LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC, ISO 9001:2018 Certified Institution
ISO 21001:2018 Certified & Accredited by NBA (under tier-1) & NAAC
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
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-II & 23CE26
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE/VII-Sem., A.Y : 2026-27

Pre-requisites: Geotechnical Engineering- I

Course Educational Objective: The course aims to teach the different types of shallow foundations and theories required for the determination of their bearing capacity. The course coverage includes the principles of important field tests such as SPT and Plate bearing test to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes: At the end of the course, the student will be able to:
CO1: Understand Soil exploration methods and field tests. **(Understand-L2)**
CO2: Understand earth pressure theories. **(Understand-L2)**
CO3: Understand stability of slopes. **(Understand-L2)**
CO4: Analyze the shallow foundations. **(Understand-L2)**
CO5: Analyze the deep foundations. **(Understand-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	3	-	-	-	-	-	-	-	-	1	3	-	1
CO2	3	3	-	-	-	-	-	-	-	-	1	3	-	1
CO3	3	3	-	-	-	-	-	-	-	-	1	3	-	1
CO4	3	3	-	-	-	-	-	-	-	-	1	3	-	1
CO5	3	3	-	-	-	-	-	-	-	-	1	3	-	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: SITE INVESTIGATION AND SELECTION OF FOUNDATIONS

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	**29-06-2026**		**TLM1**	
2.	Objective of site investigation, Methods of investigation	1	**30-06-2026**		**TLM1**	
3.	Planning of Site investigation	1	**01-07-2026**		**TLM1**	
4.	Depth of soil exploration, Significant depth, Spacing of bore holes	1	**03-07-2026**		**TLM1**	
5.	Standard penetration test and its significance in soil exploration	1	**06-07-2026**		**TLM1**	
6.	Correction to Standard penetration values	1	**07-07-2026**		**TLM1**	
7.	Soil sampling techniques	1	**08-07-2026**		**TLM1**	
8.	Sampling Disturbance	1	**10-07-2026**		**TLM1**	
9.	Methods of obtaining undisturbed samples	1	**13-07-2026**		**TLM1**	
10.	Requirements of an undisturbed sample	1	**14-07-2026**		**TLM1**	
11.	Functions and requisites of foundation	1	**15-07-2026**		**TLM1**	
12.	Different types of shallow foundations and situations under which they are adopted.	1	**17-07-2026**		**TLM1**	
13.		1	**20-07-2026**		**TLM1**	
No. of classes required to complete UNIT-I:13				No. of classes taken:		

UNIT-II: SHALLOW FOUNDATIONS AND BEARING CAPACITY 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.	Bearing Capacity of soils	1	**21-07-2026**		**TLM1**	
2.	Factors affecting Bearing capacity of soil	1	**22-07-2026**		**TLM1**	
3.	Terzaghi's bearing capacity theory	1	**24-07-2026**		**TLM1**	
4.	Meyerhof's bearing capacity theory	1	**27-07-2026**		**TLM1**	
5.	Problems	1	**28-07-2026**		**TLM1**	
6.	Problems	1	**29-07-2026**		**TLM1**	
7.	General principle of Design of Shallow Foundations	1	**31-07-2026**		**TLM1**	
8.	Plate bearing test and its limitations	1	**03-08-2026**		**TLM1**	
9.	Settlement of foundation – Causes	1	**04-08-2026**		**TLM1**	

	of total and differential settlement of foundations in sands					
10.	Settlement of foundation – Causes of total and differential settlement of foundations in clays	1	**05-08-2026**		**TLM1**	
11.	Methods of controlling settlement	1	**07-08-2026**		**TLM1**	
12.	Code provisions – Conventional procedure for proportioning of footing for equal settlement.	1	**10-08-2026**		**TLM1**	
13.	Code provisions – Conventional procedure for proportioning of footing for equal settlement.	1	**11-08-2026**		**TLM1**	
14.	Problems	1	**12-08-2026**		**TLM1**	
15.	Problems	1	**14-08-2026**		**TLM1**	
16.	Problems	1	**17-08-2026**		**TLM1**	
No. of classes required to complete UNIT-II:16				No. of classes taken:		

UNIT-III: DEEP FOUNDATIONS AND GROUP CAPACITY OF PILES

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.	**Deep Foundations:** Pile foundation, Consideration leading to the selection of pile foundation	1	**18-08-2026**		**TLM1**	
2.	Functions of piles, Types of piles, Friction pile, End bearing pile, Pile grouping	1	**19-08-2026**		**TLM1**	
3.	Estimation of individual pile capacity by Static approaches.	1	**21-08-2026**		**TLM1**	
4.	Estimation of individual pile capacity by Dynamic approaches.	1	**31-08-2026**		**TLM1**	
5.	Problems	1	**01-09-2026**		**TLM1**	
6.	**Group Capacity of Piles:** Pile group efficiency – Downward drag phenomenon on piles and its significance in the design of pile foundations	1	**02-09-2026**		**TLM1**	
7.	Pile load test	1	**07-09-2026**		**TLM1**	
8.	Impact of pile driving	1	**08-09-2026**		**TLM1**	
9.	Problems	1	**09-09-2026**		**TLM1**	
10.	Problems	1	**11-09-2026**		**TLM1**	
No. of classes required to complete UNIT-III:10				No. of classes taken:		

