", Charotar Publications, 2013.

R2 S K Duggal, "Building materials", New Age International Publishers. 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: TRADITIONAL BUILDING MATERIALS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction CO's & PO's, Subject	1	03/12/2025		**TLM2**	
2.	Introduction-housing scenario in India	1	05/12/2025		**TLM2**	
3.	Traditional building materials-stabilized soil bricks, improved mud and thatch,	1	06/12/2025		**TLM2**	
4.	Burnt and un burned bricks, laterite-lime bricks	1	10/12/2025		**TLM2**	
5.	Sand-lime blocks, stone block masonry units, bamboo,	1	12/12/2025		**TLM2**	
6.	Hollow cement blocks, light weight concrete blocks, wood cement products,	1	13/12/2025		**TLM2**	
7.	Fly ash bricks, cementitious binder from rice husk, lime based binders	1	17/12/2025		**TLM2**	
8.	Revision	1	19/12/2025		**TLM2**	
No. of classes required to complete UNIT-I: 08				**No. of classes taken:**		

UNIT-II: ECO-FRIENDLY BUILDING MATERIALS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
9.	Introduction To Eco-Friendly Building Materials	1	20/12/2025		**TLM2**	
10.	Basics and practical applications of locally available building materials	1	24/12/2025		**TLM2**	
11.	Soil, Fly ash, Ferro cement, Lime, Fibres,	1	26/12/2025		**TLM2**	
12.	Stone Dust, Red mud, Gypsum, Alternate Wood	1	27/12/2025		**TLM2**	
13.	Polymer-ADOBE, Light Clay, Straw-Bale, Bamboo	1	31/12/2025		**TLM2**	
14.	Agro-Industrial Waste, Innovative materials developed by CBRI, SERC	1	02/01/2026		**TLM2**	
15.	Structural Properties of Alternate Building Materials	1	03/01/2026		**TLM2**	
16.	Earthen Finishes, Earth Plasters, Earth Floors.	1	07/01/2026		**TLM2**	
No. of classes required to complete UNIT-II: 08				**No. of classes taken:**		

UNIT-III: IMPROVED BUILDING TECHNOLOGIES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Foundations: Introduction, types of soli, types of foundations	1	09/01/2026		**TLM2**	
18.	Permissible settlements, soil investigations.	1	21/01/2026		**TLM2**	
19.	Walls: Introduction, stabilized earth wall construction	1	23/01/2026		**TLM2**	
20.	Building blocks (lato blocks) from lateritic soil brick masonry walls	1	24/01/2026		**TLM2**	
21.	Cellular concrete blocks, hallow concrete blocks	1	04/02/2026		**TLM2**	
22.	Shell type houses made of hallow clay blocks, pre cast concrete panels.	1	06/02/2026		**TLM2**	

23.	Roofs: Introduction, catenary hollow clay blocks/brick shell roofs,	1	07/02/2026		**TLM2**	
24.	Pre cast reinforced concrete-channel units-cored units,	1	11/02/2026		**TLM2**	
25.	Roofing system with cellular unit, cellular light weight concrete roofing system.	1	13/02/2026		**TLM2**	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: PRE-FABRICATION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Pre-fabrication: Introduction, advantages of pre-fabrication,	1	18/02/2026		**TLM2**	
27.	Areas where prefabrication techniques can be introduced.	1	20/02/2026		**TLM2**	
28.	Joints in pre cast concrete structures	1	21/02/2026		**TLM2**	
29.	Approval; Technical sanction; Plinth area;	1	25/02/2026		**TLM2**	
30.	Floor Area; Carpet area; Approximate Estimate;	1	27/02/2026		**TLM2**	
31.	Plinth area estimate; Revised Estimate; Supplementary estimate	1	28/02/2026		**TLM2**	
32.	Wind effects on low rise buildings: Introduction,	1	06/03/2026		**TLM2**	
33.	Wind structure interaction concepts, Codal provision,	1	07/03/2026		**TLM2**	
34.	Housing in cyclone prone areas, cyclone resisting core units.	1	11/03/2026		**TLM2**	
No. of classes required to complete UNIT-IV:09				**No. of classes taken:**		

UNIT-V: RURAL HOUSING

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Rural housing: Introduction, traditional practice of rural house construction,	1	13/03/2026		**TLM2**	
36.	Appropriate rural housing technology,	1	14/03/2026		**TLM2**	
37.	Mud housing technology, mud roofs, characteristics of mud,	1	18/03/2026		**TLM2**	
38.	Fire retardant treatment for trench roof	1	21/03/2026		**TLM2**	
39.	Housing in disaster prone areas: Introduction, traditional houses in disaster prone areas,	1	25/03/2026		**TLM2**	
40.	Types of damages failures of non engineered buildings,	1	27/03/2026		**TLM1**	
41.	Repair and rehabilitation of earthquake damaged non engineered buildings,	1	28/03/2026		**TLM2**	
42.	Recommendations for feature construction.	1	01/04/2026		**TLM2**	
43.	Revision	1	04/04/2026		**TLM2**	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Objective Examination (Units-I & II)	O1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Objective Examination (Units-III, IV & V)	O2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =80% of Max(M1,M2)+20% of Min(M1,M2)	M=15
Objective Marks =80% of Max(O1,O2)+20% of Min(O1,O2)	O=10
Cumulative Internal Examination (CIE) : A+M+O	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to

	assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyse and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	**Course Instructor**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**K. Harish Kumar**	**Dr. C. RAJAMALLU**	**Dr. K.V.RAMANA**
Signature			

