LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : P Mohana Ganga Raju
Course Name & Code : Estimation & Quantity Surveying-17CE28
L-T-P Structure : 2-2-0 Credits : 3
Program/Sem/Sec : B.Tech., CE., VII-Sem., Sections- A A.Y : 2022-2023

PRE-REQUISITE: Construction Management, DRCS-I, DRCS-II, Transportation Engineering-I, Transportation Engineering–II, Building Materials and Construction, and Foundation Engineering.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course aims to deal with the basic principles of estimating the quantities in building, roads and canals. The course also provides details about the procedures and practices for writing specifications, preparation of analysis of rates and procedural aspects of valuating the property.

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

CO 1	**Estimate** the quantities for various types of structures.
CO 2	**Calculate** the quantities of different items in buildings and roads.
CO 3	**Compute** the quantity estimate for canals.
CO 4	**Prepare** and write specifications and rate analysis.
CO 5	**Perform** valuation of the property as per the prevailing regulations.

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	1	-	-	3	-	-	-	-	-	-	-	-	3	1
CO2	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	1	-	-	-	3	-	-	2	-	-	-	-	1	2	-
CO4	-	-	1	-	-	-	2	-	-	-	-	-	-	-	1
CO4	-	1	-	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 B.N. Dutta "Estimating & Costing in Civil Engineering", U. B. S. Publishers & Distributors, New Delhi.2002

T2 S . C. Rangwala "Valuation of Real properties", Charotar Publishing House, 9th Edition,2015.

REFERENCE BOOKS:

R1 M Chakraborthy, "Estimating, Costing Specification and Valuation", 2006

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: ESTIMATE OF 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
1.	CO's and PO's	1	11-07-2022		**TLM2**	
2.	Introduction to Estimation & methods of Estimating	1	12-07-2022			
3.	Main items of work, Units of Measurements	1	14-07-2022		**TLM2**	
4.	Different methods of Estimating	1	15-07-2022		**TLM2**	
5.	Deduction for openings, Degree of accuracy	1	18-07-2022		**TLM2**	
6.	Methods of building estimates, Individual wall method	1	19-07-2022		**TLM2**	
7.	Individual wall method problems	2	21-07-2022, 22-07-2022		**TLM2**	
8.	Centre line method procedure & problems	1	25-07-2022		**TLM2**	
9.	Arch masonry calculations	1	26-07-2022		**TLM2**	
10.	Estimate of steps	1	28-07-2022		**TLM2**	
11.	Estimate of a building from line plans	1	29-07-2022		**TLM2**	
No. of classes required to complete UNIT-I: 12				No. of classes taken:		

UNIT-II: ESTIMATE OF RCC WORKS AND ROADS

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.	Estimate of RCC Works introduction	1	01-08-2022		**TLM2**	
2.	Standard hooks & cranks in RCC	1	02-08-2022		**TLM2**	
3.	Estimate of RCC slab	1	04-08-2022		**TLM2**	
4.	Estimate of RCC Beam	1	05-08-2022		**TLM2**	
5.	Estimate of RCC T-Beam Slab	1	08-08-2022		**TLM2**	
6.	Estimate of RCC column with Foundation	2	11-08-2022, 12-08-2022		**TLM2**	
7.	Estimate of Pitching of slopes	1	16-08-2022		**TLM2**	
8.	Estimate of Earth work of road from longitudinal sections	2	18-08-2022, 22-08-2022		**TLM2**	
9.	Estimate of earth work in hill roads	2	23-08-2022, 25-08-2022		**TLM2**	
No. of classes required to complete UNIT-II:12				No. of classes taken:		

UNIT-III: CANAL ESTIMATE - SPECIFICATIONS

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.	Canal estimate-Earth work in canals different cases	1	26-08-2022		**TLM2**	
2.	Estimate of earth work in irrigation channels	1	29-08-2022		**TLM2**	
3.	Estimate of earth work in	1	30-08-2022		**TLM2**	

	irrigation channels					
4.	Purpose and method of writing specifications	1	01-09-2022		**TLM2**	
5.	General specifications & Detailed specifications for Brick work	1	02-09-2022		**TLM2**	
6.	CRT classes		05-09-2022 To 17-09-2022			
7.	Mid-1		19-09-2022 To 26-09-2022			
8.	Detailed specifications for RCC	1	27-09-2022		**TLM2**	
9.	Detailed specifications for Plastering	1	29-09-2022		**TLM2**	
10.	Detailed specifications for Mosaic flooring	1	30-09-2022		**TLM2**	
11.	Detailed specifications for R.R Stone masonry	1	10-10-2022		**TLM2**	
No. of classes required to complete UNIT-III: 9				No. of classes taken:		

UNIT-IV: ANALYSIS OF RATES- PWD ACCOUNTS AND PROCEDURE OF WORKS

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.	Analysis of rates-task or Out-turn work, Labour & material required for different works	1	11-10-2022		**TLM2**	
2.	Preparing analysis of rates for Concrete & RCC works	1	13-10-2022		**TLM2**	
3.	Preparing analysis of rates for Brick work in foundation & super structure	1	14-10-2022		**TLM2**	
4.	Preparing analysis of rates for Plastering	1	17-10-2022		**TLM2**	
5.	Preparing analysis of rates for CC flooring & White washing	1	18-10-2022		**TLM2**	
6.	Organization of Engineering department; Work charged establishment	1	20-10-2022		**TLM2**	
7.	Contract; Tender; Tender notice; Tender Schedule	1	21-10-2022		**TLM2**	
8.	Earnest money; Security money; Measurement book	1	25-10-2022		**TLM2**	
9.	Administrative approval; Technical sanction	1	27-10-2022		**TLM2**	
10.	Plinth area; Floor Area; Carpet area	1	28-10-2022		**TLM2**	
11.	Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate	1	31-10-2022		**TLM2**	
No. of classes required to complete UNIT-IV: 11				No. of classes taken:		

UNIT-V: VALUATION

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.	Cost, Price & value, Methods of valuation	1	01-11-2022		**TLM2**	
2.	Outgoings, depreciation	1	03-10-2022		**TLM2**	
3.	Methods for estimating cost depreciation	2	04-10-2022, 07-10-2022		**TLM2**	
4.	Valuation of building & Gross income, Net income, Scrap value	2	08-10-2022, 10-10-2022		**TLM2**	
5.	Salvage value, Obsolescence & Life of structures, sinking fund	2	11-10-2022, 14-10-2022		**TLM2**	
6.	Capitalized value, Years purchase, Standard rent	2	15-10-2022, 17-10-2022		**TLM2**	
7.	Process of fixing standard rent, Annuity & Mortgage	1	18-10-2022		**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

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor (P. Mohanaganga Raju)

Module Coordinator (B. Ramakrishna)

HOD (Dr. V. Ramakrishna)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (Autonomous)
L.B.REDDY NAGAR, MYLAVARAM-521 230, A.P, INDIA
DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	**:**	B.Tech., VII-Sem., CIVIL
ACADEMIC YEAR	**:**	2022-23
COURSE NAME & CODE	**:**	R S AND GIS APPLICATIONS (17CE29)
L-T-P STRUCTURE	**:**	2-2-0
COURSE CREDITS	**:**	3
COURSE INSTRUCTOR	**:**	J.Rangaiah
COURSE COORDINATOR	**:**	J.Rangaiah
PRE-REQUISITE	**:**	Nil

Course Educational Objective:

The course is designed to understand the techniques of Remote Sensing and GIS Technology for civil engineering applications.