UNIT- IV: EARTH PRESSURE THEORIES AND RETAINING WALLS

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.	Rankine's earth pressure theory- Earth pressure at rest – Active and Passive earth pressures for cohesive soils	1	**15-09-2026**		**TLM1**	
2.	Rankine's earth pressure theory Earth pressure at rest – Active and Passive earth pressures for non-cohesive soils	1	**16-09-2026**		**TLM1**	
3.	Problems	1	**18-09-2026**		**TLM1**	
4.	Problems	1	**22-09-2026**		**TLM1**	
5.	Coulomb's earth pressure theory	1	**23-09-2026**		**TLM1**	
6.	Different types of Retaining Walls	1	**25-09-2026**		**TLM1**	
7.	Design principles of Cantilever and Counterfort Retaining walls.	1	**29-09-2026**		**TLM1**	
8.	Problems	1	**30-09-2026**		**TLM1**	
9.	Problems	1	**05-10-2026**		**TLM1**	
10.	Problems	1	**06-10-2026**		**TLM1**	
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT-V: SPECIAL FOUNDATIONS AND STABILITY OF SLOPES

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.	Caisson Foundation, Necessity of selection, Types of Caisson foundation	1	**07-10-2026**		**TLM1**	
2.	Design principles of Caisson foundation	1	**09-10-2026**		**TLM1**	
3.	Foundation in filled up grounds, Foundation on expansive soil	1	**12-10-2026**		**TLM1**	
4.	Use of under-reamed pile foundations	1	**13-10-2026**		**TLM1**	
5.	Introduction of Machine foundations.	1	**14-10-2026**		**TLM1**	
6.	Stability analysis of finite earth slopes	1	**16-10-2026**		**TLM1**	
7.	Factors of safety, Different conditions of slope stability analysis.	1	**27-10-2026**		**TLM1**	
8.	Taylor's stability number and its significance	1	**28-10-2026**		**TLM1**	
9.	Problems	1	**30-10-2026**		**TLM1**	
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 (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.RAMANA)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)
NAAC Accredited with CGPA of 3.20 on 4-point scale at 'A' Grade
NIRF-2022 (Positioned in the Band of 251-300 in the Engineering Category)
NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)
NBA Accredited under Tier-I (ASE, CE,CSE, EEE, ECE,IT & MECH)
Recognized as Scientific Industrial Research Organization(SIRO) by DSIR
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.
Department of Civil Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor: K HARISH KUMAR
Course Name & Code : ADVANCED CONSTRUCTION MANAGEMENT &23CE27
L-T-P Structure : **2-0-0** **Credits:** 2
Program/Sem/Sec : B.Tech, VII SEM, CE **A.Y.:** 2026-27

PREREQUISITE: Construction Management

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course aims to equip students with knowledge of quality and safety management practices in construction, including QA/QC systems, risk assessment, and safety audits. It develops skills in cost estimation, budgeting, and project control, along with basic economic analysis. The course also focuses on material and machinery management, covering procurement, inventory control, equipment selection, and maintenance. Further, it introduces Building Information Modelling (BIM) and modern design & project management tools. Additionally, it familiarizes students with smart sustainable construction techniques and green building practices, including emerging technologies and effective waste management.

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

CO1	Explore the quality assurance, quality control and construction safety methods (Understand -L2)
CO2	Prepare project estimates and perform cost control analysis. (Understand -L2)
CO3	Plan and manage construction materials and machinery efficiently. (Understand -L2)
CO4	Utilize BIM & Advanced Design Tools applications in planning, coordination and project management. (Understand -L2)
CO5	Summarize the principles of smart sustainable construction techniques and green building practices. (Understand -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	-	-	-	2	3	-	-	-	2	-	3	2
CO2	2	2	-	-	-	-	-	-	-	-	3	2	-	3
CO3	2	2	1	-	-	-	-	-	1	-	3	-	-	3
CO4	1	2	2	-	3	-	-	-	1	-	3	3	-	2
CO5	2	2	-	-	1	3	3	-	-	-	1	-	-	3

TEXTBOOKS:

T1 A.G.Madhavrao, D.S. Ramachandra Murthy –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: Quality and Safety Management

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	30/06/2026		**TLM2**	
2.	**Quality Management in Construction** Need for quality – Quality planning	1	01/07/2026		**TLM2**	
3.	Quality Assurance (QA) – Quality Control (QC) – Difference between QA and QC	1	03/07/2026		**TLM2**	
4.	Total Quality Management (TQM) – ISO 9001 standards - Quality audits.	2	07/07/2026 08/07/2026		**TLM2**	
5.	**Safety Management** – Introduction - Causes of accidents in construction	1	10/07/2026		**TLM2**	
6.	Hazard identification – Risk assessment – Safety planning –Safety training	1	14/07/2026		**TLM2**	
7.	Accident investigation and reporting – Safety audit – protocol.	1	15/07/2026		**TLM2**	
8.	Revision	1	17/07/2026		**TLM2**	
No. of classes required to complete UNIT-I: 09				**No. of classes taken:**		

UNIT-II: Cost Estimation and Control

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.	**Cost Estimation -** Introduction to project costing – Direct cost – Indirect cost – Fixed and variable cost	2	21/07/2026 22/07/2026		**TLM2**	
10.	Approximate estimate – Detailed estimate – Quantity take-off	1	24/07/2026		**TLM2**	
11.	Rate analysis – Bill of Quantities (BOQ)	1	28/07/2026		**TLM2**	
12.	**Cost Control** – Budgeting – Cash flow forecasting – Cost monitoring	1	29/07/2026		**TLM2**	
13.	Earned Value Management basics, Economic Analysis	1	31/07/2026		**TLM2**	
14.	Benefit Cost Ratio – Net Present Value – Internal Rate of Return	1	04/08/2026		**TLM2**	
15.	Break-even analysis – Payback period	1	05/08/2026		**TLM2**	
16.	Revision	1	07/08/2026		**TLM2**	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT-III: Material and Machinery Management

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.	**Material Management** – Material requirement planning – Procurement procedure	1	11/08/2026		**TLM2**	
18.	Vendor selection – Inventory control – EOQ – ABC analysis	1	14/08/2026		**TLM2**	
19.	Stores management – Material handling – Waste reduction	1	18/08/2026		**TLM2**	
20.	**Machinery Management** – Selection of construction equipment	1	19/08/2026		**TLM2**	
21.	Equipment planning – Productivity of machinery	1	21/08/2026		**TLM2**	
22.	Ownership cost – Operating cost – Depreciation	1	01/09/2026		**TLM2**	
23.	Maintenance management – Repair and replacement policy	1	02/09/2026		**TLM2**	

