LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)
Accredited by NAAC with 'A' Grade & NBA (Under Tier - I),
ISO 21001 : 2018, 50001 : 2018, 14001: 2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT
COURSE HANDOUT
PART-A

PROGRAM   : II B. Tech., IV-Sem., CIVIL
ACADEMIC YEAR   : 2023-24
COURSE NAME & CODE   : PROBABILITY AND STATISTICS
L-T-P STRUCTURE   : 3-0-0
COURSE CREDITS   : 3
COURSE INSTRUCTOR   : G. VIJAYA LAKSHMI
COURSE COORDINATOR   : M. Rami Reddy
PRE-REQUISITES   : None

COURSE EDUCATIONAL OBJECTIVES (CEO): The objective of this course is to provide students with the foundations and applications of probabilistic and statistical methods mainly used in varied applications in engineering and science.

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

CO1	Understand various probabilistic situations using the laws of probability and Random variables.	**Understand - L2**
CO2	Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems.	**Apply - L3**
CO3	Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on sample data.	**Apply - L3**
CO4	Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis.	**Analyze - L4**
CO5	Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data.	**Apply – L3**

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	2	-	-	-
CO5	3	2	2	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).

BOS APPROVED TEXT BOOKS:
T1 Jay L.Devore "Probability and Statistics for engineering and the sciences." , 8th edition, Cengage Learning india, 2012
T2 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

BOS APPROVED REFERENCE BOOKS:
R1 Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.
R2 B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

PART-B
COURSE DELIVERY PLAN (LESSON PLAN):
UNIT-I: Probability and Random Variables

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 class, course outcomes	1	02-01-24		TLM1	
2.	Basic concepts of probability	1	03-01-24		TLM1	
3.	problems on basic probability	1	04-01-24		TLM1	
4.	Axioms, Addition theorem	1	06-01-24		TLM1	
5.	Problems on Addition theorem	1	08-01-24		TLM1	
6.	Multiplication theorem, examples	1	09-01-24		TLM1&2	
7.	Independent events, theorems	1	10-01-24		TLM1	
8.	Results on independent events	1	11-01-24		TLM1	
9.	Practice Problems	1	18-01-24		TLM1	
10.	Baye's theorem,	1	20-01-24		TLM1&2	
11.	Problems on Baye's theorem	1	22-01-24		TLM1	
12.	Problems	1	23-01-24		TLM1	
13.	Random variables, Expectations	1	24-01-24		TLM1	
14.	Probability Mass function, examples	1	25-01-24		TLM1	
15.	Probability Density Function	1	27-01-24		TLM1	
16.	Practice Problems	1	29-01-24		TLM1&2	
No. of classes required to complete UNIT-I: 16				No. of classes taken:		

UNIT-II: Probability Distributions

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.	Binomial Distribution- mean & variance	1	30-01-24		TLM1&2	
2.	Problems on Binomial distribution	1	31-01-24		TLM1	
3.	Problems on Binomial distribution	1	01-02-24		TLM1	
4.	Fitting of binomial distribution	1	03-02-24		TLM1	
5.	Poisson distribution, mean and variance	1	05-02-24		TLM1	
6.	Problems on Poisson distribution	1	06-02-24		TLM1	
7.	Fitting of Poisson distribution	1	07-02-24		TLM1	
8.	Practice problems	1	08-02-24		TLM1	
9.	Normal distribution: mean &variance	1	12-02-24		TLM1&2	
10.	Problems on Normal Distribution	1	13-02-24		TLM1	
11.	Problems on Normal Distribution	1	14-02-24		TLM1	
12.	Applications of Normal Distribution	1	15-02-24		TLM1	
13.	Exponential distribution:, examples	1	17-02-24		TLM1	
14.	Practice problems	1	19-02-24		TLM1&2	
No. of classes required to complete UNIT-II: 14				No. of classes taken:		