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

CO1: Interpret the concepts of Photogrammetry and its applications such as determination of heights of objects on terrain.
CO2: Illustrate the Electromagnetic spectrum and utilize the energy interactions of EMR with atmosphere and earth surface features for GIS data generation.
CO3: Analyze the methods of map projections and understand coordinate systems on GIS Software packages to produce high resolution thematic maps.
CO4: Apply the concepts of vector and raster data model for representation of topological earth features and its importance.
CO5: Apply the RS & GIS techniques for solving civil engineering applications

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

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

BOS APPROVED TEXT BOOKS:

T1 S S Manugula, "Photogrammetry, GIS & Remote Sensing" Ebooks2go Inc, 2018.
T2 Kang – Tsung Chang, "Introduction to geographic information system", Tata McGraw-Hill Education Private Limited, 2007.

BOS APPROVED REFERENCE BOOKS:

R1 Sujit Choudhury, Deepankar Chakrabarti, Suchandra Choudhury, "An Introduction to Geographic Information Technology" I.K. International Publishing House Pvt. Ltd. 2009.

R2 Shivangi Somvanshi, Maya Kumari, "A Introduction to Remote Sensing and Its Applications", S.K. Kataria & Sons 2014.

R3 Basudeb Bhatta, "Remote sensing and GIS" Oxford University press, 2011.

R4 S. Kumar, "Basics of Remote sensing and GIS", Laxmi Publications, 2016.

R5 K Elangovan, "GIS Fundamentals, Applications and Implementations" New India Publishing Agency, 2006.

R6 Remote sensing and Geographical Information Technology, NPTEL video lectures and web notes

COURSE DELIVERY PLAN (LESSON PLAN): Civil

UNIT-I: INTRODUCTION TO PHOTOGRAMMETRY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Photogrammetry	1	11/07/2022		TLM-2	CO1	T1	
2.	Principle and types of aerial photograph	1	13/07/2022		TLM-2	CO1	T1	
3.	Geometry of vertical aerial photograph	1	14/07/2022		TLM-2	CO1	T1	
4.	Scale and height measurement on single vertical aerial photograph	1	16/07/2022		TLM-2	CO1	T1	
5.	Height measurement based on relief displacement	1	18/07/2022		TLM-2	CO1	T1	
6.	Problems	1	20/07/2022		TLM-2	CO1	T1	
7.	Fundamentals of stereoscopy	1	21/07/2022		TLM-2	CO1	T1	
8.	Tutorial-1	1	23/07/2022		TLM-3	CO1	T1	
9.	Fudicial points, parallax	1	25/07/2022		TLM-2	CO1	T1	
10.	Measurements using fudicial points.	1	27/07/2022		TLM-2	CO1	T1	
11.	Quiz-1	1	28/07/2022		TLM-6	CO1	T1	
12.	Tutorial-2		30/07/2022		TLM-3	CO1	T1	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-II: REMOTE SENSING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
13.	Basic concept of remote sensing	1	01/08/2022		TLM-2	CO2	R2	

14.	Remote sensing data collection	1	03/08/2022		TLM-2	CO2	R2	
15.	Remote sensing advantages and limitations	1	04/08/2022		TLM-2	CO2	R2	
16.	Remote sensing process, Electromagnetic spectrum	1	06/08/2022		TLM-2	CO2	R2	
17.	Energy interactions with atmosphere and with earth surface features (soil, water, vegetation)	1	08/08/2022		TLM-2	CO2	R2	
18.	Indian satellites and sensors characteristics	1	10/08/2022		TLM-2	CO2	R2	
19.	Resolutions	1	11/08/2022		TLM-2	CO2	R2	
20.	Tutorial-3	1	13/08/2022		TLM-3	CO2	R2	
21.	Map and image and false color composite	1	17/08/2022		TLM-2	CO2	R2	
22.	Introduction to digital data, elements of visual interpretation techniques	1	18/08/2022		TLM-2	CO2	R2	
23.	Tutorial-4	1	20/08/2022		TLM-3	CO2	R2	
24.	Quiz-2	1	22/08/2022		TLM-6	CO2	R2	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III: GEOGRAPHIC INFORMATION SYSTEM

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25.	Introduction to GIS, Components of a GIS	1	24/08/2022		TLM-2	CO3	R2	
26.	Geospatial data: Spatial data, attribute data, joining spatial and attribute data	1	25/08/2022		TLM-2	CO3	R2	
27.	GIS operations: Spatial data input, attribute data management	1	27/08/2022		TLM-2	CO3	R2	
28.	Data display, Data exploration, data analysis.	1	29/08/2022		TLM-2	CO3	R2	
29.	Tutorial-5	1	01/09/2022		TLM-3	CO3	R2	
30.	Geographic coordinate system: Approximation of the earth, datum.	1	03/09/2022		TLM-2	CO3	R2	
31.	Types of map	1	28/09/2022		TLM-2	CO3	R2	

	projections							
32.	Map projection parameters, commonly used map projections.	1	29/09/2022		TLM-2	CO3	R2	
33.	Projected coordinate systems.	1	12/10/2022		TLM-2	CO3	R2	
34.	Quiz-3	1	13/10/2022		TLM-6	CO3	R2	
35.	Tutorial-6	1	15/10/2022		TLM-3	CO3	R2	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: VECTOR AND RASTER DATA MODEL

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
36.	Vector Data Model: Representation of simple features,	1	17/10/2022		TLM-2	CO4	T1	
37.	Topology and its importance Coverage and its data structure, Shape file;	1	19/10/2022		TLM-2	CO4	T1	
38.	Geometric representation of spatial feature	1	20/10/2022		TLM-2	CO4	T1	
39.	Tutorial-7	1	22/10/2022		TLM-3	CO4	T1	
40.	Data structure, topology rules.	1	26/10/2022		TLM-2	CO3	R2	
41.	Raster Data Model: Elements of the raster data model, types of raster data, raster data structure	1	27/10/2022		TLM-2	CO4	T1	
42.	Data conversion, integration of raster and vector data.	1	29/10/2022		TLM-2	CO4	T1	
43.	Data Input: Metadata, conversion of existing data, Creating new data	1	31/10/2022		TLM-2	CO4	T1	
44.	Digitizing, scanning, on screen	1	02/11/2022		TLM-2	CO4	T1	

	digitizing, importance of source map, data editing.							
45.	Tutorial-8	1	03/11/2022		TLM-3	CO4	T1	
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V: CIVIL ENGINEERING APPLICATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
46.	Surface water mapping and inventory, Rainfall runoff relations	1	05/11/2022		TLM-2	CO5	T1	
47.	Watershed management for sustainable development	1	07/11/2022		TLM-2	CO5	T1	
48.	Reservoir sedimentation	1	09/11/2022		TLM-2	CO5	T1	
49.	Ground water targeting, and identification for groundwater recharge	1	10/11/2022		TLM-3	CO5	T1	
50.	Tutorial-9	1	12/11/2022		TLM-2	CO5	T1	
51.	Waste management facilities	1	14/11/2022		TLM-2	CO3	R2	
52.	Water Quality Modeling and Mapping	1	16/11/2022		TLM-2	CO5	T1	
53.	Quiz-5	1	17/11/2022		TLM-6	CO5	T1	
54.	Tutorial-10	1	19/11/2022		TLM-3	CO5	T1	
No. of classes required to complete UNIT-V		9			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
55.								
56.								
57.								