24.	Heavy equipment: Excavators, Cranes Rollers, Bulldozers, Mixers, Dumpers	1	08/09/2026		**TLM2**	
25.	Revision	1	09/09/2026		**TLM2**	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Introduction to BIM and Advanced Design Tools

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.	**BIM**: Introduction – Evolution from CAD to BIM - Need	1	11/09/2026		**TLM2**	
27.	Dimensions - Applications - Benefits and limitations.	1	15/09/2026		**TLM2**	
28.	**Advanced Design Tools**: Importance of software applications in civil engineering projects	1	16/09/2026		**TLM2**	
29.	Objectives, features, working principles and applications - **Autodesk – 3Ds Max**	1	18/09/2026		**TLM2**	
30.	Objectives, features, working principles and applications - **STAAD Pro – ETABS**	1	22/09/2026		**TLM2**	
31.	Objectives, features, working principles and applications– **SketchUp - Revit**	1	23/09/2026		**TLM2**	
32.	Objectives, features, working principles and applications Primavera / MS Project integration	1	25/09/2026		**TLM2**	
33.	Case studies.	1	29/09/2026		**TLM2**	
34.	Revision	1	30/09/2026		**TLM2**	
No. of classes required to complete UNIT-IV:09				**No. of classes taken:**		

UNIT-V: Smart Sustainable Construction and Green Buildings

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.	**Smart Sustainable Construction:** Introduction – Concept – Need for sustainable development in construction industry	1	06/10/2026		**TLM2**	
36.	Principles of green and smart construction. Smart Construction Technologies	1	07/10/2026		**TLM2**	
37.	IoT in construction – Smart sensors for SHM –AI&ML applications.	1	09/10/2026		**TLM2**	
38.	**Green building**: Introduction - concepts – Life cycle approach – Carbon footprint	1	13/10/2026		**TLM2**	
39.	Applications of low Energy Consumption Materials - Green Building Rating Systems: GRIHA	1	14/10/2026		**TLM2**	
40.	IGBC – LEED – Net Zero Energy Buildings concepts	1	16/10/2026		**TLM2**	
41.	Construction & Demolition waste management – Reduce, Reuse, Recycle	1	27/10/2026		**TLM2**	
42.	Segregation – Disposal methods – Case studies	1	28/10/2026		**TLM2**	
43.	Revision	1	30/10/2026		**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 No.	PO Statement
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (WK1 to WK4)
PO2	**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. (WK1 to WK4)
PO3	**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. (WK5)
PO4	**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. (WK8)
PO5	**Engineering Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 to WK6)
PO6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (WK9)
PO8	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	**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.

PO10	**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.
PO11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

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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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor :C.Rajamallu
Course Name & Code : Prestressed concretes(23CE28)
L-T-P Structure : 3-1-0 Credits : 3
Program/Sem/Sec : B.Tech.,CE.,VII-Sem., Sections- A A.Y : 2026-2027

PRE-REQUISITE: DRCS -I

COURSE EDUCATIONAL OBJECTIVES (CEOs):

1. Understand the basic concepts of Prestressing
2. Understand principle in various methods of pre stressing systems
3. Evaluate the losses in pre tensioned and post tensioned members
4. Analyze and design members subjected to flexure
5. Analyze and design members subjected to Shear and Torsion

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

CO 1	Describe the basic concepts and general mechanical behavior of prestressed concrete, available IS Codes, and various methods of prestressing. **(Remembering – L1)**
CO 2	Analyze the different losses of pre-stressing **(Apply-L3)**
CO 3	Design prestressed concrete beams under flexure. **(Apply-L3)**
CO 4	Design prestressed concrete beams under shear and torsion and interpret the relevant IS code provisions for prestressed concrete. **(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	-	-	1	-	-	-	-	-	1	1	-	2
CO2	1	1	3	-	-	1	-	-	1	-	-	1	1	-	1
CO3	1	1	3	-	-	1	-	-	1	-	-	1	1	-	1
CO4	1	1	3	-	-	1	-	-	1	-	-	1	1	-	1
CO5	1	1	1	-	-	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).

TEXT BOOKS:

T1 Krishnaraju N, "Prestressed Concrete", Tata McGraw Hill Publishing Co.,Ltd., New Delhi, 1995.

T2 Rajagopalan.N, "Prestressed Concrete",Narosa Publishing House, New Delhi, 2002.

T3 MC Sinha and SK Rai "Fundamentals of prestressed concretes " s chand and company Ltd.New Delhi, 2011

REFERENCE BOOKS:

R1 James R.Libby, "Modern Prestressed Concrete", Design principles and Construction methods - Van Standard Rainford Co., New York, 1977

R2 Lin.T.Y, & Ned.H.Burns, "Design of Prestressed Concrete Structures", John Wiley & Sons, New York, 1981.

R3 P.Dhayaratnam "Prestressed concrete structures" Oxford and IBH ,New, Delhi, 2007.