UNIT-III: Sampling distribution and Estimation

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.	Sampling distribution ,definitions	1	20-02-24		TLM1&2	
2.	Sampling distribution of mean, variance	1	21-02-24		TLM1	
3.	Central limit theorem, Examples	1	22-02-24		TLM1	
4.	Problems on Central Limit Theorem	1	24-02-24		TLM1	
5.	**Mid-I examinations**		26-02-24 to 02-03-24			
6.	Problems on central limit theorem	1	04-03-24		TLM1	
7.	Practice problems	1	05-03-24		TLM1	
8.	Point and interval estimation	1	06-03-24		TLM1&2	
9.	Confidence Interval of mean (n>30)	1	07-03-24		TLM1	

10.	Problems	1	11-03-24		TLM1	
11.	Confidence Interval for proportion	1	12-03-24		TLM1	
12.	Practice Problems	1	13-03-24		TLM1	
13.	Confidence Interval for mean (n<30)	1	14-03-24		TLM1	
14.	problems	1	16-03-24		TLM1	
15.	Practice problems	1	18-03-24		TLM1&2	

No. of classes required to complete UNIT-III: 14	No. of classes taken:

UNIT-IV: Tests of Hypothesis

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.	Testing of Hypothesis , definitions	1	19-03-24		TLM1&2	
2.	Z-test for single mean	1	20-03-24		TLM1	
3.	Z-test for difference of means	1	21-03-24		TLM1	
4.	Practice problems	1	23-03-24		TLM1&2	
5.	Z-test for single Proportion	1	26-03-24		TLM1	
6.	Z-test for difference of Proportions	1	27-03-24		TLM1	
7.	Practice problems	1	28-03-24		TLM1	
8.	t-test for single mean	1	30-03-24		TLM1	
9.	t-test for difference of means	1	01-04-24		TLM1	
10.	Paired t-test	1	02-04-24		TLM1	
11.	Practice problems	1	03-04-24		TLM1&2	
12.	F-test for variances	1	04-04-24		TLM1	
13.	χ^2-test for goodness of fit	1	06-04-24		TLM1	
14.	χ^2-test for independence of attributes	1	08-04-24		TLM1	
15.	Practice Problems	1	10-04-24		TLM1&2	

No. of classes required to complete UNIT-IV: 15	No. of classes taken:

UNIT-V: Correlation and Regression

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.	Simple Bi-variate Correlation	1	15-04-24		TLM1&2	
2.	Problems on Pearson's Correlation	1	16-04-24		TLM1	
3.	Regression lines	1	18-04-24		TLM1	
4.	Problems on Regression lines	1	20-04-24		TLM1	
5.	Properties of Regression coefficients	1	22-04-24		TLM1&2	
6.	Problems on Regression coefficients	1	23-04-24		TLM1	
7.	Problems on rank Correlation	1	24-04-24		TLM1	
8.	Problems on repeated ranks	1	25-04-24		TLM1	
9.	Practice problems	1	27-04-24		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/SwayamPrabha/MOOCS)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30

Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

Program Educational Objectives (PEOs):

PEO1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO3	To develop inquisitiveness towards good communication and lifelong learning.

Program Outcomes (POs):

PO1 - Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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.
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.
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.
PO5 - 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.
PO6 - 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.
PO7 - 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.
PO8 - Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9 - Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10 - 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.
PO11 - Project Management and Finance	Demonstrate knowledge and understanding of the ring 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.
PO12 - 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	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO2	To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.
PSO3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(G.Vijaya Lakshmi)	(M.Rami Reddy)	(Dr.A.Rami Reddy)	(Dr.A.Rami Reddy)

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

PROGRAM	:	B.Tech., IV -Sem., CIVIL
ACADEMIC YEAR	:	2023-24
COURSE NAME & CODE	:	H & HMS (20CE09)
L-T-P STRUCTURE	:	3-0-0
COURSE CREDITS	:	3
COURSE INSTRUCTOR	:	J. Rangaiah
COURSE COORDINATOR	:	J. Rangaiah
PRE-REQUISITE	:	Applied Mechanics, Mechanics of Fluids,

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The course allows the student to get insight into open channel hydraulics, and the various theories dealing with the flow phenomenon of fluid in an open channel. The student is exposed to the basics, components, and working of the hydro machinery, applications of different types of turbines and pumps.

