LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I) & ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: B RAMA KRISHNA
Course Name & Code : design and drawing of reinforced concrete structures & 23CE08
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech., V-Sem., Civil **A.Y.:** 2025-26

PREREQUISITE: Building Materials

Course Objectives Upon successful completion of this course, the student will be able to

1. 1. Familiarize Students with different types of design philosophies.
2. Equip student with concepts of design of flexural members.
3. Understand Concepts of shear, bond and torsion.
4. Familiarize students with different types of compressions members and Design.
5. Understand different types of footings and their design.

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

CO1:	Work on different types of design philosophies
CO2:	Carryout analysis and design of flexural members and detailing
CO3:	Design structures subjected to shear, bond and torsion.
CO4:	Design different type of compression members and footings

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	-	2	-	-	-	-	-	2	-	2
CO2	-	-	-	-	2	-	2	-	-	-	-	-	-	2	3
CO3	1	-	-	-	2	-	1	-	-	-	-	-	-	2	3
CO4	1	-	-	1	-	-	2	-	-	-	-	-	-	-	2
1 - Low **2** –Medium **3** - High															

Textbooks:

1. 'Limit State Design' by A. K. Jain
2. 'Reinforced Concrete Structures' by S. Unnikrishna Pillai &Devdas Menon, Tata Mc.Graw Hill, New Delhi.

Reference Books:

1. Design of concrete structures' by N. Krishna Raju.
2. 'Reinforced Concrete Structures' by Park and Pauley, John Wiley and Sons.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Working stress and limit state methods

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 Syllabus and Cos	1	30-06-2025		TLM1	
2.	Working stress method Design codes and handbooks	1	01-07-2025		TLM1	
3.	loading standards basic IS Definitions	1	03-07-2025		TLM1	
4.	Types of sections in WS Method	1	04-07-2025		TLM1	
5.	working stress method of design of singly	1	07-07-2025		TLM1	
6.	working stress method of design of doubly reinforced beams.	1	08-07-2025		TLM1	
7.	Concepts of limit state design	1	10-07-2025		TLM1	
8.	IS Code provisions	1	11-07-2025		TLM1	
9.	representative stress-strain curves for steel bars	1	14-07-2025		TLM1	
10.	Assumptions in limit state design	1	15-07-2025		TLM1	
11.	stress - block parameters	1	17-07-2025		TLM1	
12.	limiting moment of Resistance.	1	18-07-2025		TLM1	
13.	Practice problems	1	21-07-2025		TLM1	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Design for flexure

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.	Limit state analysis and design of singly reinforced sections	1	22-07-2025		TLM1	
2.	Limit state analysis and design of singly reinforced sections	1	24-07-2025		TLM1	
3.	Practice problems	1	25-07-2025		TLM1	
4.	Moment of Resistance	1	28-07-2025		TLM1	
5.	design of doubly reinforced sections	1	29-07-2025		TLM1	
6.	flanged (T) beam sections	1	31-07-2025		TLM1	
7.	Minimum requirements for design of flanged sections	1	01-08-2025		TLM1	
8.	Minimum Tension Reinforcement-Maximum Flexural Steel	1	04-08-2025		TLM1	
9.	Effective width of flange	1	05-08-2025		TLM1	
10.	Design of Flanged Sections	1	07-08-2025		TLM1	
11.	Practice problems	1	08-08-2025		TLM1	

No. of classes required to complete UNIT-II:11	No. of classes taken:

UNIT-III: Design for Shear, Torsion and Bond

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.	Limit state analysis and design of section for shear	1	11-08-2025		TLM1	
2.	Design of shear reinforcement	1	12-08-2025		TLM1	
3.	Design of shear reinforcement	1	14-08-2025		TLM1	
4.	Design for torsion	1	18-08-2025		TLM1	
5.	concept of bond, anchorage and development length	1	19-08-2025		TLM1	
6.	Practice problems	1	21-08-2025		TLM1	
7.	I.S. code provisions	1	22-08-2025		TLM1	
8.	Design of continuous beams	1	01-09-2025		TLM1	
9.	Limit state design for serviceability:.	1	02-09-2025		TLM1	
10.	Deflection, cracking and code provision	1	04-09-2025		TLM1	
11.	Practice problems	1	08-09-2025		TLM1	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Design of Compression members

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.	Effective length of a column and IS code provisions	1	09-09-2025		TLM1	
2.	Design of short columns -axial load	1	11-09-2025		TLM1	
3.	Design of short columns -uni axial load	1	12-09-2025		TLM1	
4.	Design of short columns -bi-axial load	1	15-09-2025		TLM1	
5.	Practice problems	1	16-09-2025		TLM1	
6.	Design of long columns	1	18-09-2025		TLM1	
7.	Braced and un-braced columns	1	19-09-2025		TLM1	
8.	Practice problems	1	22-09-2025		TLM1	
9.	Different types of footings	1	23-09-2025		TLM1	
10.	Design of isolated footings Square footings	1	25-09-2025		TLM1	
11.	Rectangular footings	1	26-09-2025		TLM1	

12.	circular footing	1	06-10-2025		**TLM1**	
13.	spread & sloped footings	1	07-10-2025		**TLM1**	
No. of classes required to complete UNIT-IV: 13				**No. of classes taken:**		

UNIT-V: Slabs

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.	Classification of slabs and IS code provisions	1	09-10-2025		**TLM1**	
2.	design of one - way slabs	1	10-10-2025		**TLM1**	
3.	Practice problems		13-10-2025		**TLM1**	
4.	design of slabs, two - way slabs	1	14-10-2025		**TLM1**	
5.	Practice problems		16-10-2025		**TLM1**	
6.	Design of continuous slabs	1	17-10-2025		**TLM1**	
7.	Practice problems	1	21-10-2025		**TLM1**	
8.	Practice problems	1	23-10-2025		**TLM1**	
9.	design of waist-slab staircase.	1	24-10-2025		**TLM1**	
10.	Practice problems	1	27-10-2025		**TLM1**	
11.	Practice problems	1	28-10-2025		**TLM1**	
12.	Revision	1	30-10-2025		**TLM1**	
13.	Revision	1	31-10-2025		**TLM1**	
No. of classes required to complete UNIT-V: 11				**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 & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10

Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), 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 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	Possesses necessary skill set to analyse and design various systems using analytical and

1	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**	**Course Coordinator**	**Module coordinator**	**Head of the Department**
Name of the Faculty	**B Rama Krishna**	**B. Ramakrishna**	**Dr C Raamallu**	**Dr. K V Ramana**
Signature				

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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	: Engineering Hydrology (23CE09)	
L-T-P Structure	: 3-0-0	Credits : 3
Program/Sem/Sec	: CIVIL., V-Sem.	A.Y : 2025-26

Prerequisite: Fluid Mechanics, H&HM

Course Educational Objectives:

The course allows the student to get the fundamentals of hydrology and its importance in development of water resources. The student to learn physical processes and their interactions in hydrology, measurement and estimation of the components of hydrologic cycle. Hydrographs, flood frequency analysis, design flood and flood routing methods. Study the concepts of groundwater movement and well hydraulics.