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : B. NARASIMHARAO
Course Name & Code : GREEN BUILDINGS & 23CE22
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE/VI-Sem., A.Y : 2025-26

PRE-REQUISITE: Building Materials

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course aims to provide study of appropriate materials for constructing a green building and planning for energy and resource conservation in green building. The course also provides the practices of optimum use of the renewable energy resources, the principles of the designing the building using climatic factors and planning for effective green building rating system.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Describe the basic terminology used, different types, benefits of a green building and its rating concept **(Understand-L2).**
CO 2	Assess the reasons for global warming and impact of climate on a building **(Understand-L2).**
CO 3	Identify the appropriate materials for constructing a cost-effective green building **(Understand-L2).**
CO 4	Plan the various options for energy and resource conservation in a green building **(Understand-L2).**
CO 5	Identify the ways for optimal use of renewable energy resources in the green building **(Understand-L2).**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	**2**	**2**	-	-	-	-	-	-	-	**2**
CO2	-	-	-	-	-	**3**	**3**	-	-	-	-	-	-	-	**2**
CO3	-	-	-	-	-	**3**	**3**	-	-	-	-	-	-	-	**2**
CO4	-	-	-	-	-	**3**	**3**	-	-	-	-	-	-	-	**2**
CO5	-	-	-	-	-	**3**	**3**	-	-	-	-	-	-	-	**2**

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2** – Moderate (Medium), **3** - Substantial (High).

TEXT BOOKS:

T1 K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao, "Alternative building materials and technologies", New Age International, 2014.

T2 N. Kumara Swamy and A. Kameswara Rao, "Building Planning and Drawing", Charotar Publications, 2013

REFERENCE BOOKS:

R1	Abe Kruger and Carl Seville, "Green Building: Principles and Practices in Residential Construction", Demar Cengage Learning, 2012.
R2	G.D. Rai, "Non-Conventional Energy Resources", Khanna Publishers; 18th edition, 2017.
R3	Koenigsberger O H, "Manual of Tropical Housing and Building", 1st edition, Orient Longman Publishers, Chennai, 2003.
R4	Odom P. Eugene, "Ecology and Environment", 2nd edition, Oxford and IBH Publishers, New Dehi, 2005.G.K. Ghosh, "Disaster Management", APH Publishing Corporation, 2006.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: GREEN BUILDINGS CONCEPT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Green Buildings	1	**01-12-2025**		**TLM2**	
2.	Definition of Green Buildings	1	**03-12-2025**		**TLM2**	
3.	Typical features of green buildings	1	**06-12-2025**		**TLM2**	
4.	Benefits and environmental impacts of Green Buildings	1	**08-12-2025**		**TLM2**	
5.	Brown field development	1	**10-12-2025**		**TLM2**	
6.	Green field development	1	**13-12-2025**		**TLM2**	
7.	Sustainable site selection	1	**15-12-2025**		**TLM2**	
8.	Planning of buildings to maximize comfort	1	**17-12-2025**		**TLM2**	
9.	Day lighting	1	**20-12-2025**		**TLM2**	
10.	Ventilation	1	**22-12-2025**		**TLM2**	
No. of classes required to complete UNIT-I:10				No. of classes taken:		

UNIT-II: GLOBAL WARMING AND CLIMATE DESIGN

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Global Warming – Definition	1	**24-12-2025**		**TLM2**	
2.	Global Warming –Causes and Effects	1	**27-12-2025**		**TLM2**	
3.	Contribution of Buildings towards Global Warming	1	**29-12-2025**		**TLM2**	
4.	Carbon Footprint – Global Efforts to reduce carbon	1	**31-12-2025**		**TLM2**	
5.	Local climatic conditions – solar radiation, temperature, humidity	1	**03-01-2026**		**TLM2**	
6.	Local climatic conditions –wind speed and direction impact of deforestation.	1	**05-01-2026**		**TLM2**	
7.	Climate change on built environment	1	**07-01-2026**		**TLM2**	
8.	Desirable conditions	1	**19-01-2026**		**TLM2**	
9.	Fresh air requirements and standards	1	**21-01-2026**		**TLM2**	
10.	Sick building syndrome and indoor	1	**24-01-2026**		**TLM2**	

	air pollutants					
No. of classes required to complete UNIT-II:10				No. of classes taken:		