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

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	11-07-2022	03-09-2022	8 W
I Mid Examinations	19-09-2022	24-09-2022	1 W
II Phase of Instructions	26-09-2022	19-11-2022	8 W
II Mid Examinations	21-11-2022	26-11-2022	1 W
Preparation and Practical's	28-11-2022	03-12-2022	1 W
Semester End Examinations	05-12-2022	17-12-2022	2 W

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	Q=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

COURSE HANDOUT

Part-A

PROGRAM : B.Tech,VII-SEM, Civil

ACADEMIC YEAR : 2021-22

COURSE NAME & CODE : **Design of Reinforced Concrete Structures-II**17CE30

L-T-P STRUCTURE : **2**-2-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **B Rama krishna**

PRE-REQUISITES: Applied Mechanics, Strength of Materials, Structural Analysis, Concrete technology, DRCS-1

COURSE EDUCATIONAL OBJECTIVE: This course deals with design of shallow and deep foundations, different types of slabs along with staircase and retaining walls

COURSE OUTCOMES(COs): At the end of the course, the student will be able to:
CO1: Design the footings
CO2: Design the piles.
CO3: Design different slabs.
CO4: Design the staircases
CO5: Design cantilever type retaining walls

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

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**

1- Slight(Low), **2 –**Moderate(Medium), **3 -** Substantial (High).

BOS APPROVED TEXT BOOKS:

T1 B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain "Comprehensive RCC Design", Laxmi Publications (P) Ltd, New Delhi, 2015.

T2 N. Krishnaraju, "Advanced Reinforced Concrete design", CBS Publishers & Distributors, New Delhi, 2005

BOS APPROVED REFERENCE BOOKS:

R1 P.C. Varghese, "Limit State Design of Reinforced Concrete", Prentice Hall of India Pvt., Ltd., New Delhi, 2008.

R2 P.C. Varghese, "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt., Ltd., New Delhi, 2002.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT- I: DESIGN OF SHALLOW FOUNDATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
12.	Introduction and types of foundations	1	27-09-2021		2	CO 1	T1	
13.	IS456-2000 Design specifications	1	28-09-2021		2	CO 1	T1	
14.	Analysis of rectangular isolated footing of uniform thickness	1	30-09-2021		2	CO 1	T1	
15.	Analysis of square isolated footing of uniform thickness and design procedure	1	04-10-2021		2	CO 1	T1	
16.	Design of rectangular isolated footing of uniform thickness	1	05-10-2021		2	CO 1	T1	
17.	Design of square isolated footing of uniform thickness	1	07-10-2021		2	CO 1	T1	
18.	Analysis of rectangular and square isolated sloped footings	1	09-10-2021		2	CO 1	T1	
19.	Design problems	1	11-10-2021		2	CO 1	T1	
20.	**Tutorial-1**	1	12-10-2021		3	CO 1		
No. of classes required to complete UNIT-I		8			No. of classes taken:			

UNIT-II: DESIGN OF PILE FOUNDATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
21.	Introduction	1	18-10-2021		2	CO 2	T1	

22.	Types of piles and grouping	1	21-10-2021		2	CO 2	T1	
23.	IS code provisions	1	23-10-2021		2	CO 2	T1	
24.	Design procedure for pile foundation	1	25-10-2021		2	CO2	T1	
25.	Design problems	1	26-10-2021		2	CO 2	T1	
26.	Design procedure for pile cap	1	28-10-2021		2	CO 2	T1	
27.	Design problems	1	30-10-2021		2	CO 2	T1	
28.	**Tutorial-2**	1	01-11-2021		3	CO 2	T1	
No. of classes required to complete UNIT-II		07			No. of classes taken:			

UNIT-III : DESIGN OF SLABS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	Introduction and yield line theory	1	02-11-2021		2	CO 3	T1	
30.	Yield lines for different boundary conditions	1	06-11-2021		2	CO 3	T1	
31.	**Mid-1**	**08-11-2021 to 15-11-2021**						
32.	Design of circular slabs	1	16-11-2021		2	CO 3	T1	
33.	Design problems	1	18-11-2021		2	CO 3	T1	
34.	Design problems	1	20-11-2021		2	CO 3	T1	
35.	Design problems	1	22-11-2021		2	CO 3	T1	
36.	Design of grid slab	1	23-11-2021		2	CO 3	T1	
37.	Design problems	1	25-11-2021		2	CO 3	T1	
38.	Design problems	1	27-11-2021		2	CO 3	T1	
39.	Design of flat slabs	1	29-11-2021		2	CO3	T1	
40.	Design problems	1	30-11-2021		2	CO3	T1	
41.	**Tutorial-3**	1	02-12-2021		3	CO3		
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: DESIGN STAIRS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
42.	Types of stair cases	1	04-12-2021		2	CO 4	T1	
43.	IS Specification for staircases	1	06-12-2021		2	CO 4	T1	

	and design procedure							
44.	Design of stairs spanning horizontally	1	07-12-2021		2	CO 4	T1	
45.	Design of dog legged stair	1	09-12-2021		2	CO 4	T1	
46.	Design problems	1	11-12-2021		2	CO 4	T1	
47.	Design problems	1	13-12-2021		2	CO 4	T1	
48.	**Tutorial-4**	1	14-12-2021		3	CO 4	T1	
No. of classes required to complete UNIT-IV		06			No. of classes taken:			

UNIT-V: DESIGN OF CANTILEVER RETAINING WALLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
49.	Introduction to retaining walls and types of retaining walls	1	16-12-2021		2	CO 5	T1	
50.	Forces acting on retaining walls	1	18-12-2021		2	CO 5	T1	
51.	Stability requirements and design procedures	1	20-12-2021		2	CO 5	T1	
52.	Design of cantilever type retaining wall	1	21-12-2021		2	CO 5	T1	
53.	Design of cantilever type retaining wall	1	23-12-2021		2	CO5	T1	
54.	Design problems	1	27-12-2021		2	CO5	T1	
55.	Design problems	1	28-12-2021		2	CO5	T1	
56.	**Tutorial-5**	1	30-12-2021		3	CO5	T1	
57.	**Mid-2**	03-01-2022 to 08-01-2022						
No. of classes required to complete UNIT-V		07			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	Learning Outcome COs	Text Book followed	HOD Sign
58.								

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-1	27-09-2021	06-11-2021	6W
I Mid Examinations	08-11-2021	13-11-2021	1W
II Phase of Instructions	15-11-2021	01-01-2022	7W
II Mid Examinations	03-01-2022	08-01-2022	1W
Preparation and Practicals	10-01-2022	15-01-2022	1W
Semester End Examinations	17-01-2022	29-01-2022	2W

Part – C

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Quiz -1	1,2	C1=10
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Quiz -2	1,2	C2=10
Evaluation of Assignment/Quiz Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max (B1, B2) +25% of Min (B1, B2)	1,2,3,4,5	B=20
Evaluation of Quiz Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance Marks: D (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		D=5
Cumulative Internal Examination: A+B+C+D	**1,2,3,4,5**	**40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES:

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.
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.
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.