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

CO1: Understand the basic concepts of hydrology and factors affecting the hydrological components. (Understand-L2)
CO2: Compute the average rainfall over an area and estimate the runoff for a given data (Apply-L3)
CO3: Understand concepts of Hydrographs. flood frequency analysis, groundwater movement and well hydraulics. (Understand-L2)
CO4: Develop unit hydrograph and synthetic hydrograph, and estimate flood magnitude and carry out flood routing. (Apply-L3)
CO5: Determine aquifer parameters and yield of wells. (Apply-L3)

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	3	-	-	-	-	-	-	-	-	-	-	-	3	-	1
CO2	3	-	-	2	-	-	-	-	-	-	-	-	3	-	1
CO3	3	-	-	2	-	-	-	-	-	-	-	-	3	-	1
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	1
CO5	3	-	-	2	-	-	-	-	-	-	-	-	3	-	1

1=Slight(low) 2=Moderate (Medium) 3=Substantial (High)

Textbooks: -

1. 'Engineering Hydrology' by Subramanya, K, Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. 'Engineering Hydrology' by Jayarami Reddy, P, Laxmi Publications Pvt. Ltd., (2013), New Delhi

References:

1. 'Water Resources Engineering', Mays L.W, Wiley India Pvt. Ltd, (2013).
2. 'Hydrology' by Raghunath. H.M., New Age International Publishers, (2010)
3. 'Engineering Hydrology – Principles and Practice' by Ponce V.M., Prentice Hall International, (1994)
4. 'Hydrology and Water Resources Engineering' by Patra K.C., Narosa Publications, (2011).

PART-B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S.No.	Topics to be covered	No. of Classes Requi red	Tentative Date of Completion	Actual Date of Complete on	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Engineering hydrology and its applications	1	30-06-25		TLM1	CO1	T1	
2.	Hydrologic cycle, hydrological data-sources of data.	1	02-07-25		TLM1	CO1	T1	
3.	Types and forms of Precipitation:	1	03-07-25		TLM2	CO1	T1	
4.	Measurement of Precipitation	1	05-07-25		TLM2	CO1	T1	
5.	Rain gauge network, presentation of rainfall data	1	07-07-25		TLM1	CO1	T1	
6.	Problems	1	09-07-25		TLM1	CO2	T1	
7.	Average rainfall	1	10-07-25		TLM1	CO1	T1	
8.	Problems	1	14-07-25		TLM1	CO2	T1	
9	Problems	1	16-07-25		TLM1	CO2	T1	
10.	Problems	1	17-07-25		TLM1	CO2	T1	
11	Continuity and consistency of rainfall data,	1	19-07-25		TLM1	CO1	T1	
12	Frequency of rainfall	1	21-07-25		TLM2	CO1	T1	
13	Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves,	1	23-07-25		TLM2	CO1	T1	
14	Probable Maximum Precipitation (PMP), design storm.	1	24-07-25		TLM1	CO1	T1	
No. of classes required to complete UNIT-I				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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Initial abstractions, Evaporation: factors affecting	1	26-07-25		TLM2	CO1	T1	
2.	Measurement, reduction	1	28-07-25		TLM2	CO1	T1	
3.	Factors affecting Evapotranspiration:	1	30-07-25		TLM2	CO1	T1	
4.	Measuremen control Evapotranspiration	1	31-07-25		TLM1	CO1	T1	
5.	Estimation of evapotranspiration	1	02-08-25		TLM1	CO1	T1	
6.	Problems	1	04-08-25		TLM1	CO2	T1	
7.	Infiltration: factors affecting	1	06-08-25		TLM2	CO1	T1	
8.	Infiltration capacity curve, measurement	1	07-08-25		TLM2	CO1	T1	
9.	Infiltration indices.	1	11-08-25		TLM1	CO1	T1	
10	Problems	1	13-08-25		TLM1	CO2	T1	
11	Problems	1	14-08-25		TLM1	CO2	T1	
12	Problems	1	16-08-25		TLM1	CO2	T1	
No. of classes required to complete UNIT-II				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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Factors affecting runoff, components,	1	18-08-25		TLM2	CO3	T1	
2.	Empirical formulae, tables and curves,	1	20-08-25		TLM2	CO3	T1	
3.	Stream gauging, rating curve, Flow mass curve and flow duration curve.	1	21-08-25		TLM2	CO3	T1	
4.	Components of hydrograph, separation of base flow,	1	23-08-25		TLM2	CO3	T1	
5.	Effective rainfall hyetograph and direct runoff hydrograph,	1	01-09-25		TLM2	CO3	T1	
6.	Unit hydrograph, assumptions, derivation of unit hydrograph,	1	03-09-25		TLM1	CO3	T1	
7.	Problems	1	04-09-25		TLM1	CO4	T1	
8.	Problems	1	06-09-25		TLM1	CO4	T1	
9.	Unit hydrographs of different durations, principle of superposition	1	08-09-25		TLM1	CO3	T1	

10	S-hydrograph methods,	1	10-09-25		TLM1	CO3	T1	
11	Problems	1	11-09-25		TLM1	CO4	T1	
12	Limitations and applications of unit hydrograph,	1	13-09-25		TLM1	CO3	T1	
13	Dimensionless unit hydrograph, synthetic unit hydrograph, introduction to IUH.	1	15-09-25		TLM1	CO3	T1	
No. of classes required to complete UNIT-III				No. of classes taken:				

UNIT-IV

S.No.	Topics to be covered	No. of Classes Requi red	Tentative Date of Completion	Actual Date of Complete on	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Floods: Causes and effects,	1	17-09-25		TLM2	CO3	T1	
2.	Gumbel's methods,	1	18-09-25		TLM1	CO3	T1	
3.	Log-Pearson type III distribution methods,	1	20-09-25		TLM1	CO3	T1	
4.	Problems	1	22-09-25		TLM1	CO4	T1	
5.	Problems	1	24-09-25		TLM1	CO4	T1	
6.	Standard Project Flood (SPF) and Probable Maximum Flood (MPF)	1	25-09-25		TLM2	CO3	T1	
7.	Flood control methods and management.	1	27-09-25		TLM2	CO3	T1	
8.	Hydrologic routing, channel and reservoir routing	1	04-10-25		TLM1	CO3	T1	
9.	Muskingum method of routing.	1	06-10-25		TLM1	CO3	T1	
10	Puls method of routing.	1	08-10-25		TLM1	CO3	T1	
11	Problems	1	09-10-25		TLM1	CO4	T1	
12	Problems	1	11-10-25		TLM1	CO4	T1	
No. of classes required to complete UNIT-IV				No. of classes taken:				