R4 Arthur H.Nilson "Design of Prestressed concretes" john wiley and sons,Newyark,1978

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Basic concepts of prestressing

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.	Advantages of Prestressed Concretes	1	29/6/2026		TLM2	
2.	Applications of Prestressed Concretes	1	30/6/2026		TLM2	
3.	High Strength Concrete	1	1/7/2026		TLM2	
4.	Permissible Stresses	1	2/7/2026		TLM2	
5.	Shrinkage, Creep, Deformation Characteristics	1	6/7/2026		TLM2	
6.	High strength Steel-Types, Strength	1	7/7/2026		TLM2	
7.	Permissible Stresses	1	8/7/2026		TLM2	
8.	Relaxation of Stress, Stress Corrosion	1	9/7/2026		TLM2	
9.	Durability, Fire Resistance	1	13/7/2026		TLM2	
10.	Cover Requirements	1	14/7/2026		TLM2	
11.	**Tutorial-1**	1	15/7/2026		TLM3	
No. of classes required to complete UNIT-I:11				No. of classes taken:11		

UNIT-II: Prestressing 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.	Introduction and Methods of prestressing	1	16/7/2026		TLM2	
2.	Tensioning devices,	1	20/7/2026		TLM2	
3.	Pre-tensioning Systems, Post tensioning Systems,	1	21/7/2026		TLM2	
4.	Basic Assumptions in Analysis of prestress and design	1	22/7/2026		TLM2	
5.	Analysis of prestress	1	23/7/2026		TLM2	
6.	Resultant Stresses at a section	1	27/7/2026		TLM2	
7.	Basic assumptions in analysis Prestress and design	1	28/7/2026		TLM2	
8.	Resultant stress at a section	1	29/7/2026		TLM2	
9.	pressure line- Concepts of load balancing	1	30/7/2026		TLM2	
10.	Stress in tendons, cracking moment	1	3/8/2026		TLM2	
11.	Tutorial -2	2	4/8/2026		TLM 3	
No. of classes required to complete UNIT-II:12				No. of classes taken:12		

UNIT-III: Losses of prestressing

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 losses of prestress	1	27/7/2026		TLM2	
2.	Loss of Pre-stress in pre-tensioned	1	5/8/2026		TLM2	
3.	Loss of Pre-stress in post tensioned members	1	6/8/2026		TLM2	
4.	Problems on various elastic tendons	1	10/8/2026		TLM2	
5.	Elastic shortage of concrete	1	11/8/2026		TLM2	
6.	Problems on elastic shortage concrete	1	12/8/2026		TLM2	

7.	Problems on elastic shortage concrete	1	13/8/2026		TLM2	
8.	Tutorial -3	1	17/8/2026		TLM2	
9.	Shrinkage of concrete ,Problems on shrinkage of concrete	1	18/8/2026		TLM2	
10.	Creep of concrete, Relaxation of steel	1	19/8/2026		TLM2	
11.	Problems on both the cases	1	20/8/2026		TLM2	
12.	Frictional losses and problems	1	31/8/2026		TLM2	
13.	Problems on Anchorage slip	1	1/9/2026		TLM3	
14.	Differential Shrinkage-Bending Of Members	1	2/9/2026		TLM2	
15.	Total losses allowed for design of pretensioning & Post tensioning	1	3/9/2026		TLM2	
16.	Losses problems	1	7/9/2026		TLM2	
No. of classes required to complete UNIT-III:16				No. of classes taken:16		

UNIT-IV :Design for flexural resistance

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.	Types of flexural failures	1	8/9/2026		TLM2	
2.	Problems on flexural failure	1	9/9/2026		TLM2	
3.	Code Procedures	1	10/9/2026		TLM2	
4.	Tutorial -5	2	15/9/2026		TLM2	
5.	Design of sections for flexure	1	16/9/2026		TLM2	
6.	Problems	1	17/9/2026		TLM2	
7.	Control of deflections, factors influencing	1	21/9/2026		TLM3	
8.	Prediction of short term deflection	1	22/9/2026		TLM2	
9.	Prediction of long term deflection	1	23/9/2026		TLM2	
10.	Tutorial-6	2	24/9/2026		TLM3	
No. of classes required to complete UNIT-IV:12				No. of classes taken:		

UNIT-V :Design for Shear and Torsion

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.	Shear and principles of stresses	1	28/9/2026		TLM2	
2.	Codal provisions	1	29/9/2026		TLM2	
3.	Principal of stresses	1	30/9/2026		TLM2	
4.	Problems in principal stress and shear	1	1/10/2026		TLM2	
5.	Design of shear reinforcement	1	5/10/2026		TLM2	
6.	Design for torsion,	1	6/10/2026		TLM2	
7.	Design for combined bending,Shear and Torsion	1	7/10/2026		TLM2	
8.	Tutorial-7	2	8/10/2026		TLM3	
9.	Transfer of Prestress in pre tensioned members	1	12/10/2026		TLM2	
10.	Transmission length, bond stress, end zone reinforcement	1	13/10/2026		TLM2	
11.	Magnel method, Problems, Anchorage zone stresses in post tensioned members	1	14/10/2026		TLM2	
12.	Anchorage zone reinforcement problems, Analysis of stresses	1	15/10/2026		TLM2	
13.	Stress distribution in end block	1	26/10/2026		TLM2	
14.	TUTORIAL-8	2	27/10/2026		TLM3	
15.	REVISION CLASSES		28/10/2026 to 11/11/2026			
No. of classes required to complete UNIT-V:16				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): 75% best and 25% least	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	An ability to apply knowledge of mathematics, science, and engineering for engineering applications of national and international requirements
PO 2	An ability to identify-, formulate-, and analyze- complex engineering problems
PO 3	An ability to design the experiments, analyze and interpret the data
PO 4	An ability to use the techniques, skills, resources and modern engineering tools necessary to solve civil engineering problems
PO 5	An ability to assess reasoning informed by contextual knowledge to assess health, safety, legal and cultural issues relevant to professional engineering practice
PO 6	An ability to demonstrate the knowledge needed for sustainable development
PO 7	An ability to apply ethical principles and responsibilities in engineering practice
PO 8	An ability to function effectively as an individual and as a team member or leader in multi disciplinary settings
PO 9	An ability to communicate effectively
PO 10	An ability to demonstrate knowledge of engineering and management principles and apply to one's own work either as a member or as a team leader in managing projects
PO 11	An ability to engage in life-long learning to keep abreast with technological changes
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	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.
PSO 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.
PSO 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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
DrC.Rajamallu	DrC.Rajamallu	DrC.Rajamallu	Dr.KV.Ramana

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : P. KEERTHI
Course Name & Code : WATERSHED MANAGEMENT & 23CE35
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE/VII-Sem., A.Y : 2026-27

Pre-requisites: Applied Mechanics, Mechanics of Fluids, Hydraulics and Hydraulic Machinery Systems, Hydrology and Irrigation Engineering

Course Educational Objective: This course is designed to understand the concept of watershed management, watershed characteristics and concepts of watershed modelling.