COURSE OUTCOMES (COs):

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

CO1	Understand the various types of flows, specific energy curves, hydraulic jumps and working of hydraulic machines in fluid flows. (Understand-L2)
CO2	Apply the basic principles to design the open channels and determine the energy losses due to formation of hydraulic jump. (Apply-L3)
CO3	Apply the impulse-momentum equation to determine the force exerted by a jet on different configurations of vanes. (Apply-L3)
CO4	Apply the working principle to draw the velocity triangles and determine the efficiencies of hydraulic machines.(Apply-L3)

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

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

TEXT BOOKS

1. R.K. Bansal, "A Textbook of Fluid Mechanics and Hydraulic Machines", Laxmi

Publications (p) Ltd.

2. R.K. Rajput "Textbook of Fluid Mechanics and Hydraulic Machinery", Revised edition, S. Chand & Company, Ltd., New Delhi, 2005.

REFERENCES

1. A.K. Jain, Fluid Mechanics 2nd edition, Khanna Publishers, Delhi.2001 revised edition, Standard Book Home, New Delhi, 2005.

2. P.N. Modi, and S.M. Seth, "Hydraulics and Fluid Mechanics including Hydraulic

Machines", Rajsons Publications Pvt Ltd., Standard Book House, New Delhi, 2009.

3. K.R. Arora, "Fluid Mechanics, Hydraulic and Hydraulic Machines", Standard Publishers and Distributors, New Delhi, 2005.

COURSE DELIVERY PLAN (LESSON PLAN): Civil

UNIT-I

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.	Review of basics	1	04-01-24		TLM-1	CO1	T1	
2.	Introduction to open channel flow, Classification of flows in channels.	1	05-01-24		TLM-1	CO1	T1	
3.	Chezy, manning's, bazin, Kutter's formulae	1	06-01-24		TLM-1	CO1	T1	
4.	Most economical Rectangular Sections	1	08-01-24		TLM-1	CO2	T1	
5.	Problems	1	11-01-24		TLM-1	CO2	T1	
6.	Most economical Trapezoidal Sections	1	12-01-24		TLM-1	CO2	T1	
7.	Problems	1	18-01-24		TLM-1	CO2	T1	
8.	Problems	1	19-01-24		TLM-1	CO2	T1	
9.	Most economical Circular sections-	1	20-01-24		TLM-1	CO2	T1	
10.	Problems	1	22-01-24		TLM-1	CO2	T1	
11.	Problems	1	25-01-24		TLM-1	CO2	T1	
12.	Problems	1	27-01-24		TLM-1	CO2	T1	
No. of classes required to complete UNIT-I		12			No. of classes taken:			

UNIT-II

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.	Specific energy curves; - critical depth, critical velocity, minimum Specific energy	1	29-01-24		TLM-1	CO1	T1	
14.	Problems	1	01-02-24		TLM-1	CO2	T1	
15.	Critical flow in rectangular channels	1	02-02-24		TLM-1	CO1	T2	
16.	Problems	1	03-02-24		TLM-1	CO2	T1	
17.	Gradually Varied Flow: Dynamic equation	1	05-02-24		TLM-1	CO2	T1	
18.	Problems	1	08-02-24		TLM-1	CO2	T1	
19.	Surface Profiles; Computation of surface profiles by single step method	1	09-02-24		TLM-1	CO1	T2	
20.	Back water Curves and Draw down curves	1	10-02-24		TLM-1	CO1	T2	
21.	Problems	1	12-02-24		TLM-1	CO2	T1	
22.	Hydraulic jump Types of hydraulic jumps; Location and applications of hydraulic jump	1	15-02-24		TLM-1	CO1	T2	
23.	Energy loss in a hydraulic jump.	1	16-02-24		TLM-1	CO2	T1	
No. of classes required to complete UNIT-II		11			No. of classes taken:			