UNIT-V

S.No.	Topics to be covered	No. of Classes Requi red	Tentative Date of Completion	Actual Date of Complete on	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Occurrence, types of aquifers	1	13-10-25		TLM2	CO3	T1	
2.	Aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient,	1	15-10-25		TLM2	CO3	T1	
3.	Types of wells, Darcy's law, Dupuit's equation-	1	16-10-25		TLM1	CO3	T1	
4.	Steady radial flow to wells in	1	18-10-25		TLM1	CO3	T1	

	confined							
5.	Steady radial flow to wells in unconfined aquifers	1	22-10-25		TLM1	CO3	T1	
6	Problems	1	23-10-25		TLM1	CO5	T1	
7.	Problems	1	24-10-25		TLM1	CO5	T1	
8.	Yield of an open well-recuperation test.	1	25-10-25		TLM1	CO3	T1	
9.	Problems	1	27-10-25		TLM1	CO5	T1	
10	Problems	1	29-10-25		TLM1	CO5	T1	
11	Problems	1	30-10-25		TLM1	CO5	T1	
12	Problems	1	01-11-25		TLM1	CO5	T1	
No. of classes required to complete UNIT-I				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
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR

Description	**From**	**To**	**Weeks**
I Phase of Instructions	30-06-2025	23-08-2025	8 W
I Mid Examinations	25-08-2025	30-08-2025	1 W
II Phase of Instructions	01-09-2025	01-11-2025	9 W
II Mid Examinations	03-11-2025	08-11-2025	1 W
Preparation and Practical's	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	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.
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

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : B NARASIMHARAO
Course Name & Code : GEOTECHNICAL ENGINEERING-I & 23CE10
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE/V-Sem., A.Y : 2025-26

Pre-requisites: NIL

Course Educational Objective: The course aims to teach the different properties and classifications of soil. The course coverage includes the various procedures for determining index and engineering properties of soils.

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

CO1: Understand the soil formation, its index properties and classification. **(Understand-L2)**

CO2: Understand the soil moisture and flow of water through soils and its effects. **(Understand-L2)**

CO3: Evaluate the stress distribution of soil subjected to different loading conditions. **(Apply-L3)**

CO4: Understand Compaction and Compressibility characteristics under partially saturated and fully saturated conditions. **(Understand-L2)**

CO5: Evaluate the shear strength of soil at different loading & drainage conditions for different soils. **(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	2	3	-	-	-	-	-	-	-	-	-	1	2	-	1
CO2	2	2	-	-	-	-	-	-	-	-	-	1	2	-	1
CO3	3	3	-	-	-	-	-	-	-	-	-	1	2	-	1
CO4	3	3	-	-	-	-	-	-	-	-	-	1	2	-	1
CO5	3	3	-	-	-	-	-	-	-	-	-	1	2	-	1
1 - Low					**2** –Medium						**3** - High				

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

TEXTBOOKS:

1. 'Soil Mechanics and Foundation Engineering by Dr. K.R. Arora, Standard Publishers and Distributors, New Delhi.
2. Basic and Applied Soil Mechanics' by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.
3. 'Soil Mechanics and Foundation Engineering' by V.N.S.Murthy ,CBS publishers
4. 'Geotechnical Engineering' by C. Venkataramaiah, New Age International Publishers.

REFERENCES:

1. 'Fundamentals of Soil Mechanics' by D.W.Taylor., Wiley.
2. 'An introduction to Geotechnical Engineering' by Holtz and Kovacs; Prentice Hall
3. Principles of Geotechnical Engineering, BrajaM.Das, Cengage Learing

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: Introduction & Index Properties and Classification Tests of Soils

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	1	**30-06-2025**		**TLM1**	
2.	Soil formation	1	**02-07-2025**		**TLM1**	
3.	Structure of Soils	1	**03-07-2025**		**TLM1**	
4.	Texture of Soils	1	**04-07-2025**		**TLM1**	
5.	Three phase system: V-V Relations	1	**07-07-2025**		**TLM1**	
6.	Three phase system: W-V Relations	1	**09-07-2025**		**TLM1**	
7.	Three phase system: W-W Relations	1	**10-07-2025**		**TLM1**	
8.	Problems	1	**11-07-2025**		**TLM1**	
9.	Problems	1	**14-07-2025**		**TLM1**	
10.	Grain size analysis	1	**16-07-2025**		**TLM1**	
11.	Consistency of Clay Soils	1	**17-07-2025**		**TLM1**	
12.	Soil Classification	1	**18-07-2025**		**TLM1**	
13.	Problems	1	**21-07-2025**		**TLM1**	
No. of classes required to complete UNIT-I:13				No. of classes taken:		

UNIT-II: Soil moisture and Capillarity & Permeability

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.	**Soil moisture**	1	**23-07-2025**		**TLM1**	
2.	Total Pressures	1	**24-07-2025**		**TLM1**	
3.	Neutral and Effective Pressures	1	**25-07-2025**		**TLM1**	
4.	Capillary Rise in soils	1	**28-07-2025**		**TLM1**	
5.	Problems	1	**30-07-2025**		**TLM1**	
6.	Problems	1	**31-07-2025**		**TLM1**	
7.	Flow of water through soils and Darcy's law- permeability	1	**01-08-2025**		**TLM1**	
8.	Factors affecting	1	**04-08-2025**		**TLM1**	
9.	Constant head permeability test	1	**06-08-2025**		**TLM1**	
10.	Variable head permeability test	1	**07-08-2025**		**TLM1**	
11.	Permeability of layered systems	1	**08-08-2025**		**TLM1**	
12.	Problems	1	**11-08-2025**		**TLM1**	
No. of classes required to complete UNIT-II:12				No. of classes taken:		