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

CO1	Determine watershed parameters and analyse watershed characteristics to take appropriate management action. **(Understand-L2)**
CO2	Quantify soil erosion and design control measures. **(Understand-L2)**
CO3	Recommend suitable harvesting techniques for better watershed management. **(Understand-L2)**
CO4	Describe the land grading techniques for proper land management. **(Understand-L2)**
CO5	Discuss the appropriate models for watershed management. **(Understand-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	-	-	1	-	2	-	-	-	-	1	-	1
CO2	3	3	2	1	1	-	2	-	-	-	-	1	-	1
CO3	3	2	3	1	2	-	3	-	-	-	-	1	-	1
CO4	2	2	2	-	1	-	3	-	-	-	-	1	-	1
CO5	2	3	1	2	3	-	2	-	-	-	-	1	-	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. M.M Das and M.D Saikia, "Watershed Management", PHI Learning Pvt. Ltd, 2012.
2. JVS Murthy, "Watershed Management", New Age International Publishers, 2017.

REFERENCES:

1. VVN Murthy, Madan K. Jha "Land and Water Management Engineering", Kalyani Publications, 2013.
2. R. Suresh, "Watershed Hydrology" Standard Publishers, 1997.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: WATER SHED CHARACTERISTICS

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,PO	1	29.06.2026		TLM1	
2.	Concept of watershed development	1	30.06.2026		TLM1	
3.	Objectives and need for watershed development	1	01.07.2026		TLM1	
4.	Integrated and multidisciplinary approach for watershed management	1	03.07.2026		TLM1	
5.	Characteristics of Watersheds	2	06.07.2026 & 07.07.2026		TLM1	
6.	Socio-economic characteristics	1	08.07.2026		TLM1	
7.	Watershed delineation	1	10.07.2026		TLM1	
8.	Stream order (Strahler method)	1	13.07-2026		TLM1	
9.	Drainage denisty	1	14.07.2026		TLM1	
10.	Watershed slope	1	15.07.2026		TLM1	
11.	Land use / Land cover	1	17.07.2026		TLM1	
12.	Basic watershed data collection	1	20.07.2026		TLM2	
13.	Watershed boundaries – case study	1	21.07.2026		TLM2	
No. of classes required to complete UNIT-I: 14				No. of classes taken:		

UNIT-II: PRINCIPLES OF EROSION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Types of erosion	1	22.07.2026		TLM1	
15.	Sheet erosion	1	24.07.2026		TLM1	
16.	Rill erosion	1	27.07.2026		TLM1	
17.	Gully erosion	1	28.07.2026		TLM1	
18.	Stream bank erosion	1	29.07.2026		TLM1	
19.	Causes of erosion	1	31.07.2026		TLM1	
20.	Factors affecting erosion	1	03.07.2026		TLM1	

21.	Estimation of soil loss due to erosion- USLE	2	04.08.2026 & 05.08.2026		TLM1	
22.	Numerical problems	2	07.08.2026 & 10.08.2026		TLM1	
23.	Measures to Control Erosion - Contour techniques	1	11.08.2026		TLM1	
24.	Ploughing, Furrowing	1	12.08.2026		TLM1	
25.	Trenching, Bunding	1	14.08.2026		TLM1	
26.	Terracing, Gully control	1	17.08.2026		TLM1	
27.	Check dams	1	18.08.2026		TLM1	
28.	Rock-fill dams	1	19.08.2026		TLM1	
29.	Brushwood dams & Gabions	1	21.08.2026		TLM1	
No. of classes required to complete UNIT-II: 18				No. of classes taken:		

UNIT-III: WATER HARVESTING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Techniques of rainwater harvesting	1	31.08.2026		TLM1	
31.	Rooftop harvesting	1	01.09.2026		TLM1	
32.	Surface flow harvesting	1	02.09.2026		TLM1	
33.	Subsurface flow harvesting	1	07.09.2026		TLM1	
34.	Stop dams	1	08.09.2026		TLM1	
35.	Farm ponds	1	09.09.2026		TLM1	
36.	Percolation tanks	1	11.09.2026		TLM1	
37.	Dugout ponds	1	15.09.2026		TLM1	
38.	Andhra Pradesh water harvesting projects	1	16.09.2026		TLM2	
39.	Groundwater recharge	1	18.09.2026		TLM1	
No. of classes required to complete UNIT-III: 10				No. of classes taken:		

UNIT- IV: LAND MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	Land use and Land capability classification	1	21.09.2026		TLM1	
41.	Forest land management	1	22.09.2026		TLM1	
42.	Agricultural land management	1	23.09.2026		TLM1	
43.	Grassland management	1	25.09.2026		TLM1	
44.	Wild land management	1	28.09.2026		TLM1	
45.	Land grading operation	1	29.09.2026		TLM1	
46.	Land degradation in India	1	30.09.2026		TLM2	
47.	Reclamation of saline and alkaline soils	1	05.10.2026		TLM1	
48.	Salinity problems in coastal Andhra	1	06.10.2026		TLM2	
49.	Sustainable agriculture	1	07.10.2026		TLM2	
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT-V: WATERSHED MODELLING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50.	Data of watershed for modelling	2	09.10.2026 & 12.10.2026		TLM1	
51.	Application of watershed models	1	13.10.2026		TLM1	
52.	Comparison of watershed models	1	14.10.2026		TLM1	
53.	Model Calibration	1	16.10.2026		TLM1	
54.	Validation	1	26.10.2026		TLM1	
55.	Advances in watershed models	1	27.10.2026		TLM2	
56.	Modern tools – Introduction to GIS	1	28.10.2026		TLM2	
57.	Remote Sensing applications	1	29.10.2026		TLM2	
58.	Climate change impacts on watersheds	1	30.10.2026		TLM1	
59.	Revision	1	31.10.2026		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 (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
(P. KEERTHI)	(P. KEERTHI)	(J. RANGAIAH)	(Dr.K.V.RAMANA)