UNIT-III: GREEN MATERIALS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Recycling of building materials, Advantages in usage of natural local materials such as bamboo	1	**02-02-2026**		**TLM2**	
2.	Timber	1	**04-02-2026**		**TLM2**	
3.	Rammed earth	1	**07-02-2026**		**TLM2**	
4.	Stabilized mud blocks	1	**09-02-2026**		**TLM2**	
5.	Lime & lime-pozzolana cements	1	**11-02-2026**		**TLM2**	
6.	Materials from agriculture and industrial waste	1	**16-02-2026**		**TLM2**	
7.	Ferro-cement and ferro-concrete	1	**18-02-2026**		**TLM2**	
8.	Alternative roofing systems, various paints reducing the heat gain of the building, etc.	1	**21-02-2026**		**TLM2**	
No. of classes required to complete UNIT-III:8				No. of classes taken:		

UNIT- IV: ENERGY AND RESOURCE CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Building envelope – its parts and types	1	**23-02-2026**		**TLM2**	
2.	Active and passive energy systems	1	**25-02-2026**		**TLM2**	
3.	Need for energy conservation, Various forms of energy used in buildings	1	**28-02-2026**		**TLM2**	
4.	Energy used in transportation and construction processes	1	**02-03-2026**		**TLM2**	
5.	Building automation and building management systems.	1	**07-03-2026**		**TLM2**	
6.	Principles of thermal design - means of thermal –light and lighting-	1	**09-03-2026**		**TLM2**	
7.	Building acoustics- energy efficient lighting, Ventilation and indoor air quality.	1	**11-03-2026**		**TLM2**	
8.	Water conservation systems in buildings- planning for storm water drainage, water harvesting in buildings.	1	**16-03-2026**		**TLM2**	
No. of classes required to complete UNIT-IV:08				No. of classes taken:		

UNIT-V: RENEWABLE ENERGY AND GREEN BUILDING RATING SYSTEMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Wind and Solar Energy Harvesting		**18-03-2026**		**TLM2**	
2.	Potential of solar energy in India and world, construction and operation of various solar and wind energy-based appliances,		**21-03-2026**		**TLM2**	
3.	Geothermal energy usage in buildings, Case studies.		**23-03-2026**		**TLM2**	

4.	Introduction to Leadership in Energy		**25-03-2026**		**TLM2**	
5.	Environment Design (LEED)		**28-03-2026**		**TLM2**	
6.	Green rating systems for Integrated Habitat Assessment –GRIHA, IGBC ratings		**30-03-2026**		**TLM2**	
7.	Salient features of green buildings constructed in India.		**01-04-2026**		**TLM2**	
8.	Revision		**04-04-2026**		**TLM2**	
No. of classes required to complete UNIT-V:08				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
CIE-I (Mid-I, Assignment-I. Quiz-I)	30
CIE-II (Mid-II, Assignment-II. Quiz-II)	30
Cumulative Internal Examination (CIE): 80% best and 20% least	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	Module Coordinator	HOD
(B NARASIMHARAO)	(B NARASIMHARAO)	(Dr.K.V.RAMANA)

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: R. Ashok
Course Name & Code : IoT Based Smart Systems & 23CS84
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech.–CE/VI Sem/Sec-A **A.Y.:** 2025-26

PREREQUISITE: Python Programming

COURSE OBJECTIVE (CO): To provide a foundational understanding of Internet of Things (IoT) concepts, architecture, communication technologies, data handling, and cloud integration, enabling students from non-CSE disciplines to explore IoT-based smart systems relevant to their fields

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Explain the basic concepts, applications, and communication principles of Internet of Things (IoT).
CO2	Describe the simplified architecture and communication technologies used in IoT-based systems.
CO3	Demonstrate an understanding of web and device connectivity methods used in IoT environments.
CO4	Illustrate the process of data collection, organization, and its role in IoT-based smart solutions.
CO5	Summarize the role of cloud platforms and sensor technologies in building integrated smart

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	1	1	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	1	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	1	2	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	1	2	-	-
1 - Low			**2 –**Medium						**3 –** High						

TEXTBOOKS:

T1 ArshdeepBahga and Vijay Madisetti, —Internet of Things - A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547.

T2 James C Sheusi, —Android Application Development for Java Programmers, Cengage Learning, 2013.

REFERENCE BOOKS:

R1 Pethuru Raj and Anupama C. Raman,"The Internet of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press).

R2 Adrian McEwen, —Designing the Internet of Things||, Wiley Publishers, 2013, ISBN: 978-1-118-43062-0.

R3 Daniel Kellmereit, —The Silent Intelligence: The Internet of Things||, 2013, ISBN:

0989973700.
R4 https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf
R5 https://nptel.ac.in/courses/106/105/106105166/

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to IoT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Overview of Internet of Things (IoT)	1	02/12/2025			
2.	Key Technologies and Applications of IoT	1	03/12/2025			
3.	Machine-to-Machine (M2M) Communication Basics	2	04/12/2025& 9/12/2025			
4.	Examples of Smart Systems in Daily Life	2	10/12/2025& 11/12/2025			
5.	Basic Design Considerations for Connected Devices	2	16/12/2025& 17/12/2025			
6.	Internet Connectivity and Common Protocols: HTTP, HTTPS	2	18/12/2025& 23/12/2025			
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: IoT Architecture and Communication Technologies