UNIT-III

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
24.	Stationary flat, inclined and curved vanes,	1	17-02-24		TLM-1	CO3	T1	
25.	Problems	1	19-02-24		TLM-1	CO3	T1	
26.	Moving flat, inclined vanes,	1	22-02-24		TLM-1	CO3	T1	
27.	Problems	1	23-02-24		TLM-1	CO3	T1	
28.	Moving curved vanes,	1	24-02-24		TLM-1	CO3	T1	
29.	Problems	1	04-03-24		TLM-1	CO3	T1	
30.	Jet striking centrally and at tip	1	07-03-24		TLM-1	CO3	T1	
31.	Velocity triangles at inlet and outlet	1	11-03-24		TLM-1	CO3	T1	

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
32.	Expressions for work done and efficiency	1	14-03-24		TLM-1	CO3	T1	
33.	Problems	1	15-03-24		TLM-1	CO3	T1	
34.	Angular momentum principle	1	16-03-24		TLM-1	CO3	T1	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV

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
35.	Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines	1	18-03-24		TLM-1	CO4	T1	
36.	Pelton wheel	1	21-03-24		TLM-1	CO4	T1	
37.	Problems	1	22-03-24		TLM-1	CO4	T1	
38.	Francis turbine	1	23-03-24		TLM-1	CO4	T1	
39.	Problems	1	28-03-24		TLM-1	CO4	T1	
40.	Kaplan turbine	1	30-03-24		TLM-1	CO4	T1	
41.	Problems	1	23-04-24		TLM-1	CO4	T1	
42.	Draft tube – theory and efficiency	1	25-04-24		TLM-1	CO4	T1	
43.	Specific turbines	1	27-04-24		TLM-1	CO4	T1	
44.	Unit speed - unit quantity - unit power	1	30-04-24		TLM-1	CO4	T1	
45.	Problems	1	04-04-24		TLM-1	CO4	T1	
46.	Specific speed characteristics- geometric similarity- cavitation	1	05-04-24		TLM-1	CO4	T1	
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V

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
47.	Centrifugal Pumps: Classification, work done, , losses and efficiencies,	1	07-04-24		TLM-1	CO4	T1	
48.	Minimum starting speed, specific speed	1	09-04-24		TLM-1	CO4	T1	
49.	Multistage pumps	1	11-04-24		TLM-1	CO4	T1	
50.	Problems	1	12-04-24		TLM-1	CO4	T1	

S.No.	Topic	No. of Classes	Tentative Date	Actual Date	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
51.	Specific speed, characteristic curves,	1	14-04-24		TLM-1	CO4	T1	
52.	NPSH, Cavitation in pumps	1	16-04-24		TLM-1	CO4	T1	
53.	Reciprocating Pumps: Types, working, Work done	1	18-04-24		TLM-1	CO4	T1	
54.	Problems	1	19-04-24		TLM-1	CO4	T1	
55.	Coefficient of discharge and slip	1	25-04-24		TLM-1	CO4	T1	
56.	Effects of acceleration and frictional resistance	1	26-04-24		TLM-1	CO4	T1	
57.	Indicator diagrams, separation	1	27-04-24		TLM-1	CO4	T1	
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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.								
2.								
3.								

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	01-01-2024	24-02-2024	8 W
I Mid Examinations	26-02-2024	02-03-2024	1 W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	29-04-2024	04-05-2024	1 W
Preparation and Practical's	06-05-2024	11-05-2024	1 W
Semester End Examinations	13-05-2024	25-05-2024	2 W

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 & III)	M1=15
I-Quiz Examination (Units-I, II & III)	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
Mid Marks =80% of Max(M1,M2)+20% of Min(M1,M2)	M=15
Quiz Marks =80% of Max(Q1,Q2)+20% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PROGRAMME OUTCOMES (POs):

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

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

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: M.KARTHIK KUMAR

Course Name & Code : GEOTECHNICAL ENGINEERING	**Regulation**: R20
L-T-P Structure : 3-0-0	**Credits:** 3
Program/Sem/Sec : II B.TECH.,/IV SEM	**A.Y.:** 2023-24

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course aims to teach the different properties and classifications of soil. The course coverage includes the various procedures for determining index and engineering properties of soils.