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 ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.MB Chakravarthy
Course Name & Code : Utilization of Electrical Energy & 20EE83
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech, CSE-C., VII-Sem. A.Y : 2026-27

Pre-requisites : Basic Electrical Engineering

Course Educational Objective: This course enables the student to familiarize with characteristics of various drives, comprehend the different issues related to heating, welding and illumination.

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

CO 1	Understand mechanism of electric heating and electric welding**(Understanding –L2)**
CO 2	Analyze performance of various lighting schemes**(Understanding –L2)**
CO 3	Analyze the performance of electric drive systems**(Understanding –L2)**
CO 4	Illustrate the different schemes of traction and its main components **(Understanding –L2)**
CO5	Understand various tariff methods and power factor improvement techniques **(Understanding –L2)**

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 a	PSO b	PSO c
CO1	2	2	2												
CO2	2	2	2								2				
CO3	2	2	2												
CO4	2	2	2								2				
CO5	2	2	2								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: C.L.Wadhwa "Generation, Distribution and Utilization of Electrical energy, New Age International Publishers,3rd Edition,2015.

T2: N.V.Suryanarayana "Utilization of electric power including electric drives and electric traction, New age international publishers New Delhi,2nd edition 2014.

REFERENCE BOOKS:

R1: V K Mehta & Rohit Mehta, "Principles of Power System", Revised Edition, S.Chand Publications, 2022.

R2: A.Chakrabarthi, M.L.Soni, P.V.Gupta and U.S.Bhatnagar, "A Textbook on Power system Engineering", Dhanpat Rai Publishing Company (P) Ltd., 2008.

Part - B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : ELECTRIC HEATING &WELDING

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, CEO's &CO's	1	30-06-2026		TLM1	
2.	Advantages &applications of Electric heating	1	02-07-2026		TLM2	
3.	Classification of electric heating	1	03-07-2026		TLM2	
4.	Resistance heating	1	04-07-2026		TLM2	
5.	Arc heating	1	07-07-2026		TLM2	
6.	Induction heating	1	09-07-2026		TLM2	
7.	dielectric heating	1	10-07-2026		TLM2	
8.	Causes of failures of heating elements	1	11-07-2026		TLM2, TLM6	
9.	Materials for heating elements	1	14-07-2026		TLM2, TLM6	
10.	Requirement of good heating material	1	16-07-2026		TLM2	
11.	ARC Furnace	1	17-07-2026		TLM2, TLM4	
12.	Resistance welding	1	18-07-2026		TLM2	
13.	Spot welding, seam welding	1	21-07-2026		TLM2, TLM4	
14.	,Arc welding	1	23-07-2026		TLM2, TLM4	
15.	Comparison between AC and DC welding	1	24-07-2026		TLM2, TLM6	
No. of classes required to complete UNIT-I : 15					No. of classes taken:	

UNIT-II : ILLUMINATION 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
16	Introduction	1	25-07-2026		TLM1	
17	Nature of light	1	28-07-2026		TLM2	
18	Laws of illumination	1	30-07-2026		TLM1	
19	Laws of illumination	1	31-07-2026		TLM1	
20	Lighting schemes, sources of light	1	01-08-2026		TLM2	
21	Fluorescent Lamp, CFL and LED	1	04-08-2026		TLM1, TLM4	
22	Sodium Vapor	1	06-08-2026		TLM1,	

	Lamp				TLM4	
23	Neon lamps	1	07-08-2026		TLM1, TLM2	
24	mercury vapor lamps	1	08-08-2026		TLM1, TLM2	
25	Comparision between tungsten &fluroscent tubes	1	11-08-2026		TLM1, TLM2	
26	Requirements of good lighting	1	13-08-2026		TLM2, TLM6	
27	Street lighting	1	14-08-2026		TLM2	
28	Assignment/Quiz	1	18-08-2026		TLM3	
No. of classes required to complete UNIT-II : 13					No. of classes taken:	

UNIT-III: ELECTRIC DRIVES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29	Introduction	1	20-08-2026		TLM2	
30	Elements of drive, advantages	1	21-08-2026		TLM2	
31	Factors affecting selection of motor	1	22-08-2026		TLM2	
32	Types of loads	1	22-08-2026		TLM2	
33	Industrial applications	1	01-09-2026		TLM1, TLM2	
34	Transient Characteristics of drives	1	03-09-2026		TLM1, TLM2	
35	Steady state characteristics of drives	1	05-09-2026		TLM1, TLM2	
36	Size of motor, Load Equalization	1	08-09-2026		TLM1, TLM2	
37	Assignment/Quiz	1	10-09-2026		TLM3	
No. of classes required to complete UNIT-III : 09					No. of classes taken:	

UNIT-IV : ELECTRIC TRACTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38	Introduction	1	11-09-2026		TLM2	
39	Requirement of an ideal traction system	1	12-09-2026		TLM2	
40	Supply system for electric traction	1	15-09-2026		TLM2	
41	Train movement	1	17-09-2026		TLM2	
42	mechanism of train movement	1	18-09-2026		TLM2	
43	electric traction	1	19-09-2026		TLM1, TLM2	
44	Modern trends in electric traction,	1	22-09-2026		TLM2, TLM6	
45	Automation in traction	1	24-09-2026		TLM2,	