PROGRAM OUTCOMES (PO'S)

At the end of the programme, the students will possess-

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems anddesign 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.
4. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms ofthe engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity 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.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineering 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.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

PSO's

PSO1: Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering

PSO2: Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands

PSO3: Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor	Module Coordinator	HOD

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor :M.Satyanarayana
Course Name & Code : Prestressed concretes(17CE31)
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech.,CE.,VII-Sem., Sections- A A.Y : 2022-2023

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	Understand the general mechanical behavior of prestressed concrete
CO 2	Perform analysis and design of prestressed concrete members and connections.
CO 3	Identify and interpret the appropriate relevant industry design codes.
CO 4	Become familiar with professional and contemporary issues in the design and fabrication of prestressed concrete members.
CO 5	Perform an industry relevant design project in team setting etc .

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	2	2	1	2	1		3	3	3
CO2	3	3	3	3	2	2	2	2	1	2	1		3	3	3
CO3	3	3	3	3	2	2	2	2	1	2	1		3	3	3
CO4	3	3	3	3	2	2	2	2	1	2	1		3	3	3
CO5	3	3	3	3	2	2	2	2	1	2	1		3	3	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 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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
59.	Introduction to prestreesed	1	11.07.22		TLM2	CO1	T1	
60.	Historic development of prestreesed	1	12.07.22		TLM2	CO1	T1	
61.	General principles of prestressing	1	12.07.22		TLM2	CO1	T1	
62.	Principles of pre tensioning and post tensioning	1	14.07.22		TLM2	CO1	T1	

63.	Advantages of prestreesed concrete	1	18.07.22		TLM2	CO1	T1	
64.	Limitations of prestreesed concrete	1	19.07.22		TLM2	CO1	T1	
65.	Materials of prestreesed concrete	1	21.07.22		TLM2	CO1	T1	
66.	High strength concrete and High tensile steel	1	23.07.22		TLM2	CO1	T1	
67.	Relaxation of stress, stress corrosion	1	25.07.22		TLM2	CO1	T1	
68.	Durability, fire resistance, cover requirement	1	26.07.22		TLM2	CO1	T1	
No. of classes required to complete UNIT-I: 10						No. of classes taken:		

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
10.	Introduction and Methods of prestressing	1	28.07.22		TLM2	CO2	T1	
11.	Pre-tensioning method and post tensioning methods	1	30.07.22		TLM2	CO2	T1	
12.	Post tensioning methods analysis	1	01.08.22		TLM2	CO2	T1	
13.	Different systems of prestressing	1	02.08.22		TLM2	CO2	T1	
14.	Hoyer's , Magnel analysis	1	04.08.22		TLM2	CO2	T1	
15.	Freyssinet and Gifford analysis	1	06.08.22		TLM2	CO2	T1	
16.	Basic assumptions in analysis Prestress and design	1	08.08.22		TLM2	CO2	T1	
17.	Resultant stress at a section	1	11.08.22		TLM1	CO2	T1	
18.	Pressure line, concept of load balancing	2	13.08.22 16.08.22		TLM1	CO2	T1	
19.	Stress in tendons, cracking moment	1	18.08.22		TLM1	CO2	T1	
20.	Stress in tendons, cracking moment	1	20.08.22		TLM1	CO2	T1	
No. of classes required to complete UNIT-II:12						No. of classes taken:		

UNIT-III: Losses Of Prestressing

S.No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	Learning Outcome	Text Book	HOD Sign

		Required	Completion	Completion	Methods	COs	followed	Weekly
12.	Introduction to losses of prestress	1	22.08.22		TLM2	CO3	T1	
13.	Analysis of sections of flexure	1	23.08.22		TLM2	CO3	T1	
14.	Elastic analysis of concrete beams prestressed with tendons	1	25.08.22		TLM2	CO3	T1	
15.	Problems on various elastic tendons	1	27.08.22		TLM1	CO3	T1	
16.	Elastic shortage of concrete	1	29.08.22		TLM1	CO3	T1	
17.	Problems on elastic shortage concrete	1	30.08.22		TLM1	CO3	T1	
18.	Problems on elastic shortage concrete	1	01.09.22		TLM1	CO3	T1	
19.	Problems on elastic shortage concrete	1	03.09.22		TLM1	CO3	T1	
20.	Shrinkage of concrete ,Problems on shrinkage of concrete	1	26.09.22		TLM2	CO3	T1	
21.	Creep of concrete, Relaxation of steel	1	27.09.22		TLM2	CO3	T1	
22.	Problems on both the cases	1	29.09.22		TLM1	CO3	T1	
23.	Frictional losses and problems	1	29.09.22		TLM1	CO3	T1	
24.	Frictional losses and problems	1	01.10.22		TLM1	CO3	T1	
25.	Problems on Anchorage slip	1	01.10.22		TLM1	CO3	T1	
26.	Total loss of pretensioning & Post tensioning	1	10.10.22		TLM1	CO3	T1	
No. of classes required to complete UNIT-III:15						No. of classes taken:		

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
12.	Types of flexural failures	1	11.10.22		TLM2	CO4	T1	
13.	Problems on flexural failure	1	13.10.22		TLM1	CO4	T1	
14.	Flexural failure, Strain compatibility method	1	15.10.22		TLM1	CO4	T1	
15.	Flexural failure, Strain compatibility method	1	25.10.22		TLM2	CO4	T1	
16.	Problems on strain compatibility	1	27.10.22		TLM1	CO4	T1	
17.	Problems	1	27.10.22		TLM1	CO4	T1	
18.	Control of deflections, factors	1	29.10.22		TLM1	CO4	T1	

	influencing							
19.	Prediction of short term deflection	1	31.10.22		TLM1	CO4	T1	
20.	Prediction of long term deflection	1	31.10.22		TLM1	CO4	T1	
21.	Prediction of long term deflection	1	01.11.22		TLM1	CO4	T1	
No. of classes required to complete UNIT-IV:08						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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
8.	Shear and principles of stresses	1	03.11.22		TLM2	CO5	T1	
9.	Problems on flexibility matrix method	1	05.11.22		TLM1	CO5	T1	
10.	Principal of stresses	1	07.11.22		TLM1	CO5	T1	
11.	Problems in principal of stress and shear	1	07.11.22		TLM1	CO5	T1	
12.	Design of shear reinforcement	1	10.11.22		TLM1	CO5	T1	
13.	Design for torsion,	1	10.11.22		TLM1	CO5	T1	
14.	Design for combined bending,Shear and Torsion	1	12.11.22		TLM1	CO5	T1	
15.	Transfer of Prestress in pre tensioned members	1	14.11.22		TLM1	CO5	T1	
16.	Transmission length,bond stress,end zone reinforcement	1	14.11.22		TLM1	CO5	T1	
17.	Mugnel method, Problems, Anchorage zone stresses	1	15.11.22		TLM1	CO5	T1	
18.	Anchorage zone reinforcement problems, Analysis of stresses	1	17.11.22		TLM1	CO5	T1	
19.	Differential shrinkage and problems	1	17.11.22		TLM1	CO5	T1	
20.	Differential shrinkage and problems	2	19.11.22		TLM1	CO5	T1	
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 (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
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
M.Satyanarayana	M.Satyanarayana	B.Ramakrishna	Dr.V.Ramakrishna

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada& Approved by AICTE, New Delhi, Accredited by NAAC, Certified by ISO 9001:2015
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM **:** B.Tech., VII-Sem., CE
ACADEMIC YEAR **:** 2020-21
COURSE NAME & CODE **: Environmental Engineering -17CE35**
L-T-P STRUCTURE **:** 3-1-0
COURSE CREDITS **:** 3
COURSE INSTRUCTOR **: Dr V. Ramakrishna**
COURSE COORDINATOR **: Dr V. Ramakrishna**
PRE-REQUISITE **:**Nil

Course Objectives:
This course deals with importance of meteorology on air pollution and dispersion of air pollutants, air pollution control techniques, impacts of noise pollution on society, study of the principles of noise pollution, solid waste management in the society, impacts of hazardous waste flow in society and application of environmental management principles to develop solutions to major environmental problems.