UNIT-III: Seepage and Flow Nets & Stress Distribution in Soils

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.	Flow net for one and two dimensional flow	1	**13-08-2025**		**TLM1**	
2.	Basic equation for Seepage	1	**14-08-2025**		**TLM1**	
3.	Flow net Characteristics and Uses	1	**18-08-2025**		**TLM1**	
4.	Quicksand condition & Seepage forces	1	**20-08-2025**		**TLM1**	
5.	Problems	1	**21-08-2025**		**TLM1**	
6.	Problems	1	**22-08-2025**		**TLM1**	
7.	Boussinesq's theory for point loads	1	**01-09-2025**		**TLM1**	
8.	Boussinesq's theory for circular loaded areas	1	**03-09-2025**		**TLM1**	
9.	Westergaard's theories for point loads	1	**04-09-2025**		**TLM1**	
10.	Newmark's influence chart	1	**05-09-2025**		**TLM1**	
11.	2:1 stress distribution method	1	**08-09-2025**		**TLM1**	
12.	Pressure Blubs	1	**10-09-2025**		**TLM1**	
13.	Problems	1	**11-09-2025**		**TLM1**	
14.	Problems	1	**12-09-2025**		**TLM1**	
No. of classes required to complete UNIT-III:14				No. of classes taken:		

UNIT- IV: Compaction & Consolidation

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.	Mechanism of compaction	1	**15-09-2025**		**TLM1**	
2.	Factors affecting	1	**17-09-2025**		**TLM1**	
3.	Effects of compaction on soil properties	1	**18-09-2025**		**TLM1**	
4.	Compaction control	1	**19-09-2025**		**TLM1**	
5.	Problems	1	**22-09-2025**		**TLM1**	
6.	Problems	1	**24-09-2025**		**TLM1**	
7.	Concept of consolidation and Spring Analogy method	1	**25-09-2025**		**TLM1**	
8.	Basic definitions	1	**26-09-2025**		**TLM1**	
9.	e-p and e-log p curves	1	**06-10-2025**		**TLM1**	
10.	Determination of coefficient of consolidation (c_v)	1	**08-10-2025**		**TLM1**	
11.	Problems	1	**09-10-2025**		**TLM1**	
12.	Problems	1	**10-10-2025**		**TLM1**	
No. of classes required to complete UNIT-IV:12				No. of classes taken:		

UNIT-V: Shear Strength of Soils

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.	Basic mechanism of shear strength	1	**13-10-2025**		**TLM1**	
2.	Mohr – Coulomb Failure theories	1	**15-10-2025**		**TLM1**	
3.	Shear strength parameters	1	**16-10-2025**		**TLM1**	
4.	Shear strength parameters	1	**17-10-2025**		**TLM1**	
5.	Critical Void Ratio	1	**20-10-2025**		**TLM1**	

6.	Stress-Strain behavior of Sands	1	**22-10-2025**		**TLM1**	
7.	Stress-Strain behavior of clays	1	**23-10-2025**		**TLM1**	
8.	Various drainage conditions	1	**24-10-2025**		**TLM1**	
9.	Problems on Shear strength parameters for total stresses	1	**27-10-2025**		**TLM1**	
10.	Problems on Shear strength parameters for total stresses	1	**29-10-2025**		**TLM1**	
11.	Problems on Shear strength parameters for effective stresses	1	**30-10-2025**		**TLM1**	
12.	Problems on Shear strength parameters for effective stresses	1	**31-10-2025**		**TLM1**	
No. of classes required to complete UNIT-V:12				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 (R20 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	Course Coordinator	Module Coordinator	HOD
(B NARASIMHARAO)	(B NARASIMHARAO)	(B NARASIMHARAO)	(Dr.K.V.R)

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.V. Ramakrishna,
Course Name & Code : Construction Technology and Management (23CE13)
Regulations : R23
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B.Tech – V Semester – A Section **A.Y.:** 2025-26

Pre-requisites: NIL

Course Educational Objectives:

1. To introduce the concept of project management including network drawing and monitoring
2. To illustrate the various equipments related to construction such as earth moving equipment, trucks, aggregate production, construction equipment and machinery
3. To establish the importance of various construction techniques, quality control and safety in construction projects

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

CO1: Appreciate the importance of construction planning, Stakeholders involved, quality control and safety engineering in Construction projects **(Understand)**

CO2: Understand the functioning of various earthmoving equipment and construction techniques **(Understand)**

CO3: Distinguish the methods of production of aggregate products and concreting **(Understand)**

CO4: Apply the project management and construction techniques using CPM and PERT to practical problems **(Apply)**

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				3	1	1		
CO2							2				2	1	1		
CO3							2				2	1	1		
CO4	2						2				3	1	1		
1 - Low							**2** –Medium						**3** - High		

TEXTBOOKS:

1. 'Construction Engineering and Management' by S. Seetharaman, Umesh Publications, 4th Edition 2003, Reprint 2005.
2. 'Project Planning and Control with PERT and CPM', by B.C. Punmia and K.K. Khandelwal,

Laxmi Publications, 4th Edition 2002, Reprint 2015.
3. 'Construction Project Management Theory and Practice' by Kumar Neeraj Jha (2011), Pearson.
4. 'Construction Technology' by Subir K. Sarkar and Subhajit Sarasvati, Oxford University Press.

REFERENCES:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw Hill.
2. 'Construction Project Management-An Integrated Approach' by Peter Fewings, Taylor and Francis
3. 'Construction Management Emerging Trends and Technologies' by Trefor Williams, Cengage Learning

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT–I: Introduction, Scheduling and Planning Approaches

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	1	30.6.25		2	
2	Construction project management (CM)	1	1.7.25		2	
3	Importance of CM	1	3.7.25		2	
4	Terminology	1	5.7.25		2	
5	Stake holders and Regulatory requirements	1	7.7.25		2	
6	Qualities of a project manager, project planning,	1	8.7.25		2	
7	Coordination, scheduling, monitoring	1	10.7.25		2	
8	Bar charts, milestone charts	1	12.7.25		2	
9	Network analysis	1	14.7.25		2	
10	Critical Path Method	1	15.7.25		1	
11	Critical Path Method	1	17.7.25		1	
12	Critical Path Method	1	19.7.25		1	
13	Critical Path Method	1	21.7.25		1	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT–II: PERT

S No	Topics to be covered	No. of classes required	Tentative date of completion	Actual date of completion	Teaching Learning Methods	HOD sign weekly
15	Project evaluation and review technique (PERT) Basics	1	22.7.25		2	
16	PERT Basics	1	24.7.25		2	
17	PERT Analysis	1	26.7.25		1	
18	PERT Analysis	1	28.7.25		1	

19	PERT Analysis	1	29.7.25		1	
20	PERT Analysis	1	31.7.25		1	
21	PERT Analysis	1	2.8.25		1	
22	Cost analysis updating crashing for optimum cost	1	4.8.25		2	
23	Cost analysis updating crashing for optimum cost	1	5.8.25		1	
24	Crashing for optimum resources	1	7.8.25		2	
25	Crashing for optimum resources	1	8.8.25		1	
26	Software's for construction management	1	10.8.25		2	
27	Examples	1	12.8.25		2	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		