					TLM6	
46	Speed time curves for different services	1	25-09-2026		TLM1, TLM2	
47	Trapezoidal speed time curves	1	26-09-2026		TLM1, TLM2	
48	Quadrilateral speed time curves	1	29-09-2026		TLM1, TLM2	
49	Problems on train movement	1	01-10-2026		TLM2, TLM6	
50	Assignment/quiz	1	03-10-2026		TLM3	
No. of classes required to complete UNIT-IV : 13					No. of classes taken:	

UNIT-V: TARIFF AND POWER FACTOR IMPROVEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	**Teaching Learning Methods**	HOD Sign Weekly
51	Desirable characteristics	1	06-10-2026		TLM2	
52	Types of Tariff, Flat rate, Block-rate	1	08-10-2026		TLM2	
53	KVA maximum demand	1	09-10-2026		TLM1, TLM2	
54	Time of Day tariff	1	10-10-2026		TLM1, TLM2	
55	Disadvantages of low power factor, Advantages of improved p.f	1	13-10-2026		TLM1, TLM2	
56	Improvement devices , Power factor improvement using static capacitor	1	15-10-2026		TLM1, TLM2	
57	Most economical power factor	1	16-10-2026		TLM2	
58	Location of power factor improvement devices from consumer	1	17-10-2026		TLM1, TLM2	
59	Numericals on power factor improvement.		27-10-2026		TLM1, TLM2	
60	Assignment/quiz	1	29-10-2026		TLM3	
61	REVISION	1	30-10-2026		TLM2	
No. of classes required to complete UNIT-V : 11					No. of classes taken:	

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
57	Economic aspects in utilization of electrical energy	1	16-10-2026		TLM2, TLM6	

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 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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	29-06-2026	22-08-2026	8W
I Mid Examinations	24-08-2026	29-08-2026	1 W
II Phase of Instructions	31-08-2026	17-10-2026	7 W
Dussehra Holidays	19-10-2026	24-10-2026	1 W
II Phase of Instructions Contd.	26-10-2026	31-10-2026	1 W
II Mid Examinations	02-11-2026	07-11-2026	1 W
Preparation and Practicals	09-11-2026	14-11-2026	1 W
Semester End Examinations	16-11-2026	28-11-2026	2 W

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 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):

PSO1: To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.

PSO2: To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.

PSO3: To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Dr.MB Chakravarthy	Dr.B.Pangedaiah	Dr.G.Nageswara Rao	Dr. P. Sobha Rani
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)
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NIRF-2022 (Positioned in the Band of 251-300 in the Engineering Category)
NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)
NBA Accredited under Tier-I (ASE, CE,CSE, EEE, ECE,IT & MECH)
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L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.
Department of Civil Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor: K HARISH KUMAR, B. RAMAKRISHNA, Dr. K.V.RAMANA
Course Name & Code : **STRUCTURAL ANALYSIS AND DESIGN LABORATORY USING ETABS, 23CES5**
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : B.Tech, VII SEM, CE **A.Y.:** 2026-27

PREREQUISITE: STAAD Pro

COURSE EDUCATIONAL OBJECTIVES (CEOs): The students completing the course are expected to

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

CO1	Understand and apply the fundamentals of structural modelling, load assignment and analysis of RCC buildings using ETABS.
CO2	Analyse building structures under dead load, live load, seismic load and wind load conditions using relevant IS Codes and interpret structural behaviour.
CO3	Design RCC structural components such as beams, columns, slabs and shear walls based on analysis results for safe and economical construction.
CO4	Prepare structural analysis reports, design documentation and engineering interpretations using ETABS software for practical civil engineering applications.

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

References: ETABS manual **prepared by Civil Engineering Department**

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, Subject	1	29/06/2026		TLM2	
2.	Introduction to ETABS Interface – Demo & practice	3	02/07/2026		TLM2	
3.	Modelling of G+3 RCC Building-Class	1	06/07/2026		TLM2	
4.	Modelling of G+3 RCC Building-Practice	3	09/07/2026		TLM2	

5.	Assignment of Material and Section Properties and Application of Loads - Class	1	13/07/2026		**TLM2**	
6.	Assignment of Material and Section Properties and Application of Loads - Practice	3	16/07/2026		**TLM2**	
7.	Linear Static Analysis of Building - Class	1	20/07/2026		**TLM2**	
8.	Linear Static Analysis of Building - Practice	3	23/07/2026		**TLM2**	
9.	Seismic Analysis Using Equivalent Static Method - Class	1	27/07/2026		**TLM2**	
10.	Seismic Analysis Using Equivalent Static Method - Practice	3	30/07/2026		**TLM2**	
11.	Wind Load Analysis of Building - Class	1	03/08/2026		**TLM2**	
12.	Wind Load Analysis of Building - Practice	3	06/08/2026		**TLM2**	
13.	Design of RCC Beams – Theory Class	1	10/08/2026		**TLM2**	
14.	Design of RCC Beams - Practice	3	13/08/2026		**TLM2**	
15.	Design of RCC Columns – Theory Class	1	17/08/2026		**TLM2**	
16.	Design of RCC Columns - Practice	3	20/08/2026		**TLM2**	
17.	Revision	1	31/08/2026		**TLM2**	
18.	Practice	3	03/09/2026		**TLM2**	
19.	Effect of Shear Walls on Building Behaviour – Theory Class	1	07/09/2026		**TLM2**	
20.	Effect of Shear Walls on Building Behaviour - Practice	3	10/09/2026		**TLM2**	
21.	Practice	3	17/09/2026		**TLM2**	
22.	Analysis of Soft Storey Building - Theory Class	1	21/09/2026		**TLM2**	
23.	Analysis of Soft Storey Building - Practice	3	24/09/2026		**TLM2**	
24.	Analysis of Flat Slab Building – Theory Class	1	28/09/2026		**TLM2**	
25.	Analysis of Flat Slab Building – Practice	3	01/10/2026		**TLM2**	
26.	Preparation of Design Report	1	05/10/2026		**TLM2**	
27.	Preparation of Design Report	3	08/10/2026		**TLM2**	
28.	Revision	1	12/10/2026		**TLM2**	
29.	Repetition Lab	3	15/10/2026		**TLM2**	
30.	Revision	1	26/10/2026		**TLM2**	
31.	Internal Exam	3	29/10/2026		**TLM2**	

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 Examination (SEE)	**70**
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

PO No.	PO Statement
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (WK1 to WK4)
PO2	**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. (WK1 to WK4)
PO3	**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. (WK5)
PO4	**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. (WK8)
PO5	**Engineering Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 to WK6)
PO6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (WK9)
PO8	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	**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.