Course Outcomes (COs): At the end of the course, the student will be able to:
CO1: Evaluate the impacts of air pollution due to meteorology and estimate concentration of pollutants at any location using available air quality models**.**
CO2: Design the air pollution control equipment
CO3: Apply appropriate measures to estimate and reduce noise pollution
CO4: Apply appropriate techniques for the management of solid waste in the society
CO5: Analyze the impacts of hazardous waste flow in society and apply the principles of environmental management to develop solutions to major environmental problems

4. Course Articulation Matrix:

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
17CE 35	CO1	3					1						1	1		1
	CO2	2		2			1						1	2		1
	CO3	2					1						1	1		1

	CO4	2		2			1						1	2		1
	CO5	2					1						1	1		1
1 = Slight (Low) 2 = Moderate (Medium) 3-Substantial (High)																

BOS APPROVED TEXT BOOKS:

T1 Garg.S.K, "Sewage disposal and Air Pollution Engineering", Khanna Publishers 29th Edition, New Delhi, 2014

T2 Suresh K. Dhameja, "Environmental Science and Engineering", S.K. Kataria & Sons Publications, New Delhi.

BOS APPROVED REFERENCE BOOKS:

R1 Peavy, Rowe and G Tchobanoglous, "Environmental Engineering", McGraw Hill Publications, New Delhi, 1985.

R2 Muralikrishna K.V.S.G. "Air Pollution and Control", University Science Press, 2015.

R3 Environmental Management & Impact Assessment, NPTEL Video Lectures

R4 Solid & Hazardous Waste Management, NPTEL Video lectures.

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: AIR POLLUTION BASICS AND IMPACTS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
69.	Introduction-History of air pollution	1	13.7.22	3.8.22	2	
70.	Global air pollution	1	14.7.22	4.8.22	2	
71.	Primary and secondary air pollutants	1	15.7.22	5.8.22	2	
72.	Particulate pollutants	1	16.7.22	6.8.22	2	
73.	Gaseous pollutants	1	20.7.22	10.8.22	2	
74.	Impact of air pollution on humans	1	21.7.22	11.8.22	2	
75.	Impact of air pollution on receptors	1	22.7.22	12.8.22	2	
76.	Meteorological parameters	1	23.7.22	13.8.22	2	
77.	Meteorological parameters	1	27.7.22	17.8.22	2	
78.	Wind rose – Lapse rates	1	28.7.22	18.8.22	2	
79.	Stability phenomenon	1	29.7.22	20.8.22	2	
80.	Stack height	1	30.7.22	24.8.22	4	
81.	Plume rise, Gaussian model	1	3.8.22	25.8.22	4	
82.	Problems	1	4.8.22	26.8.22	4	
83.	No. of classes required to complete UNIT-I	14	No. of classes taken		14	

UNIT-II: AIR POLLUTION 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
84.	Control Processes	1	5.8.22	27.8.22	2	
85.	Gravity chamber	1	6.8.22	1.9.22	2	
86.	Problems	1	10.8.22	2.9.22	4	
87.	Cyclone separator	1	11.8.22	3.9.22	2	
88.	Bag filter, ESP	1	12.8.22	7.9.22	2	

89.	Problems	1	17.8.22	8.9.22	4	
90.	Problems	1	18.8.22	9.9.22	4	
91.	Wet collectors	1	20.8.22	14.9.22	2	
92.	Absorption	1	24.8.22	15.9.22	2	
93.	Adsorption	1	25.8.22	16.9.22	2	
94.	Combustion	1	26.8.22	17.9.22	2	
95.	No. of classes required to complete UNIT-II	11	No. of classes taken		11	

Mid-I Exam: 19.9.22 to 24.9.22

UNIT-III: NOISE POLLUTION

S.No.	Topics to be cover1ed	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
96.	Noise pollution basics	1	15.10.22	22.10.22	2	
97.	Noise rating systems	1	19.10.22	26.10.22	2	
98.	Frequency analyzer	1	20.10.22	27.10.22	2	
99.	Problems	1	21.10.22	28.10.22	4	
100.	Impacts	1	22.10.22	29.10.22	2	
101.	Noise control	1	26.10.22	29.10.22	2	
102.	No. of classes required to complete UNIT-III	6	No. of classes taken		6	

UNIT-IV: SOLID WASTE 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
103.	SWM Basics	1	27.8.22	28.9.22	2	
104.	Properties of solid waste	1	1.9.22	29.9.22	2	
105.	Problems	1	2.9.22	30.9.22	4	
106.	Problems	1	3.9.22	1.10.22	4	
107.	Collection of solid waste	1	28.9.22	12.10.22	2	
108.	Collection of solid waste	1	29.9.22	13.10.22	2	
109.	Processing of solid waste	1	30.9.22	14.10.22	2	
110.	Composting	1	1.10.22	15.10.22	2	
111.	Incineration	1	12.10.22	18.10.22	2	
112.	Landfill	1	13.10.12	20.10.22	2	
113.	Problems	1	14.10.22	21.10.22	4	
114.	No. of classes required to complete UNIT-IV	11	No. of classes taken		11	

UNIT-V: WASTE MANAGEMENT PRACTICES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
115.	Hazardous waste Management	1	2710.22	2.11.22	2	
116.	HWM Control approaches	1	28.10.22	3.11.22	2	
117.	E waste Management	1	29.10.22	4.11.22	2	
118.	Bio Medical waste Management	1	2.11.22	5.11.22	2	
119.	CETP, TSDF	1	3.11.22	9.11.22	2	
120.	EIA	1	4.11.22	10.11.22	2	
121.	Env Audit	1	5.11.22	11.11.22	2	
122.	No. of classes required to complete UNIT-V	7	No. of classes taken			
123.	Revision and case studies	7	9.11.22 to 19.11.22	4, 6, 9	4	

Mid-II Exam: 21.11.22 to 26.11.22

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

EVALUATION PROCESS

Evaluation Task	**Marks**
Assignment – 1	A1=5
Assignment – 2	A2=5
I-Mid Examination	M1=20
I-Quiz Examination	Q1=10
Assignment – 3	A3=5
Assignment – 4	A4=5
Assignment – 5	A5=5
II-Mid Examination	M2=20
II-Quiz Examination	Q2=10
Attendance	B = 5
Assignment Marks: A= Best Four average of A1,A2,A3,A4,A5	A=5
Mid Marks: M = 75% of Max (M1, M2) + 25% of Min (M1,M2)	M=20
Quiz Marks = 75% of Max (Q1, Q2) + 25% of Min (Q1,Q2)	Q=10
Cumulative Internal Examination : A+B+M+Q	**40**
Semester End Examinations	**60**
Total Marks	**100**