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
7.	Simple Architecture of IoT Systems	2	24/12/2025			
8.	Communication Layers and Components	2	30/12/2025& 31/12/2025			
9.	Role of Gateways and Connectivity Options	2	06/01/2026& 07/01/2026			
10.	Overview of Communication Technologies (Wi-Fi, Bluetooth, etc.),	2	08/01/2026 20/01/2026			
11.	Ease of Designing and Cost-Effective Systems	2	21/01/2026 22/01/2026			
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Connectivity and Communication for IoT

	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Web-Based Communication for Smart Devices	2	03/02/2026 04/02/2026			
13.	Introduction to IoT Communication Protocols (Conceptual)	2	05/02/2026 10/02/2026			
14.	Connecting Devices to	3	11/02/2026			

	the Web – Practical Insights		12/02/2026 17/02/2026			
15.	Overview of Data Transfer Methods in IoT	2	18/02/2026 19/02/2026			
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Data Handling in IoT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28	Basics of Data Collection and Storage, ,	2	24/02/2026& 25/02/2026			
29	Real-Life Applications: Smart Cities,	2	26/02/2026& 03/03/2026			
30	Real-Life Applications: Smart Agriculture, etc.,	2	05/03/2026& 10/03/2022			
31	Introduction to How IoT Systems Handle and Organize Data	2	11/03/2026& 12/03/2026			
32	Simple View of How IoT Supports Business or Government Processes	2	17/03/2026& 18/03/2026			
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: : Cloud and IoT Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Using Cloud Platforms for IoT Data Storage	2	19/03/2026& 24/03/2026			
17.	Simple Explanation of Cloud Services (e.g., Google Cloud, AWS, etc.),	2	25/03/2026& 26/03/2026			
18.	IoT Applications Using Cloud (e.g., Smart Monitoring Systems)	2	31/03/2026 01/04/2026			
19.	Introduction to Sensors and Wireless Technologies (RFID, WSN)	1	02/04/2026			
20.	Everyday Examples of Sensors in Smart Systems	1	02/04/2026			
No. of classes required to complete UNIT-V: 08				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.R.Ashok**	**Mr.R.Ashok**	**Dr. D. V. Subbaiah**	**Dr. S. Nagarjuna Reddy**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	**:**	B.Tech., VI-Sem., CIVIL
ACADEMIC YEAR	**:**	2025-26
COURSE NAME & CODE	**:**	ENVIRONMENTAL ENGINEERING LAB (23CE58)
L-T-P STRUCTURE	**:**	0-0-3
COURSE CREDITS	**:**	1.5
COURSE INSTRUCTORS	**:**	Dr V. Ramakrishna, Dr V. Bhagya Lakshmi, Dr Shaheda Niloufer
COURSE COORDINATOR	**:**	**Dr V. RAMAKRISHNA**
PRE-REQUISITE	**:**	Engineering Chemistry

Course Educational Objectives: The course aims to determine some important characteristics of water and wastewater in the laboratory. The course analyses the significance of the characteristics of the water and wastewater on the environment for the suitable options pertaining to their usage, treatment, and disposal.

Course Outcomes: At the end of the course, the students will be able to:

CO1	Determine few important characteristics of water and wastewater in the laboratory **(Apply-L3)**
CO2	Draw some conclusions based on prevailing standards about (i) suitability of water for a specific purpose (ii) options for the appropriate treatment options and ultimate disposal of sewage **(Apply-L3)**
CO3	Interpret the impacts of the water or wastewater on the local environment **(Understand-L2)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	3	3	3				2		1		2	1
CO2	3	-	-	3	3	3				2		1		2	1
CO3	3					3				2		1		2	1
1 - Low					**2** –Medium						**3** - High				

TEXTBOOK/REFERENCES:

1. Laboratory Manual developed by Civil Engineering Department
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

PART-B
COURSE DELIVERY PLAN (LESSON PLAN)

List of Experiments

At least 10 of the experiments are to be conducted.

CYCLE-1

C-1.1.Determination of pH value and Electrical Conductivity of water and soil.
C-1.2.Determination of Alkalinity of water sample.
C-1.3.Determination of Chloride concentration of water sample.
C-1.4.Determination of Total hardness – Calcium & Magnesium of water sample.
C-1.5.Determination of Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.

CYCLE-2

C-2.1.Determination of Dissolved Oxygen (Analytical Method) and B.O.D. of water sample
C-2.2.Determination of Optimum dose of coagulant using Jar test.
C-2.3. Determination of Chlorine demand of given water sample.
C-2.4. Determination of N, P, K values in solid waste.
C-2.5. Determination of Total solids in sewage sample.

DEMONSTRATION/VIRTUAL LAB

C-3.1. Determination of C.O.D in sewage sample.
C-3.2. Determination of Iron in given water sample.
C-3.3. Presumptive Coliform test.
C-3.4. Visit a Water Treatment Plant and give a technical report.