Mid-I: 25.8.25 to 30.8.25

UNIT–III: Construction Equipment

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	Construction equipment	1	14.8.25		2	
29	Economical considerations	1	16.8.25		2	
30	Earthwork equipment	1	18.8.25		2	
31	Earthwork equipment	1	19.8.25		2	
32	Earthwork equipment	1	21.8.25		2	
33	Compaction equipment	1	23.8.25		2	
34	Hoisting and earthwork equipment	1	1.9.25		2	
35	Hoisting and earthwork equipment	1	2.9.25		2	
36	Hoisting and earthwork equipment	1	4.9.25		2	
No. of classes required to complete UNIT-III: 9				**No. of classes taken:**		

UNIT–IV: Concreting Equipment

S No	Topics to be covered	No. of classes required	Tentative date of completion	Actual date of completion	Teaching Learning Methods	HOD sign weekly
37	Concreting equipment	1	6.9.25		2	
38	Concreting equipment	1	8.9.25		2	
39	Concrete mixers	1	9.9.25		2	
40	Batching plants	1	11.9.25		2	
41	Mixing and placing of concrete	1	13.9.25		2	
42	Consolidating and finishing	1	15.9.25		2	
43	Examples	1	16.9.25		2	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT–V: Construction Methods

S No	Topics to be covered	No. of classes required	Tentative date of completion	Actual date of completion	Teaching Learning Methods	HOD sign weekly
44	Construction methods	1	18.9.25		2	
45	Earthwork, piling	1	20.9.25		2	
46	Placing of concrete	1	22.9.25		2	
47	Form work	1	23.9.25		2	
48	Fabrication and erection	1	25.9.25		2	
49	Quality control	1	27.9.25		2	
50	Safety engineering	1	29.9.25		2	
51	Safety Engineering	1	30.9.25		2	
52	BIM	1	2.10.25		2	
53	Case Studies	1	4.10.25		2	
54	Revision	1	6.10.25		2	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

Mid-2: 3-11.25 to 8.11.25

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	**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 test 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	Course Coordinator	HOD
Name of faculty	Dr V. Ramakrishna	Dr C. Rajamallu	Dr K.V. Ramana
Signature			

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr.P.Vijaya Kumar**, Professor

Course Name & Code : Sustainable Energy Technologies- 23ME81 **Regulation**: R23

L-T-P Structure : **3-0-0** **Credits:** 03

Program/Sem/Sec : B.Tech- CIVIL V Sem A/S **A.Y.:** 2025-26

PREREQUISITE : **Nil**

COURSE EDUCATIONAL OBJECTIVES (CEOs):

To provide the insights on different sustainable energy sources, potential, salient features and utilization of solar, wind, geothermal, ocean thermal energy, bio energy and fuel cell systems.

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

CO 1	Demonstrate the importance, the impact of solar radiation. **(Understanding-L2)**
CO 2	Understand the principles of solar PV modules and storage in PV systems. **(Understanding-L2)**
CO 3	Discuss solar energy storage systems and their applications. **(Understanding-L2)**
CO 4	Describe power extraction from wind and bio-mass. **(Understanding-L2)**
CO5	Illustrate the working of geothermal, ocean energy and fuel cells. **(Understanding-L2)**

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

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

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 Renewable Energy Technologies -Ramesh & Kumar /Narosa

T2 Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/TMH

REFERENCE BOOKS:

R1. Non-Conventional Energy Resources- Khan B.H/ Tata McGraw Hill, New Delhi, 2006.

R2. Non-Conventional Energy - Ashok V Desai /New Age International (P) Ltd

R3. Non-conventional Energy Source- G S Sawhney- PHI, New Delhi, 2012

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: SOLAR RADIATION

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.	Course Outcomes	1	01-07-2025		TLM2	
2.	Role and potential of new and renewable sources	1	04-07-2025		TLM2	
3.	The solar energy option, Environmental impact of solar power	1	05-07-2025		TLM2	
4.	Structure of the Sun, The solar constant	1	08-07-2025		TLM2	
5.	Sun-earth relationships	1	11-07-2025		TLM2	
6.	Coordinate systems and coordinates of the sun	1	12-07-2025		TLM2	
7.	Extraterrestrial and terrestrial solar radiation	1	15-07-2025		TLM2	
8.	Solar radiation on tilted surface	1	18-07-2025		TLM2	
9.	Instruments for measuring solar radiation and sun shine, Solar radiation data	1	19-07-2025		TLM2	
No. of classes required to complete UNIT-I: 09				No. of classes taken:		

UNIT-II: SOLAR PV MODULES AND PV 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.	PV module Circuit Design, Module Structure, Packing Density	1	22-07-2025		TLM2	
2.	Interconnenctions, Mismatch and temperature effects	1	25-07-2025		TLM2	
3.	Electrical and Mechanical Insulation, Lifetime of PV modules, Degradation and failure	1	29-07-2025		TLM2	
4.	PV module parameters, Efficiency of PV Systems	1	01-08-2025		TLM2	
5.	Solar PV Systems	1	02-08-2025		TLM2	
6.	Battery Operation, Types of Batteries, Battery parameters, Applications, Selection of batteries for Solar PV System	1	05-08-2025		TLM2	
No. of classes required to complete UNIT-II: 06				No. of classes taken:		

UNIT-III: SOLAR ENERGY COLLECTION, SOLAR ENERGY STORAGE AND APPLICATIONS

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.	Solar Energy Collection: Flat plate and concentrating collectors	1	08-08-2025		TLM2	
2.	Classification of concentrating collectors	1	09-08-2025		TLM2	
3.	Solar Energy Storage and Applications: Different methods	1	12-08-2025		TLM2	
4.	Sensible latent heat and stratified storage, Solar ponds	1	19-08-2025		TLM2	
5.	Solar Applications-solar heating cooling technique	1	22-08-2025		TLM2	
6.	Solar distillation and drying	1	23-08-2025		TLM2	
7.	Solar cookers	1	02-09-2025		TLM2	
8.	Central power tower concept	1	05-09-2025		TLM2	
9.	Solar chimney	1	06-09-2025		TLM2	
No. of classes required to complete UNIT-III: 09				No. of classes taken:		