PROGRAM OUTCOMES:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural, sciences and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components, processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
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.
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.
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.
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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively 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.
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.
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.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering

PSO2: Possesses ability to plan, examine and analyze the various laboratory test required for the professional demands

PSO3: Possesses basic technical skills to pursue higher studies and professional practice n civil engineering domain

Dr V. Ramakrishna	Dr V. Ramakrishna	J. Rangaiah	Dr V. Ramakrishna
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr..Imran Abdul
Course Name & Code : Utilization of Electrical Energy & 17EE81 (OE-II)
L-T-P Structure : 4-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CIVIL Engg VII-Sem. A.Y :2022-23

PRE-REQUISITES: -

COURSE EDUCATIONAL OBJECTIVES (CEOs): 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	Choose a drive for particular application
CO 2	Identify a heating /welding scheme for a given application
CO 3	Illustrate the different schemes of traction and its main components
CO 4	Develop a lighting scheme for a given practical case
CO5	Assess the economic aspects in utilization of electrical energy

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1																
CO2																
CO3																
CO4																
CO5																

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 Art & Science of Utilization of electrical Energy, Partab, Dhanpat Rai & Co., 2004.

R2 Utilization of Electric Energy, E. Openshaw Taylor and V. V. L. Rao, Universities Press, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: ELECTRIC HEATING AND 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
124.	Introduction, CEO's &CO's	1	13-07-2022		TLM1/TLM2	
125.	Advantages & applications of Electric heating	1	14-07-2022		TLM1/TLM2	
126.	Classification of electric heating	1	15-07-2022		TLM1/TLM2	
127.	Classification of electric heating	1	16-07-2022		TLM1/TLM2	
128.	Requirement of good heating material	1	20-07-2022		TLM1/TLM2	
129.	Electric Arc Furnace	1	21-07-2022		TLM1/TLM2	
130.	Induction heating	1	22-07-2022		TLM1/TLM2	
131.	Dielectric heating	1	23-07-2022		TLM1/TLM2	
132.	Electric welding	1	27-07-2022		TLM1/TLM2	
133.	Resistance welding	1	28-07-2022		TLM1/TLM2	
134.	Arc welding	1	29-07-2022		TLM1/TLM2	
No. of classes required to complete UNIT-I:11				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
21.	Introduction		03-08-2022		TLM1/TLM2	
22.	Nature of light &Laws of illumination		04-08-2022		TLM1/TLM2	
23.	Lighting schemes, sources of light		05-08-2022		TLM1/TLM2	
24.	Fluorescent Lamps		06-08-2022		TLM1/TLM2	
25.	Compact Fluorescent Lamps		10-08-2022		TLM1/TLM2	
26.	LED Lamps discharge lamps		11-08-2022		TLM1/TLM2	
27.	Sodium Vapour Lamp		08-08-2022		TLM1/TLM2	
28.	mercury vapour lamps		12-08-2022		TLM1/TLM2	
29.	Neon lamps		13-08-2022		TLM1/TLM2	
30.	Comparison between tungsten &fluorescent tubes		17-08-2022		TLM1/TLM2	
31.	Requirements of good lighting		18-08-2022		TLM1/TLM2	
32.	Street lighting		20-08-2022		TLM1/TLM2	

33.	Mid-I Exams		20-09-2022			
34.	Mid-I Exams		21-09-2022			
35.	Mid-I Exams		23-09-2022			
36.	Mid-I Exams		24-09-2022			
No. of classes required to complete UNIT-II: 12				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
27.	Introduction	1	24-08-2022		TLM1/TLM2	
28.	Factors affecting selection of motor	1	25-08-2022		TLM1/TLM2	
29.	Types of loads	1	26-08-2022		TLM1/TLM2	
30.	Elements of electric drive	1	27-08-2022		TLM1/TLM2	
31.	Steady state characteristics of drives	1	01-09-2022		TLM1/TLM2	
32.	Transient characteristics of drives	1	02-09-2022		TLM1/TLM2	
33.	Size of motor	1	27-09-2022		TLM1/TLM2	
34.	Load equalization	1	28-09-2022		TLM1/TLM2	
35.	Industrial applications	1	29-09-2022		TLM1/TLM2	
No. of classes required to complete UNIT-III:10				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
22.	Introduction	1	30-09-2022		TLM1/TLM2	
23.	Requirement of an ideal traction system	1	12-10-2022		TLM1/TLM2	
24.	Supply system for electric traction	1	13-10-2022		TLM1/TLM2	
25.	Supply system for electric traction	1	14-10-2022		TLM1/TLM2	
26.	Train movement	1	15-10-2022		TLM1/TLM2	
27.	Mechanism of train movement	1	19-10-2022		TLM1/TLM2	
28.	Traction motors	1	20-10-2022		TLM1/TLM2	
29.	Modern trends in electric traction	1	21-10-2022		TLM1/TLM2	
30.	Automation in electric traction	1	22-10-2022		TLM1/TLM2	
31.	problems	1	26-10-022		TLM1/TLM2	
No. of classes required to complete UNIT-IV:10				No. of classes taken:		

UNIT-V: REFRIGERATION AND AIRCONDITIONING

S.No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	HOD Sign

		Required	Completion	Completion	Methods	Weekly
21.	Introduction	1	27-10-2022		TLM1/TLM2	
22.	Types of refrigeration	1	28-10-2022		TLM1/TLM2	
23.	Compression refrigeration	1	29-10-2022		TLM1/TLM2	
24.	Basic vapour compression cycle	1	02-11-2022		TLM1/TLM2	
25.	Absorption refrigeration system	1	03-11-2022		TLM1/TLM2	
26.	Operational features	1	04-11-2022		TLM1/TLM2	
27.	household refrigerator	1	05-11-2022		TLM1/TLM2	
28.	Air-conditioning	1	09-11-2022		TLM1/TLM2	
29.	Types of air conditioning system	1	10-11-2022		TLM1/TLM2	
30.	Room air conditioner	1	11-11-2022		TLM1/TLM2	
31.	Summer & winter air conditioning systems	1	12-11-2022		TLM1/TLM2	
32.	Cooling capacity of an air conditioner	1	17-11-2022		TLM1/TLM2	
33.	Working of electrical system	1	18-19-2022		TLM1/TLM2	
34.	Revision	1	18-19-2022		TLM1/TLM2	
35.	Mid-II Exams	1	22-11-2022			
36.	Mid-II Exams	1	23-11-2022			
37.	Mid-II Exams	1	25-11-2022			
38.	Mid-II Exams	1	26-11-2022			
No. of classes required to complete UNIT-V:				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
1.	Economic aspects in utilization of electrical energy	1	28-09-2022		TLM1/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 (R17 Regulations):)

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	11-07-2022	03-09-2022	8W
CRT classes	05-09-2022	17-09-2022	2W
I Mid Examinations	19-09-2022	24-09-2022	1W
II Phase of Instructions	26-09-2022	19-11-2022	8W
II Mid Examinations	21-11-2022	26-11-2022	1W
Preparation and Practicals	28-11-2022	03-12-2022	1W
Semester End Examinations	5-12-2022	17-12-2022	2W

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):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO 4	Design controllers for electrical and electronic systems to improve their performance.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Imran Abdul	Mrs T.Naga Durga		Dr. J.Siva Vara Prasad

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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : B NARASIMHARAO
Course Name & Code : ENVIRONMENTAL SANITATION & 17CE92
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE., VII-Sem., A.Y : 2022-23

PRE-REQUISITE:NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course teaches the basic terminology of Environmental sanitation, different methods for control of Communicable and non-communicable diseases, the control techniques for rodent and vectors, sanitation measures that are required in few Institutions, sanitation management aspects due to rural and refuse wastes.