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

CO1	Understand the engineering and index properties of soil. (Understand-L2)
CO2	Classify the soils based on ISC system and grain size distribution. (Understand-L2)
CO3	Evaluate the permeability, shear strength and consolidation properties of soil. (Apply-L3)
CO4	Illustrate the stress distribution of soil subjected to different loading conditions. (Apply-L3)

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

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

TEXTBOOKS:

T1 Arora. K.R, "**Soil Mechanics and Foundation Engineering**", Standard Publishers & Distributors, Nai Sarak, Delhi, 1987

T2 Murthy.V.N.S, "**A Text book of Soil Mechanics and Foundation Engineering**", KripaTechnical Consultants, Bangalore, 1992

REFERENCE BOOKS:

R1 Venkataramaiah, "**Geotechnical Engineering**", Wiley Eastern Ltd., Madras, 1993.

R2 Punmia. B.C, "**Soil Mechanics and Foundation Engineering**", A.Saurabh and Co.,(P) Ltd., Madras, 1988.

R3 Taylor. D.W, "**Fundamentals of Soil Mechanics**", Asia Publishing house, 1948.

R4 Terzaghi and Peck, "**Soil Mechanics in Engineering**", Asia Publishing house,

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Types and physical properties of soil

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.	Geotechnical engineering Introduction	1	02-1-24		**TLM1**	
2.	Introduction to soil	1	03-1-24		**TLM1**	
3.	Types of soil	1	04-1-24		**TLM1**	
4.	Physical properties of soil	1	05-1-24		**TLM3**	
5.	Basic definition on mass, volumes	1	08-1-24		**TLM1**	
6.	Basic definition on weights	1	09-1-24		**TLM1**	
7.	Three phase diagram	1	10-1-24		**TLM1**	
8.	Relationships among basic definitions	1	11-1-24		**TLM1**	
9.	Derive an expression on volumes	1	12-1-24		**TLM3**	
10.	Derive an expression on weights	1	18-1-24		**TLM1**	
11.	Derive an expression on saturation	1	19-1-24		**TLM3**	
12.	Derive an expression on unit weights	1	22-1-24		**TLM1**	
13.	Over view of inter relationship	1	23-1-24		**TLM1**	
14.	Classification of soils based on grain size distribution	1	24-1-24		**TLM1**	
15.	Hydrometer analysis	1	25-1-24		**TLM1**	
16.	Problems	1	29-1-24		**TLM1**	
No. of classes required to complete UNIT-I: 16				**No. of classes taken:**		

UNIT-II: Consistency and plasticity characteristics of soil and Soil compaction

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.	introduction to Consistency limits	1	30-1-24		**TLM1**	
18.	Determination of LL,	1	31-1-24		**TLM4**	
19.	Determination of PL and SL	1	1-2-24		**TLM1**	
20.	problems	1	2-2-24		**TLM3**	
21.	problems	1	5-2-24		**TLM1**	
22.	Plasticity characteristics of soil	1	6-2-24		**TLM1**	
23.	Laboratory light weight methods of compaction of soils	1	7-2-24		**TLM1**	
24.	Laboratory heavy weight methods of compaction of soils	1	8-2-24		**TLM4**	
25.	Field compaction methods and factors affecting compaction of soil	1	9-2-24		**TLM3**	
26.	Field compaction control	1	12-2-24		**TLM1**	
27.	Problems	1	13-2-24		**TLM1**	
28.	Problems	1	14-2-24		**TLM1**	
No. of classes required to complete UNIT-II: 8				**No. of classes taken:**		

UNIT-III: Permeability characteristics of soil and Concept of effective stress in soils