UNIT-IV : WIND ENERGY, BIO-MASS

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 energy: Sources and potential	1	09-09-2025		TLM2	
2.	Horizontal and Vertical axis wind mill	1	12-09-2025		TLM2	
3.	Performance characteristics	1	13-09-2025		TLM2	
4.	Betz criteria	1	16-09-2025		TLM2	
5.	Types of winds	1	19-09-2025		TLM2	
6.	Wind data measurement	1	20-09-2025		TLM2	
7.	Bio-mass: Principles of bio-conversion	1	23-09-2025		TLM2	
8.	Anaerobic/aerobic digestion	1	26-09-2025		TLM2	
9.	Types of biogas digesters	1	27-09-2025		TLM2	
10.	Gas yield, Gasifiers	1	03-10-2025		TLM2	
11.	Applications	1	04-10-2025		TLM2	
No. of classes required to complete UNIT-IV:11				No. of classes taken:		

UNIT-V : GEOTHERMAL ENERGY, OCEAN ENERGY, FUEL CELLS

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.	Geothermal Energy: Origin, Applications	1	07-10-2025		TLM2	
2.	Types of Geothermal Resources	1	10-10-2025		TLM2	
3.	Geothermal power generation	1	11-10-2025		TLM2	
4.	Relative merits and demerits	1	14-10-2025		TLM2	

5.	Ocean Energy: Ocean Thermal energy	1	17-10-2025		TLM2	
6.	Open cycle and closed cycle OTEC plants, Environmental impacts	1	18-10-2025		TLM2	
7.	Challenges and applications, Fuel Cells: Introduction, Applications	1	24-10-2025		TLM2	
8.	Classification, Different types of Fuel Cells, Phosphoric Acid fuel cell	1	25-10-2025		TLM2	
9.	Alkaline fuel cell	1	28-10-2025		TLM2	
10.	PEM fuel cell	1	31-10-2025		TLM2	
11.	MC fuel cell	1	01-11-2025		TLM2	
No. of classes required to complete UNIT-V: 11				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

Academic Calendar

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8
I MID Examinations	25-08-2025	30-08-2025	1
II Phase of Instructions	01-09-2025	01-11-2025	9
II MID Examinations	03-11-2025	08-11-2025	1
Preparation and Practicals	10-11-2025	15-11-2025	1
Semester End Examinations	17-11-2025	25-11-2025	2

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II-Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus),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	**Engineering 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 the World**: 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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 8	**Individual and Collaborative team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 9	**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 10	**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 11	**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	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. P.Vijay Kumar	Dr. P.Vijay Kumar	Dr. P.Vijay Kumar	Dr. M B S Sreekar Reddy

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	:	B.Tech., V-Sem., CIVIL
ACADEMIC YEAR	:	2025-26
COURSE NAME & CODE	:	GEOTECHNICAL ENGINEERING LAB (23CE56)
L-T-P STRUCTURE	:	0-0-3
COURSE CREDITS	:	1.5
COURSE INSTRUCTOR	:	B. NARASIMHARAO/K. HARISH KUMAR
COURSE COORDINATOR	:	B. NARASIMHARAO/ K. HARISH KUMAR

Pre-requisites: Geotechnical Engineering-I

Course Educational Objective: The course aims to train the students in performing laboratory experiments to find the basic properties soil. The course coverage includes the various field applications of soil.

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

CO1: Perform the index and engineering properties of the soil and interpret the results. **(Apply- L3)**

CO2: Perform the Strength, compaction and consolidation properties of the soil and interpret the results. **(Apply- L3)**

CO3: Apply field conditions for computing and analyzing the experimental data. **(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	-	-	-	3	-	-	-	-	-	-	1	-	3	1
CO2	3	-	-	-	3	-	-	-	-	-	-	1	-	3	1
CO3	1	-	-	-	3	-	-	-	-	-	-	1	-	**2**	1
1 - Low					**2** –Medium							**3** - High			

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DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL ENGINEERING LAB (23CE56)

Course Instructor(s): B. NARASIMHARAO
K. HARISH KUMAR

B.Tech (V Sem)
A.Y 2025-26

CYCLE-1

C-1-1. Specific gravity test

C-1-2. Atterburg limits tests

C-1-3. Field density test- Core cutter method

C-1-4. Field density test- Sand replacement method

C-1-5. Grainsize analysis by sieving

CYCLE-2

C-2-1. Constant head permeability test

C-2-2. Compaction test by standard proctor

C-2-3. Direct shear test

C-2-4. Unconfined compression test

C-2-5. Differential free swell test

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DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL ENGINEERING LAB (23CE56)

Course Instructor(s): B. NARASIMHARAO
K. HARISH KUMAR

B.Tech (V Sem)
A.Y 2025-26

Batch-A

Tentative Date/Batch	Actual date	A1	A2	A3	A4	A5
01-07-2025		Demo	Demo	Demo	Demo	Demo
08-07-2025		Demo	Demo	Demo	Demo	Demo
15-07-2025		C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
22-07-2025		C-1-2	C-1-3	C-1-4	C-1-5	C-1-1
29-07-2025		C-1-3	C-1-4	C-1-5	C-1-1	C-1-2
05-08-2025		C-1-4	C-1-5	C-1-1	C-1-2	C-1-3
12-08-2025		C-1-5	C-1-1	C-1-2	C-1-3	C-1-4
19-08-2025		Demo	Demo	Demo	Demo	Demo
02-09-2025		C-2-1	C-2-2	C-2-3	C-2-4	C-2-5
09-09-2025		C-2-2	C-2-3	C-2-4	C-2-5	C-2-1
16-09-2025		C-2-3	C-2-4	C-2-5	C-2-1	C-2-2
23-09-2025		C-2-4	C-2-5	C-2-1	C-2-2	C-2-3
07-10-2025		C-2-5	C-2-1	C-2-2	C-2-3	C-2-4
14-10-2025		Revision	Revision	Revision	Revision	Revision
28-10-2025		Internal Test				

INCHARGE **HOD**

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DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL ENGINEERING LAB (23CE56)

Course Instructor(s): B. NARASIMHARAO
K. HARISH KUMAR

B.Tech (V Sem)
A.Y 2025-26

Batch-B

Date/Batch	Actual date	B1	B2	B3	B4	B5
05-07-2025		Demo	Demo	Demo	Demo	Demo
19-07-2025		C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
02-08-2025		C-1-2	C-1-3	C-1-4	C-1-5	C-1-1
23-08-2025		C-1-3	C-1-4	C-1-5	C-1-1	C-1-2
06-09-2025		C-1-4	C-1-5	C-1-1	C-1-2	C-1-3
20-09-2025		C-1-5	C-1-1	C-1-2	C-1-3	C-1-4
27-09-2025		C-2-1	C-2-2	C-2-3	C-2-4	C-2-5
04-10-2025		C-2-2	C-2-3	C-2-4	C-2-5	C-2-1
11-10-2025		C-2-3	C-2-4	C-2-5	C-2-1	C-2-2
18-10-2025		C-2-4	C-2-5	C-2-1	C-2-2	C-2-3
25-10-2025		C-2-5	C-2-1	C-2-2	C-2-3	C-2-4
01-11-2025		Internal Test				