PO10	**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.
PO11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

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			

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

PART-A

Name of Course Instructor	: J.Rangaiah	
Course Name & Code	: Constitution of India (23MC05)	
L-T-P Structure	: 3-0-0	Credits : 3
Program/Sem/Sec	: CIVIL., VII-Sem.	A.Y : 2026-27

Prerequisite: Nil

Course Objectives: The main objectives of the course are to

1. To make students understand the historical background and philosophy of the Indian Constitution.
2. To make students acquire knowledge of Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties.
3. To make students understand the structure, powers, and functions of the Legislature, Executive, and Judiciary.
4. To make students analyse the role and functioning of local self-government institutions and grassroots democracy.
5. To make students understand the role of the Election Commission and constitutional bodies for the welfare of marginalized sections.

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

CO1:	Explain the history, philosophy, and salient features of the Indian Constitution. L2)
CO2:	Describe Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties. (L2)
CO3:	List the powers and functions of the Legislature, Executive, and Judiciary. (L1)
CO4:	Interpret the structure and functioning of local administration and Panchayat Raj institutions. (L2)
CO5:	Explain the role of the Election Commission and welfare institutions for SC/ST/OBC and women. (L2)

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

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

Text Books:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
2. Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar 2015

Reference Books:

1. Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014

PART-B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT–I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION:

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.	History,	1	02-07-26		TLM2	CO1	T1	
2.	Drafting Committee, (Composition & Working)	1	03-07-26		TLM2	CO1	T1	
3.	Preamble,	1	09-07-26		TLM2	CO1	T1	
4.	Preamble,	1	10-07-26		TLM2	CO1	T1	
5.	Salient Features	1	16-07-26		TLM2	CO1	T1	
6.	Salient Features	1	17-07-26		TLM2	CO1	T1	
No. of classes required to complete UNIT-I				No. of classes taken:				

UNIT–II: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES:

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.	Fundamental Rights	1	23-07-26		TLM2	CO2	T1	
2.	Right to Equality, Right to Freedom	1	24-07-26		TLM2	CO2	T1	
3.	Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights,	1	30-07-26		TLM2	CO2	T1	
4.	Right to Constitutional Remedies,	1	31-07-26		TLM2	CO2	T1	
5.	Directive Principles of State Policy	1	06-08-26		TLM2	CO2	T1	
6.	Fundamental Duties.	1	07-08-26		TLM2	CO2	T1	
No. of classes required to complete UNIT-II				No. of classes taken:				

UNIT–III: ORGANS OF GOVERNANCE:

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.	Parliament, Composition,	1	13-08-26		TLM2	CO3	T1	
2.	Qualifications and Disqualifications,	1	14-08-26		TLM2	CO3	T1	
3.	Powers and Functions,	1	20-08-26		TLM2	CO3	T1	
4.	President, Governor, Council of Ministers	1	21-08-26		TLM2	CO3	T1	
5.	Judiciary, Appointment and Transfer of Judges,	1	03-09-26		TLM2	CO3	T1	
6.	Qualifications, Powers and Functions	1	10-09-26		TLM2	CO3	T1	
No. of classes required to complete UNIT-III				No. of classes taken:				

UNIT–IV: LOCAL ADMINISTRATION:

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.	District's Administration head: Role and Importance,	1	11-09-26		TLM2	CO4	T1	
2.	Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation,	1	17-09-26		TLM2	CO4	T1	
3.	Panchayati raj: Introduction, PRI: Zila Panchayat, Elected officials and their roles, CEO	1	18-09-26		TLM2	CO4	T1	
4.	ZilaPachayat: Position and role,	1	24-09-26		TLM2	CO4	T1	
5.	Block level: Organizational Hierarchy (Different departments),	1	25-09-26		TLM2	CO4	T1	
6.	Village level: Role of Elected and Appointed officials, Importance of grass root democracy	1	01-10-26		TLM2	CO4	T1	
No. of classes required to complete UNIT-IV				No. of classes taken:				

UNIT–V: ELECTION COMMISSION:

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.	Election Commission: Role	1	8-10-26		TLM2	CO5	T1	
2.	Election Commission: Functioning,	1	9-10-26		TLM2	CO5	T1	
3.	Chief Election Commissioner	1	15-10-26		TLM2	CO5	T1	
4.	Election Commissioners,	1	16-10-26		TLM2	CO5	T1	

5.	State Election Commission: Role and Functioning,	1	29-10-26		TLM2	CO5	T1	
6	Institute and Bodies for the welfare of SC/ST/OBC and women.	1	30-10-26		TLM2	CO5	T1	
No. of classes required to complete UNIT-V				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	29-06-2026	22-08-2026	8 W
I Mid Examinations	24-08-2026	29-08-2026	1 W
II Phase of Instructions	31-08-2026	31-10-2026	8 W
II Mid Examinations	02-11-2026	07-11-2026	1 W
Preparation and Practical's	09-11-2026	14-11-2026	1 W
Semester End Examinations	16-11-2026	28-11-2026	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.
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