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Darcy's law ,	1	15-2-24		**TLM4**	
30.	Factors affecting permeability	1	16-2-24		**TLM3**	
31.	laboratory determination of permeability of cohesion less and cohesive soils	1	19-2-24		**TLM1**	
32.	Constant head permeability	1	20-2-24		**TLM1**	
33.	Variable head permeability	1	21-2-24		**TLM1**	

34.	Permeability of layered soil deposits	1	22-2-24		**TLM1**	
35.	Problems	1	23-2-24		**TLM3**	
36.	Terzaghi's effective stress concept	1	4-3-24		**TLM1**	
37.	Seepage flow and seepage pressure	1	5-3-24		**TLM1**	
38.	Quick Sand Condition, Critical hydraulic gradient	1	6-3-24		**TLM1**	
39.	Problems	1	7-3-24		**TLM1**	
40.	Problems and Tutorial	1	11-3-24		**TLM3**	
No. of classes required to complete UNIT-III: 8				**No. of classes taken:**		

UNIT-IV: Shear strength of soils

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Analysis of shear failure	1	12-3-24		**TLM1**	
42.	Shear and normal stress at a point	1	13-3-24		**TLM1**	
43.	Mohr's circle and Tutorial	1	14-3-24		**TLM1**	
44.	Relationship with Mohr's circle	1	15-3-24		**TLM3**	
45.	Mohrs strength theory	1	18-3-24		**TLM4**	
46.	Mohr's coulomd failure theory	1	19-3-24		**TLM1**	
47.	Direct shear test	1	20-3-24		**TLM4**	
48.	Triaxial test	1	21-3-24		**TLM4**	
49.	UCC test	1	22-3-24		**TLM3**	
50.	Vane shear test	1	26-3-24		**TLM1**	
51.	Advantages of triaxial tests	1	27-3-24		**TLM1**	
52.	Classification of shear test based on drainage conditions	1	28-3-24		**TLM1**	
53.	Problems	1	1-4-24		**TLM1**	
54.	Problems	1	2-4-24		**TLM1**	
No. of classes required to complete UNIT-IV: 14				**No. of classes taken:**		

UNIT-V: Stress distribution in soils and Compressibility characteristics 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
55.	Boussinesq's theory for point load	1	3-4-24		**TLM1**	
56.	Westergaard's theory for point load	1	4-4-24		**TLM1**	
57.	Boussinesq's and Westergaard's theory comparison		8-4-24		**TLM1**	
58.	Approximate methods for stresses and its validilty	1	10-4-24		**TLM1**	
59.	Computation of stresses beneath circular and Square loaded areas	1	12-4-24		**TLM3**	
60.	Concept of pressure bulb	1	15-4-24		**TLM1**	
61.	Newmarks chart and its application		16-4-24		**TLM1**	
62.	Terzaghi's theory of 1- D consolidation	1	18-4-24		**TLM1**	
63.	Concept consolidation	1	19-4-24		**TLM3**	
64.	Consolidometer test	1	22-4-24		**TLM1**	
65.	consolidation settlement	1	23-4-24		**TLM1**	
66.	Problems	1	25-4-25		**TLM1**	
67.	Problems	1	26-4-25		**TLM3**	
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 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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**M.Karthik kumar**	**M.Karthik kumar**	**B Narasimharao**	**Dr. J.Venkateswarao**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr.J.Venkateswara Rao
Course Name & Code : STRUCTURAL ANALYSIS & 20CE11
L-T-P Structure : 3-0-0   Credits   : 3
Program/Sem/Sec : B.Tech., CE., IV-Sem.,   A.Y : 2023-24
PRE-REQUISITE : Applied and Solid Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs): Structural analysis is an analytical approach for finding the internal forces, different structural components and their structural behavior due to applied external loads.