INCHARGE **HOD**

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Ex. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8,9,10	A=10
Record = **B**	1,2,3,4,5,6,7,8,9,10	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8,9,10	C = 15
Cumulative Internal Examination: A + B + C = 30	1,2,3,4,5,6,7,8,9,10	30
Semester End Examinations = D	1,2,3,4,5,6,7,8,9,10	D = 70
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8,9,10	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**
(B. Narasimharao)	(B. Narasimharao)	(B. Narasimha rao)	(Dr. K. V. RAMANA)

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DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNICAL ENGINEERING LAB (23CE56)

Course Instructor(s): B. NARASIMHARAO
K. HARISH KUMAR

B.Tech (V Sem)
A.Y 2025-26

LAB TIME TABLE

DAY	FN	AN
Monday		
Tuesday	**V Semester Batch-A**	
Wednesday		
Thursday		
Friday		
Saturday	**V Semester Batch-B**	

Batch-A: 23761A0101 to 22761A0129

Batch-B: 23761A0130 to 24765A0117

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : J.RANGAIAH
P.KEERTHI

Course Name & Code : H & H M LAB & 23CE57 **Regulation**: R23

L-T-P Structure : 0-0-3 **Credits:** 1.5

Program/Sem/Sec : III B.Tech,. V sem **A.Y.:** 2025-26

PREREQUISITE : Mechanics of Fluids, Hydraulics and Hydraulic Machinery Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): The student is given hands on training in working on fluid flow hydraulic machinery equipment and performs experiments to verify the principles of fluid mechanics and hydraulics based on laws of conservation of mass, energy, and momentum

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

CO1	Demonstrate knowledge on the fundamental principles of fluid flow. (Apply-L3)
CO2	Apply the laws of conservation of mass, energy, and momentum to solve practical problems in fluid mechanics. (Apply-L3)
CO3	Select the required flow rate, pressure rise and the proper hydraulic turbines and pumps. (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	-	-	-	-	-	-	-	-	-	2	1
CO2	3	-	-	3	-	-	-	-	-	-	-	-	-	2	1
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	2	1
1 - Low						**2** –Medium						**3** - High			

TEXTBOOKS/REFERENCE BOOKS:
Laboratory manual developed by Civil Engineering Department

HYDRAULICS AND HYDRAULIC MACHINERY LAB (23CE57)

COURSE: V SEMESTER **A.Y: 2025-26**

PART-B

LIST OF EXPERIMENTS

I CYCLE

1. Determination of coefficient of discharge of given Notches
2. Calibration of given Venturimeter.
3. Experiment on Orifice meter set-up
4. Determine of Darcy's Friction Co-efficient
5. Verification of Bernoulli's theorem

II CYCLE

1. Experiment on Friction in pipes.
2. Impact of jet on vanes.
3. Calibration of Turbine Flow Meter.
4. Performance characteristics of Pelton Wheel Turbine.
5. Operating characteristics of Centrifugal Pump.

LIST OF BATCHES

BATCH: A (Saturday)	BATCH: B (Tuesday)
A_1 -----23761A0101 to 23761A0105	B_1 ----23761A0130 to 22761A0134
A_2 -----23761A0106 to 23761A010	B_2 ---- 23761A0135 to 23761A0142
A_3 -----23761A0111 to 23761A0115	B_3 ---- 24765A0101 to 24765A0105
A_4 ----- 23761A0116 to 23761A0123	B_4 ---- 24765A0106 to 24765A0111
A_5 ----- 23761A0124 to 23761A0129	B_5 ---- 24765A0112 to 24765A0117

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (23CE57)

COURSE: V SEMESTER **A.Y: 2025-26**

I CYCLE SCHEDULE: BATCH-A (SATURDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
05/07/2025		Demo	Demo	Demo	Demo	Demo
19/07/2025		B_1	B_2	B_3	B_4	B_5
02/08/2025		B_2	B_3	B_4	B_5	B_1
23/08/2025		B_3	B_4	B_5	B_1	B_2
06/09/2025		B_4	B_5	B_1	B_2	B_3
13/09/2025		B_5	B_1	B_2	B_3	B_4

I CYCLE SCHEDULE: BATCH-B (TUESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
01/07/2025		Demo	Demo	Demo	Demo	Demo
08/07/2025		A_1	A_2	A_3	A_4	A_5
15/07/2025		A_2	A_3	A_4	A_5	A_1
22/07/2025		A_3	A_4	A_5	A_1	A_2
29/07/2025		A_4	A_5	A_1	A_2	A_3
05/08/2025		A_5	A_1	A_2	A_3	A_4

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (23CE57)

COURSE: V SEMESTER **A.Y: 2025-26**

II CYCLE SCHEDULE: BATCH-A (SATURDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
20/09/2025		B_1	B_2	B_3	B_4	B_5
27/09/2025		B_2	B_3	B_4	B_5	B_1
04/10/2025		B_3	B_4	B_5	B_1	B_2
18/10/2025		B_4	B_5	B_1	B_2	B_3
25/10/2025		B_5	B_1	B_2	B_3	B_4

II CYCLE SCHEDULE: BATCH-B (TUESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
12/08/2025		A_1	A_2	A_3	A_4	A_5
19/08/2025		A_2	A_3	A_4	A_5	A_1
02/09/2025		A_3	A_4	A_5	A_1	A_2
09/09/2025		A_4	A_5	A_1	A_2	A_3
16/09/2025		A_5	A_1	A_2	A_3	A_4
07/10/2025		Repetition Lab				
28/10/2025		Internal Exam				

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (23CE57)

COURSE: V SEMESTER **A.Y: 2025-26**

LAB TIME TABLE

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

Batch – A: 23761A0101 to 23761A0129

Batch – B: 23761A0130 to 23761A0142 & 24765A0101 to 24765A0117

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8 W
I Mid Examinations	25-08-2025	30-08-2025	1 W
II Phase of Instructions	01-09-2025	01-11-2025	9 W
II Mid Examinations	03-11-2025	08-11-2025	1 W
Preparation and Practical's	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	2 W