Batches

Batch – A: 23761A0101 to 23761A0128
Batch – B: 23761A0129 to 25765A0117

Thursday		**Tuesday**	
A1	23761A0101 to 23761A0104	**B1**	23761A0129 to 25765A0135
A2	23761A0105 to 23761A0110	**B2**	23761A0136 to 25765A0102
A3	23761A0111 to 23761A0115	**B3**	23761A0103 to 25765A0107
A4	23761A0116 to 23761A0122	**B4**	23761A0108 to 25765A0113
A5	23761A0123 to 23761A0128	**B5**	23761A0114 to 25765A0117

I CYCLE SCHEDULE: BATCH-A (Thursday)

Tentative Date of Completion	**Actual Date of Completion**	I	II	III	IV	V
4.12.25		Demo	Demo	Demo	Demo	Demo
11.12.25		A1	A2	A3	A4	A5
18.12.25		A2	A3	A4	A5	A6
25.12.25		A3	A4	A5	A6	A1
8.1.26		A4	A5	A6	A1	A2
22.1.26		A5	A6	A1	A2	A3

II CYCLE SCHEDULE: BATCH-A (Thursday)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
29.1.26		A1	A2	A3	A4	A5
5.2.26		A2	A3	A4	A5	A6
12.2.26		A3	A4	A5	A6	A1
19.2.26		A4	A5	A6	A1	A2
26.2.26		A5	A6	A1	A2	A3
5.3.26		Repetition				
12.3.26		Repetition				
19.3.26		Repetition				
26.3.26		Repetition				
2.4.26		Lab Internal Test				

I CYCLE SCHEDULE: BATCH-B (Tuesday)

Tentative Date of Completion	**Actual Date of Completion**	I	II	III	IV	V
2.12.25		Demo	Demo	Demo	Demo	Demo
9.12.25		B1	B2	B3	B4	B5
16.12.25		B2	B3	B4	B5	B6
23.12.25		B3	B4	B5	B6	B1
30.12.25		B4	B5	B6	B1	B2
6.1.26		B5	B6	B1	B2	B3

II CYCLE SCHEDULE: BATCH-B (Tuesday)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
20.1.26		B1	B2	B3	B4	B5
27.1.26		B2	B3	B4	B5	B6
3.2.26		B3	B4	B5	B6	B1
10.2.26		B4	B5	B6	B1	B2
17.2.26		B5	B6	B1	B2	B3
24.2.26		Repetition				
3.3.26		Repetition				
10.3.26		Repetition				
17.3.26		Repetition				
24.3.26		Lab Internal Test				

LAB TIMETABLE

Day	FN	AN
Monday		
Tuesday		VI Semester Batch- B
Wednesday		
Thursday	VI Semester Batch- A	
Friday		
Saturday		

Batch – A: 23761A0101 to 23761A0128
Batch – B: 23761A0129 to 25765A0117

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt.no's	Marks
Day to Day work = **A**	1,2,3,4,5,.. 10	A =10
Record = **B**	1,2,3,4,5.. 10	B = 05
Internal Test/Viva = **C**	1,2,3,4,5 .. 10	C =15
Cumulative Internal Examination: A+B+C = 30	1,2,3,4,5 .. 10	**30**
Semester End Examinations = D Procedure: 20M; Experimental Work & Results: 30M; Viva–Voce: 20 M	1,2,3,4,5 .. 10	**D =70**
Total Marks: A+B+C+D = 100	1,2,3,4,5 .. 10	**100**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructors	**Course Coordinator**	**Module Coordinator**	**HOD**
Dr V. Ramakrishna, Dr V. Bhagya Lakshmi, Dr Shaheda Niloufer	Dr V. Ramakrishna	J. Rangaiah	Dr K.V. Ramana

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COURSE HANDOUT

PROGRAM	**:**	B.Tech., VI-Sem., CIVIL
ACADEMIC YEAR	**:**	2025-26
COURSE NAME & CODE	**:**	HIGHWAY ENGINEERING LAB (23CE59)
L-T-P STRUCTURE	**:**	0-0-3
COURSE CREDITS	**:**	1.5
COURSE INSTRUCTOR	**:**	P. KEERTHI
COURSE COORDINATOR	**:**	P. KEERTHI
PRE-REQUISITE	**:**	Nil

COURSE LEARNING OBJECTIVE:

The objectives of this course are:

1. To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bituminous mix
4. To carry out surveys for traffic volume, speed and parking.

COURSE OUTCOMES:

At the end of the course, the student will be able to

a. Test aggregates and judge the suitability of materials for the road construction
b. Test the given bitumen samples and judge their suitability for the road construction.
c. Obtain the optimum bitumen content for Bituminous Concrete
d. Determine the traffic volume, speed and parking characteristics.
e. Draw highway cross sections and intersections.