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

CO 1	Recognize the basic terminology of Environmental sanitation.
CO 2	Interpret the control approaches of Communicable and non-communicable diseases.
CO 3	Identify and assess the control approaches for rodent and vectors.
CO 4	Classify the appropriate sanitation measures for several institutions.
CO 5	Categorize the sanitation aspects for rural and refuse management.

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	1	-	-	-	1	1	-	-	-	-	1	1	-	1
CO2	2	1	1	-	-	1	1	-	-	-	-	1	1	-	1
CO3	2	1	1	-	-	1	1	-	-	-	-	1	1	-	1
CO4	2	1	2	-	-	1	1	-	-	-	-	1	1	1	1
CO 5	3	1	2	-	-	1	1	-	-	-	-	1	1	1	1

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

TEXT BOOKS:

T1 Joseph. A. Salvato, Nelson N. Nemerow, Frankiln J. Agardy, "Environmental Engineering", John Wiley & Sons, 5th Edition, 2003.

T2 I.M. Prahlad Edited, "Environmental Sanitation - Reflections from Practice, A Module for Community Health Practitioners", Society For Community Health Awareness Research and Action, 2015.

REFERENCE BOOKS:

R1 S.K. Garg, "Sewage Disposal and Air pollution engineering", Khanna Publishers, New Delhi, 2009.

R2 K.V.S.G. Muralikrishna, "Environmental Sanitation", Reem Publications, Kakinada, 2003.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: ENVIRONMENTAL SANITATION BASICS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
135.	Introduction of sanitation practices	1	11-07-2022		**TLM2**	
136.	History sanitation practices	1	14-07-2022		**TLM2**	
137.	Evolution of sanitation practices	1	15-07-2022		**TLM2**	
138.	Role of Sanitary Engineer	1	16-07-2022		**TLM2**	
139.	Sanitation management aspects for liquid wastes	1	18-07-2022		**TLM2**	
140.	Sanitation management aspects for solid wastes	1	21-07-2022		**TLM2**	
141.	**Revision**	1	22-07-2022		**TLM2**	
142.	Basic Definitions	1	23-07-2022		**TLM2**	
143.	Basic Definitions	1	25-07-2022		**TLM2**	
144.	Types of diseases- Communicable diseases	1	28-07-2022		**TLM2**	
145.	Non-communicable diseases	1	29-07-2022		**TLM2**	
146.	Water borne diseases	1	30-07-2022		**TLM2**	
147.	Mortality rates	1	01-08-2022		**TLM2**	
148.	**Revision**	1	04-08-2022		**TLM2**	
149.	Tutorial	1	05-08-2022		**TLM3**	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

UNIT-II: CONTROL OF COMMUNICABLE AND NON-COMMUNICABLE DISEASES

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.	**Communicable Diseases:** Impacts,	1	06-08-2022		**TLM2**	
38.	Control of Source (Agent Factors)	1	08-08-2022		**TLM2**	
39.	Control of Mode of Transmission Factor (Environmental Factors)	1	11-08-2022		**TLM2**	
40.	Control of Mode of Transmission Factor (Environmental Factors)	1	12-08-2022		**TLM2**	
41.	Control of Susceptibles (Host Factors)	1	13-08-2022		**TLM2**	
42.	Epidemic Control	1	18-08-2022		**TLM2**	
43.	Revision	1	20-08-2022		**TLM2**	
44.	Respiratory Diseases- Types, Impacts, Characteristics	1	22-08-2022		**TLM2**	
45.	Respiratory Diseases- Control	1	25-08-2022		**TLM2**	
46.	Water borne Diseases- Types, Impacts, Characteristics	1	26-08-2022		**TLM2**	
47.	Water borne Diseases- Control	1	27-08-2022		**TLM2**	
48.	Food borne Diseases- Types, Impacts, Characteristics	1	29-08-2022		**TLM2**	
49.	Food borne Diseases- Control	1	01-09-2022		**TLM2**	
50.	Revision	1	02-09-2022		**TLM2**	
51.	Tutorial	1	03-09-2022		**TLM3**	
No. of classes required to complete UNIT-II:12				No. of classes taken:		

UNIT-III: INSECT VECTOR AND RODENT 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
36.	Mosquitoes as carriers of diseases	1	29-09-2022		**TLM2**	
37.	Mosquito control	1	30-09-2022		**TLM2**	
38.	Larvae control	1	01-10-2022		**TLM2**	
39.	Adult control	1	06-10-2022		**TLM2**	
40.	Man-made mosquito breeding centres	1	07-10-2022		**TLM2**	
41.	Outdoor control of mosquitoes	1	08-10-2022		**TLM2**	
42.	Housefly as disease carrier	1	10-10-2022		**TLM2**	
43.	Fly control	1	13-10-2022		**TLM2**	
44.	Rodent control	1	14-10-2022		**TLM2**	
45.	Control Diseases transmitted from Animals.	1	15-10-2022		**TLM2**	
46.	Revision	1	17-10-2022		**TLM2**	
No. of classes required to complete UNIT-III:10				No. of classes taken:		

UNIT- IV: INSTITUTIONAL SANITATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Sanitation measures in Hotels/restaurants	1	20-10-2022		**TLM2**	
33.	Sanitation measures in public bathing ghats	1	21-10-2022		**TLM2**	
34.	Sanitation measures in Schools	1	22-10-2022		**TLM2**	
35.	Sanitation measures in Hospitals	1	27-10-2022		**TLM2**	
36.	Sanitation measures in Swimming pools	1	28-10-2022		**TLM2**	
37.	Sanitation measures in Prisons.	1	29-10-2022		**TLM2**	
38.	Revision	1	31-10-2022		**TLM2**	
No. of classes required to complete UNIT-IV:07				No. of classes taken:		