Lab-In charge

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Ex. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8,9,10	A=10
Record = **B**	1,2,3,4,5,6,7,8,9,10	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8,9,10	C = 15
Cumulative Internal Examination: A + B + C = 30	1,2,3,4,5,6,7,8,9,10	30
Semester End Examinations = D	1,2,3,4,5,6,7,8,9,10	D = 70
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8,9,10	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 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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	J.Rangaiah	J.Rangaiah	J.Rangaiah	Dr. K.V.R
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.J.Venkateswara Rao/ Mr. M. Manoj Kumar
Course Name & Code: Estimation, Specification and Contracts /23CES3 **Regulation**:R23
L-T-P Structure **:0-1-2** **Credits:** 2
Program/Sem/Sec : B.Tech/V **A.Y.:** 2025-26

PREREQUISITE: Building planning and drawing Lab, Concrete Technology, Design of concrete structures, Design of steel structures.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

COURSE OUTCOMES (COs): At the end of the course

CO1	The student should be able to determine the quantities of different components of buildings **(Apply-L3)**
CO2	The student should be in a position of find the cost of various building components **(Apply-L3)**
CO3	The student should be capable of finalizing the value of structures **(Analyse-L4)**

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	2											2			2
CO3	2											2			2
1 - Low			**2** –Medium							**3** - High					

Textbooks:

1. Estimating and Costing by B. N. Dutta, UB S publishers, 2000.
2. Civil Engineering Contracts and Estimate by B.S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. Construction Planning and Technology by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. Estimating and Costing by G.S. Birdie.

References:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS1200 (Parts I to XXV-1974 / Method of Measurement of Building & Civil Engg Works–B.I.S.)
3. 'Estimation, Costing and Specifications 'by M.Chakraborthi; Laxmi publications.
4. National Building Code

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Contracts- Types - Documents – Conditions	3	09-07-25		TLM 3 & 6	
2.	Valuation of buildings- concepts of e-procurement and reverse auctions	3	16-07-25		TLM 3 & 6	
3.	Standard specifications for different items of building construction.	3	23-07-25		TLM 3 & 6	
4.	General items of work in Building–Standard Units	3	30-07-25		TLM 3 & 6	
5.	Principles of working out quantities for detailed and abstract estimates	3	06-08-25		TLM 3 & 6	
6.	Approximate method of Estimating	3	13-08-25		TLM 3 & 6	
7.	Rate Analysis–Working out data for various items of work	3	20-08-25		TLM 3 & 6	
8.	Earthwork for roads and canals	3	03-09-25		TLM 3 & 6	
9.	Bar bending schedules	3	10-09-25		TLM 3 & 6	
10.	Individual wall method for one and two roomed building	3	17-09-25		TLM 3 & 6	
11.	Individual wall method for Four roomed building	3	24-09-25		TLM 3 & 6	
12.	Centre line method for one and two roomed building	3	01-10-25		TLM 3 & 6	
13.	Centre line method for Four roomed building	3	08-10-25		TLM 3 & 6	
14.	Building estimation using building estimator software	3	15-10-25		TLM 3 & 6	
15.	Building estimation using building estimator software	3	22-10-25		TLM 3 & 6	
No. of classes required to complete 12				**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
Day to Day work	10
Record	05
Internal Test	15
Cumulative Internal Examination(CIE)	**30**
Semester End Examinations (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 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 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	Dr.J.Venkateswara Rao/ Mr. M. Manoj 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: Mr. EESHWAR RAM J & P SIVARAM KRISHNA

Course Name &	**:** -TINKERING LAB& 23EM01	**Regulation**	: R23
L-T-P Structure	**: 0-0-2**	**Credits**	: 1
Program/Sem/Sec	**:** B. Tech/V/CE	**A.Y.**	: 2025-26

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

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

CO1	Encourage Innovation and Creativity
CO2	Provide Hands-on Learning
CO3	Impart Skill Development
CO4	Foster Collaboration and Teamwork
CO5	Enable Interdisciplinary Learning
CO6	Impart Problem-Solving mind-set
CO7	Prepare for Industry and Entrepreneurship

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to startups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

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

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

CO3		**2**	**1**	**1**	-	-	-	-	-	-	-	**2**		**2**
CO4		**2**	**1**	**1**	-	-	-	-	-	-	-	**2**	**3**	
1 - Low						**2** –Medium						**3** - High		

Reference

https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2) https://atl.aim.gov.in/ATL-Equipment-Manual/
3) https://aim.gov.in/pdf/Level-1.pdf
4) https://aim.gov.in/pdf/Level-2.pdf
5) https://aim.gov.in/pdf/Level-3.pdf
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PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Si.No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-I					
1.	Introduction	2	30-06-2025		TLM4	
2.	Make your own parallel and series circuits using breadboard for any application of your choice.	2	07-07-2025			
3.	Demonstrate a traffic light circuit using breadboard	2	14-07-2025		TLM4	
4.	Build and demonstrate automatic Street Light using LDR	2	21-07-2025		TLM4	
5.	Simulate the Arduino LED blinking activity in Tinkercad	2	28-07-2025		TLM4	
6.	Build and demonstrate an Arduino LED blinking activity using Arduino IDE	2	04-08-2025		TLM4	
7.	Interfacing IR Sensor and Servo Motor with Arduino	2	11-08-2025		TLM4	
8.	Blink LED using ESP32	2	18-08-2025		TLM4	
	CYCLE-II					
9.	LDR Interfacing with ESP32	2	01-09-2025		TLM4	
10.	Control an LED using Mobile App	2	08-09-2025		TLM4	
11.	Design and 3D print a Walking Robot	2	15-09-2025		TLM4	
12.	Design and 3D Print a Rocket.	2	22-09-2025		TLM4	
13.	Build a live soil moisture monitoring project, and monitor soil moisture levels	2	06-10-2025		TLM4	

	of a remote plan in your computer dashboard.				
14.	Demonstrate all the steps in design thinking to redesign a motor bike.	2	13-10-2025		TLM4
15.	Revision	2	20-10-2025		TLM4
16.	Internal Exam	2	27-10-2025		-----
No. of classes required to complete				**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	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A=10
Record/ Viva = **B**	1,2,3,4,5,6,7,8	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8	C = 15
Cumulative Internal Examination: A+B+C = 30	1,2,3,4,5,6,7,8	**30**
Semester End Examinations = D	1,2,3,4,5,6,7,8	**70**
Total Marks: A+ B + C + D = 100	1,2,3,4,5,6,7,8	**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**
PEO 2	**To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance**
PEO 3	**To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt**

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 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**

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**
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**
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PSO 3	**Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.**

	Course Instructor	**Head of the Department**
Signature		
Name of the Faculty	Mr. EESHWAR RAM	Dr. K V Ramana