COURSE ARTICULATION MATRIX (Correlation between Cos & POs, PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	-	-	-	1	-	-	1	-	-	-	-	2	-
CO2	1	-	-	-	-	1	-	-	1	-	-	-	-	2	-
CO3	1	-	-	-	-	1	-	-	1	-	-	-	-	2	-

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

20CE63 – HIGHWAY ENGINEERING LAB

Course Instructor(s): P. KEERTHI B.Tech (VI Sem)

K. HARISH KUMAR A.Y 2025-26

CYCLE-1

TESTS ON ROAD AGGREGATES

C-1-1. Aggregate Crushing value test

C-1-2. Aggregate Impact test

C-1-3. Specific Gravity and Water Absorption tests

C-1-4. Deval's Attrition Test

C-1-5. Los Angeles Abrasion test

C-1-6. Shape tests (a) Flakiness index (b) Elongation index

CYCLE-2

TESTS ON BITUMINOUS MATERIALS

C-2-1. Penetration test

C-2-2. Ductility test

C-2-3. Softening point test

C-2-4. Viscosity test

C-2-5. Stripping test

C-2-6. Flash and fire point tests

CYCLE-3

C-3-1. Marshall Stability test

INCHARGE **HOD**

20CE63 – HIGHWAY ENGINEERING LAB

Course Instructor(s): P. KEERTHI B.Tech (VI Sem)

K. HARISH KUMAR A.Y 2025-26

Batch-A

Tentative Date/Batch	Actual date	A1	A2	A3	A4	A5	A6
02.12.2025		Introduction	Introduction	Introduction	Introduction	Introduction	Introduction
09.12.2025		C-1-1	C-1-2	C-1-3	C-1-4	C-1-5	C-1-6
16.12.2025		C-1-2	C-1-3	C-1-4	C-1-5	C-1-6	C-1-1
23.12.2025		C-1-3	C-1-4	C-1-5	C-1-6	C-1-1	C-1-2
30.01.2025		C-1-4	C-1-5	C-1-6	C-1-1	C-1-2	C-1-3
06.01.2026		C-1-5	C-1-6	C-1-1	C-1-2	C-1-3	C-1-4
20.01.2026		C-1-6	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
03.02.2026		C-2-1	C-2-2	C-2-3	C-2-4	C-2-5	C-2-6
10.02.2026		C-2-2	C-2-3	C-2-4	C-2-5	C-2-6	C-2-1
24.02.2026		C-2-3	C-2-4	C-2-5	C-2-6	C-2-1	C-2-2
03.03.2026		C-2-4	C-2-5	C-2-6	C-2-1	C-2-2	C-2-3
10.03.2026		C-2-5	C-2-6	C-2-1	C-2-2	C-2-3	C-2-4
17.03.2026		C-2-6	C-2-1	C-2-2	C-2-3	C-2-4	C-2-5
24.03.2026		C-3-1	C-3-1	C-3-1	C-3-1	C-3-1	C-3-1
31.03.2026		REPEATATION					

20CE63 – HIGHWAY ENGINEERING LAB

Course Instructor(s): P. KEERTHI B.Tech (VI Sem)

K. HARISH KUMAR A.Y 2025-26

Batch-B

Date/Batch	Actual date	B1	B2	B3	B4	B5	B6
04.12.2025		C-1-1	C-1-2	C-1-3	C-1-4	C-1-5	C-1-6
11.12.2025		C-1-2	C-1-3	C-1-4	C-1-5	C-1-6	C-1-1
18.12.2025		C-1-3	C-1-4	C-1-5	C-1-6	C-1-1	C-1-2
08.01.2026		C-1-4	C-1-5	C-1-6	C-1-1	C-1-2	C-1-3
22.01.2026		C-1-5	C-1-6	C-1-1	C-1-2	C-1-3	C-1-4
05.02.2026		C-1-6	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
12.02.2026		C-2-1	C-2-2	C-2-3	C-2-4	C-2-5	C-2-6
19.02.2026		C-2-2	C-2-3	C-2-4	C-2-5	C-2-6	C-2-1
26.02.2026		C-2-3	C-2-4	C-2-5	C-2-6	C-2-1	C-2-2
05.03.2026		C-2-4	C-2-5	C-2-6	C-2-1	C-2-2	C-2-3
12.03.2026		C-2-5	C-2-6	C-2-1	C-2-2	C-2-3	C-2-4
19.03.2026		C-2-6	C-2-1	C-2-2	C-2-3	C-2-4	C-2-5
26.03.2026		C-3-1	C-3-1	C-3-1	C-3-1	C-3-1	C-3-1
02.04.2025		REPEATATION					

INCHARGE **HOD**

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
(P. KEERTHI)	(P. KEERTHI)	(B.NARASIMHA RAO)	(Dr. K.V.RAMANA)

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HIGHWAY ENGINEERING LAB

COURSE : B.TECH (VI SEM) **A.Y : 2025-26**

LAB TIME TABLE

DAY	FN	AN
Monday		
Tuesday		**VI Semister Batch-A**
Wednesday		
Thursday	**VI Semister Batch-B**	
Friday		
Saturday		

Batch-A : 23761A0101 to 23761A0128

Batch-B : 23761A0129 to 23765A0117

Lab Incharge

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: B Rama Krishna/Dr C Rajamallu
Course Name & Code : Building Planning and Drawing & 23CES4
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : B.Tech, VI SEM- Civil **A.Y.:** 2025-26

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs):
To impart hands-on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1:	Apply structural analysis software to analyze and design the beams, 2D and 3D frames (Apply-L3)
CO2:	Design the retaining walls and foundations using STAAD Pro (Apply-L3)
CO3:	Draw the details of RCC and steel structural elements uing Auto CAD. (Apply-L3)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	3	-	2	-	-	-	-	2	-	1	-	3	2
CO2	-	-	3	-	2	-	-	-	-	2	-	1	-	3	2
CO3	-	-	3	-	2	-	-	-	-	2	-	1	-	3	2
1 - Low						**2 –**Medium						**3 -** High			