UNIT-V :RURAL AND REFUSE SANITATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39.	**Rural sanitation**: Aqua privy, Septic tank, Soak pit and sulabh mode of sanitation	1	03-11-2022		**TLM2**	
40.	**Rural sanitation**: Appropriate low cost rural sanitation techniques	1	04-11-2022		**TLM2**	
41.	**Rural sanitation**: Biogas generation from toilet	1	05-11-2022		**TLM2**	
42.	**Refuse Sanitation:** Municipal garbage – sources, generation and collection	1	07-11-2022		**TLM2**	
43.	**Refuse Sanitation:** Municipal garbage – recovery and disposal options	1	10-11-2022		**TLM2**	
44.	**Refuse Sanitation:** Sanitation problems with regard to: Dumping and sanitary landfilling	1	11-11-2022		**TLM2**	
45.	**Refuse Sanitation:** Sanitation problems with regard to: Mass firing of waste and incineration	1	12-11-2022		**TLM2**	
46.	**Refuse Sanitation:** Mosquito breeding, Leachate, Management issues	1	14-11-2022		**TLM2**	
47.	**Ecological Sanitation:** Principle, Eco-sanitation as a sustainable approach	1	17-11-2022		**TLM2**	
48.	**Occupational health hazards:** Concept, Types, Safety aspects of sanitation workers	1	18-11-2022		**TLM2**	
49.	**Revision**	1	19-11-2022		**TLM2**	
No. of classes required to complete UNIT-V:10				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 (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering 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 anddesign 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 researchmethods 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 modernengineering 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 assesssocietal, 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 solutionsin 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 ofthe engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity 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 theengineering 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 inindependent 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)	(J RANGAIAH)	(Dr.V.RAMAKRISHNA)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (Autonomous)
L.B.REDDY NAGAR, MYLAVARAM-521 230, A.P, INDIA
DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	**:**	B.Tech., VII-Sem., CIVIL
ACADEMIC YEAR	**:**	2022-23
COURSE NAME & CODE	**:**	GIS and C A in Civil Engineering Lab (17CE73)
L-T-P STRUCTURE	**:**	0-0-2
COURSE CREDITS	**:**	1
COURSE INSTRUCTOR	**:**	J.Rangaiah
COURSE COORDINATOR	**:**	J.Rangaiah
PRE-REQUISITE	**:**	Nil

COURSE EDUCATIONAL OBJECTIVE:

The course is designed to introduce GIS software and apply GIS software to simple problems in civil engineering problems. It also involves in developing coding in C language for civil engineering problems and analyzing results.

COURSE OUTCOMES (CO) :

1. Digitize and create thematic map and extract important features using GIS software.
2. Analyze and Interpret the maps created using GIS for specific applications.
3. Develop coding for civil engineering problems and analyze the results.

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	2	2	3	2	1	1					1		3	1	1
CO2	2	2	3	2	1	1					1		3	1	1
CO3	2	2	3	2	1	1					1		3	1	1

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

GIS AND COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

LIST OF EXPERIMENTS

COURSE: VII SEMESTER **A.Y: 2022-23**

1. Determination of Permeability of Soil
2. Design of Irrigation Channel by Kennedy's Theory
3. Design of Flexible Pavement
4. Design of Singly Reinforced Rectangular Beam for Flexure.
5. Determination of Discharge over a Rectangular, Triangular or Trapezoidal Notch.
6. Design of Sedimentation Tank
7. Design of Compression Member
8. Digitization of Map / Toposheet
9. Estimation of Features and Interpretation
10. Creation of Thematic Maps

Lab-In charge

GIS AND COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

COURSE: VII SEMESTER **A.Y: 2022-23**

LAB SCHEDULE

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	Demo	12-07-2022	
2	Determination of Permeability of Soil	19-7-2022	
3	Design of Irrigation Channel by Kennedy's Theory	26-7-2022	
4	Design of Flexible Pavement	02-8-2022	
5	Design of Singly Reinforced Rectangular Beam for Flexure.	16-8-2022	
6	Determination of Discharge over a Rectangular, Triangular or Trapezoidal Notch.	23-8-2022	
7	Design of Sedimentation Tank	30-8-2022	
8	Design of Compression Member	27-9-2022	
9	Digitization of Map / Toposheet	11-10-2022	
10	Estimation of Features and Interpretation	18-10-2022	
11	Creation of Thematic Maps	25-10-2022	
12	Revision	01-11-2022	
13	Internal Test	08-11-2022	

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	11-07-2022	03-09-2022	8 W
I Mid Examinations	19-09-2022	24-09-2022	1 W
II Phase of Instructions	26-09-2022	19-11-2022	8 W
II Mid Examinations	21-11-2022	26-11-2022	1 W
Preparation and Practical's	28-11-2022	03-12-2022	1 W
Semester End Examinations	05-12-2022	17-12-2022	2 W

Lab-In charge

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
(J.RANGAIAH)	(J.RANGAIAH)	(J.RANGAIAH)	(Dr.V.RAMAKRISHNA)

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM : B.Tech., VII-Sem., CIVIL

ACADEMIC YEAR : 2022-23

COURSE NAME & CODE : Quantity Estimation & Project Management Lab(17CE73)

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : P. M. Ganga Raju, B. Ramakrishna& K. Harish Kumar

COURSE COORDINATOR : P. M. Ganga Raju, B. Ramakrishna& K. Harish Kumar

PRE-REQUISITE : Estimation & Quantity Surveying

COURSE EDUCATIONAL OBJECTIVE:
The course deals with usage of software tools for calculating the quantities and estimating the cost of different structures. It also deals with managing the project by using software tools.

COURSE OUTCOMES (CO) :

4. Estimate the quantities for different items of civil engineering using software tools.
5. Prepare the estimate of different items of RCC elements.
6. Control the project for execution of civil engineering projects through systematic planning.

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				3		3		2
CO2	3	3		3		2	3				3		3		2
CO3	3	3		3		2	3				3		3		2

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

QUANTITY ESTIMATION AND PROJECT MANAGEMENT LAB

LIST OF EXPERIMENTS

COURSE: VII SEMESTER **A.Y: 2022-23**

1. Quantity estimation of a single storey residential building (differentitems).
2. Cost estimation of a single storey residentialbuilding.
3. Quantity estimation of a B.T.Road (differentitems).
4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (differentitems).
6. Cost estimation of a Canal.
7. Quantity estimation of RCC roof slab and preparing schedule ofbars.
8. Quantity estimation of RCC beam and preparing schedule ofbars.
9. Quantity estimation of RCC Column with foundation footing and preparing schedule ofbars.
10. Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stonechart.
11. Preparing the Project management report for a single storey residential building by using the network technique(PERT/CPM).
12. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).

Lab-In charge

QUANTITY ESTIMATION AND PROJECT MANAGEMENT LAB

COURSE: VII SEMESTER **A.Y: 2021-22**

LAB SCHEDULE

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	Quantity estimation of a single storey residential building (differentitems).	11-07-2022	
2	Cost estimation of a single storey residentialbuilding.	18-07-2022	
3	Quantity estimation of a B.T.Road (differentitems).	25-07-2022	
4	Cost estimation of a B.T.Road.	01-08-2022	
5	Quantity estimation of a Canal (differentitems).	08-08-2022	
6	Cost estimation of a Canal.	22-08-2022	
7	Quantity estimation of RCC roof slab and preparing schedule ofbars.	29-08-2022	
8	Quantity estimation of RCC beam and preparing schedule ofbars.	10-10-2022	
9	Estimation of Features and Interpretation	17-10-2022	
10	Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stonechart.	31-10-2022	
11	Preparing the Project management report for a single storey residential building by using the network technique(PERT/CPM).	07-11-2022	
12	Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).	14-11-2022	

Lab-In charge

PROGRAM OUTCOMES (PO'S)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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.

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.

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.

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.

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.

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.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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.

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.

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.

PROGRAM SPECIFIC OUTCOMES FOR CIVIL ENGINEERING

PSO1: Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering

PSO2: Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands

PSO3: Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Course Instructor **Course Coordinator** **Module Coordinator** **HOD**