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction CO's & PO's Introduction to STAAD Pro	3	01-12-2025		TLM4	
2.	Drafting and loading in STAAD Pro	3	08-12-2025		TLM4	
3.	Analysis & Design determinate structures using a software	3	15-12-2025		TLM4	
4.	Analysis & Design of fixed & continuous beams using a software	3	22-12-2025		TLM4	
5.	Analysis & Design of Plane Frames	3	29-12-2025		TLM4	
6.	Analysis & Design of space frames subjected to DL & LL	3	05-01-2026		TLM4	

7.	Analysis & Design of residential building subjected to all loads (DL, LL,WL,EQL)	3	19-01-2026		TLM4	
8.	Analysis & Design of Roof Trusses	3	02-02-2026		TLM4	
9.	Design and detailing of built up steel beam	3	09-02-2026		TLM4	
10.	Development of EXCEL sheet for foundation design	3	16-02-2026		TLM4	
11.	Developing a design program for foundation using EXCEL Spread Sheet	3	23-02-2026		TLM4	
12.	Revision of Auto Cad basics	3	02-03-2026		TLM4	
13.	Detailing of RCC beam and RCC slab	3	09-03-2026		TLM4	
14.	Detailing of Steel built up compression member	3	16-03-2026		TLM4	
15.	Revision	3	23-03-2026		TLM4	
16.	Internal exam	3	30-03-2026		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Day-to-day work	10
Record	05
Internal Test	15
Continuous Internal Evaluation (CIE)	**30**
Semester End Examination (SEE)	**70**
Total Marks = CIE+SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyse and design various systems using analytical and software tools related to civil engineering
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PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**B RAMA KRISHNA**	**B RAMA KRISHNA**	**Dr C Rajamallu**	**Dr K V Ramana**
Signature				

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Phone: 08659-222933, Fax: 08659-222931

COURSE HANDOUT

PART-A

Name of Course Instructor : **Mrs. D.Chaithanya**
Course Name & Code : Soft Skills & 23HSS1
L-T-P Structure : **0**-1-2 **Credits:** 02
Program/Sem/Sec : B. Tech- VI SEM Civil
Academic Year : 2025-26

PREREQUISITE : NIL

Course Objectives:

• To equip the students with the skills to effectively communicate in English

• To train the students in interview skills, group discussions and presentation skills

• To motivate the students to develop confidence

• To enhance the students' interpersonal skills

• To improve the students' writing skills

COURSE ARTICULATION MATRIX
(Correlation between COs & POs)

Course Outcomes / PO's	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1.				1		1		3	3	3		2
CO2.				1				3	3	3		3
CO3.								3	3	3		3
CO4.				2		2		3	3	3		3
CO5.								3	3	3		3

1 = Slight (Low) **2= Moderate (Medium)** **3 = Substantial (High)**

UNIT – I

Analytical Thinking & Listening Skills: Self-Introduction, Shaping Young Minds - A Talk by Azim Premji (Listening Activity), Self – Analysis, Developing Positive Attitude, Perception.

Communication Skills: Verbal Communication; Non Verbal Communication (Body Language)

UNIT – II

Self-Management Skills: Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

Etiquette: Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

UNIT – III

Standard Operation Methods : Basic Grammars, Tenses, Prepositions, Pronunciation, Letter Writing; Note Making, Note Taking, Minutes Preparation, Email & Letter Writing.

UNIT-IV

Job-Oriented Skills: Group Discussion, Mock Group Discussions, Resume Preparation, Interview Skills, Mock Interviews

UNIT-V

Interpersonal relationships: Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships, Accommodating different styles, Consequences of interpersonal relationships

Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

References:

1. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.

2. Raman, Meenakshi& Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

E-resources:

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

COURSE DELIVERY PLAN (LESSON PLAN)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	***Analytical Thinking & Listening Skills:*** Self-Introduction	1+2	05/12/2025		
2.	Self – Analysis, Developing Positive Attitude, Perception	1+2	12/12/2025		
3.	Verbal Communication; Non Verbal Communication (Body Language)	1+2	19/12/2025		
4.	***Self-Management Skills:*** Anger Management, Stress Management	1+2	26/12/2025		
5.	Time Management, Six Thinking Hats	1+2	02/1/2026		
6.	Team Building and Leadership Qualities	1+2	09/01/2026		
7.	***Standard Operation Methods :*** Basic Grammars, Tenses, and Prepositions	1+2	23/01/2026		
8.	Pronunciation, Letter Writing	1+2	06/02/2026		
9.	Note Making, Note Taking, Minutes Preparation, Email	1+2	13/02/2026		
10.	***Job-Oriented Skills:*** Group Discussion, Mock Group Discussions	1+2	20/02/2026		
11.	Mock Group Discussions	1+2	27/02/2026		
12.	Resume Preparation	1+2	06/03/2026		
13.	Interview Skills, Mock Interviews	1+2	13/03/2026		
14.	Interview Skills, Mock Interviews	1+2	20/03/2026		
15.	***Interpersonal relationships:*** Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships	1+2	27/03/2026		
16.	Accommodating different styles, Consequences of interpersonal relationships	1+2	3/04/2026		
No. of classes required to complete Syllabus :48					

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

Laboratory Examination:

Evaluation Task	Marks
Day-to-Day Work	A1 = 10
Record & Observation	B1 = 5
Internal Exam	C1 = 15
Cumulative Internal Examination (CIE): (A1+B1+C1)	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty				
Signature	**Mrs. D . Chaithanya**	**Dr Padma Venkat**	**Dr Padma Venkat**	**Dr. T Satyanarayana**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(Autonomous)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with "A" Grade and NBA (CSE, IT, ECE, EEE & ME) under Tier - I
College Code: 76

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

PART-A

Name of Course Instructor	: J.Rangaiah	
Course Name & Code	: 23MC04-TPW & IPR	
L-T-P Structure	: 2-0-0	Credits : nil
Program/Sem/Sec	: CIVIL., VI-Sem.	A.Y : 2025-26

Prerequisite: Nil,

Course Objective:

The course will explain the basic related to writing the technical reports and understanding the concepts related to formatting and structuring the report. This will help students to comprehend the concept of proofreading, proposals and practice.

Textbooks: -

i. Kompal Bansal & Parshit Bansal, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.
ii. William S. Pfeiffer and Kaye A. Adkins, "Technical Communication: A Practical Approach", Pearson.
iii. Ramappa,T., "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.

References:

i. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
ii. Day R, how to Write and Publish a Scientific Paper, Cambridge University Press (2006)

PART-B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Text Book followed	HOD Sign Weekly
1.	An introduction to writing technical reports, technical sentences formation	2	06-12-25		TLM1	T1	
2.	using transitions to join sentences, Using tenses for technical writing.	2	13-12-25		TLM1	T1	
3.	Planning and Structuring: Planning the report, identifying reader(s), Voice,	2	20-12-25		TLM1	T1	
4	Formatting and structuring the report, Sections of a technical report, Minutes of meeting writing.	2	27-12-25		TLM1	T1	
	No. of classes required to complete UNIT-I	8	No. of classes taken:				

UNIT-II:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Text Book followed	HOD Sign Weekly
1.	Drafting report and design issues: The use of drafts, Illustrations and graphics.	2	03-01-26		TLM1	T1	
2.	Final edits: Grammar, spelling, readability Writing in plain English, Jargon	2	10-02-26		TLM1	T1	
3.	final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.	2	24-02-26		TLM1	T1	
	No. of classes required to complete UNIT-I	6	No. of classes taken:				

UNIT-III:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Text Book followed	HOD Sign Weekly
1.	Proofreading and summaries: Proofreading, summaries, Activities on summaries.	2	07-02-26		TLM1	T1	
2.	Presenting final reports: Printed presentation, Verbal presentation	2	14-02-26		TLM1	T1	

	skills,						
3.	Introduction to proposals and practice.	2	21-02-26		TLM1	T1	
	No. of classes required to complete UNIT-I	6	No. of classes taken:				

UNIT-IV:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Text Book followed	HOD Sign Weekly
1.	Using word processor: Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments,	2	28-02-26		TLM1	T1	
2.	Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes, Working with Footnotes and Endnotes, Inserting citations and Bibliography,	2	07-03-26		TLM1	T1	
3.	Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros,	2	14-03-26		TLM1	T1	
	No. of classes required to complete UNIT-I	6	No. of classes taken:				

UNIT-V:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completeon	Teaching Learning Methods	Text Book followed	HOD Sign Weekly
1.	Nature of Intellectual Property: Patents, Designs, Trade and Copyright.	2	21-03-26		TLM1	T1	
2.	Process of Patenting and Development: technological research, innovation, patenting, development.	2	28-03-26		TLM1	T1	
3.	International Scenario: International cooperation on Intellectual Property	2	04-04-26		TLM1	T1	
	No. of classes required to complete UNIT-I	6	No. of classes taken:				

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART – C- EVALUATION PROCESS:

Evaluation Task	**Marks**
Assignment-I (Units-I, II)	**A1=5**
I-Descriptive Examination (Units-I, II)	**M1=15**
I-Quiz Examination (Units-I, II)	**Q1=10**
Assignment-II (III, IV & V)	**A2=5**
II- Descriptive Examination (Unit-III, IV & V)	**M2=15**
II-Quiz Examination (Unit-III, IV & V)	**Q2=10**
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	**30**
Total Marks = CIE	**30**

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	01-12-2025	24-01-2026	8 W
I Mid Examinations	26-01-2026	31-01-2026	1 W
II Phase of Instructions	02-02-2026	04-04-2026	9 W
II Mid Examinations	06-04-2026	11-04-2026	1 W
Preparation and Practical's	13-04-2026	18-04-2026	1 W
Semester End Examinations	20-04-2026	02-04-2026	2 W

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	Course Coordinator	Module Coordinator	HOD