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

CO 1	Show the reactions at the supports and joints as well as interior forces of Members subjected to different loads and Boundary Conditions(Understand-L2).
CO 2	Solve for the internal forces in determinate structures viz/ namely arches, cables. (Apply-L3)
CO 3	Identify the appropriate method for determining the deflections of beams(Apply-L3)
CO 4	Solve for the internal forces in indeterminate structures viz/ namely propped cantilevers/fixed and continuous beams (Apply-L3)
CO5	Identify the appropriate method of analysis for computing internal forces, stresses in beams / Trusses subjected to all practical load combinations (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
CO2	2	1										2	2		2
CO3	3	2										3	2		2
CO4	3	2										3	2		2
CO5	3	2										3	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).
TEXTBOOKS
  1. R.Vaidyanathan, Dr.P.Perumal, A Textbook on "Structural Analysis-Volume I& II" Laxmi Publications, Fourth Edition,2016
  2. S.Ramamrutham, R.Narayan, A Textbook on "Theory of Structures" Dhanpat Rai Publications, Ninth Edition, 2018
REFERENCES
  1. Punmia. B. C., Jain, A. K., and Jain, A. K., A Textbook on " Theory of Structures" Laxmi Publications, New Delhi, 2004.
  2. R.C.Hibbeler, A Textbook on "Structural Analysis" Pearson Publications, Ninth Edition, 2018.
  3. T.S. Thandavamoorthy, A Textbook on "Structural Analysis" Oxford Publications, Second Edition, 2012.
  4. Bhavikatti S.S., A Textbook on "Analysis of Structures"-Vol. I & 2, Vikas publications, Fourth Edition, 2013.

<div align="center">**PART-B**</div>

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT I ARCHES AND CABLES :

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.	Interaction	1	02-01-2024		1	
2.	Review on SM	1	03-01-2024		1	
3.	Introduction to Arches-Types	1	04-01-2024		1,2	
4.	Forces in Arch-Eq. conditions	1	05-01-2024		1	
5.	Parabolic Arch with UDL	1	06-01-2024		1	
6.	Normal thrust, Radial Shear in arch	1	09-01-2024		1	
7.	Circular arch requirements	1	10-01-2024		1	
8.	Circular arch-problems	1	11-01-2024		1	
9.	Circular arch-problems	1	12-01-2024		1	
10.	Parabolic arch with typical loading	1	18-01-2024		1	
11.	Tutorial on parabolic arch	1	19-01-2024		1	
12.	Semicircular arch	1	20-01-2024		1	
13.	Max positive and negative BM in arch	1	23-01-2024		1	
14.	Eddy's theorem-Temp effect.	1	24-01-2024		1,2	
15.	Introduction to cables and general cable theorem	1	25-01-2024		1	
16.	Tension in Uniformly loaded cable	1	27-01-2024		1	
17.	Tension in Uniformly loaded cable	1	28-01-2024		1	
18.	Anchor cables	1	30-01-2024		1	
19.	Problems on guided pulley	1	01-02-2024		1	
20.	Problems on Saddle support	1	02-02-2024		1	
21.	Tutorial on cables	1	03-02-2024		1	
No. of classes required to complete UNIT-I: 19				**No. of classes taken:**		

UNIT-II: DEFLECTION OF BEAMS:

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 deflection of beams	1	06-02-2024		1,2	
2.	Double integration method application to Cantilever beam loadings	1	07-02-2024		1	
3.	Double integration method application to Cantilever beam loadings	1	08-02-2024		1	
4.	Double integration method application to simply supported beam loadings	1	09-02-2024		1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
5.	Macaulay's method application to simply supported beam loadings	1	10-02-2024		1	
6.	Macaulay's method application to simply supported beam loadings	1	13-02-2024		1	
7.	Macaulay's method application to simply supported beam loadings	1	14-02-2024		1	
8.	Tutorial	1	15-02-2024		1	
9.	Moment area method application to find deflections in cantilevers	1	16-02-2024		1	
10.	Moment area method application to find deflections in cantilevers	1	17-02-2024		1	
11.	Moment area method application to find deflections in SS beam	1	20-02-2024		1	
12.	Moment area method application to find deflections in SS beam	1	21-02-2024		1	

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

UNIT-III: INTRODUCTION TO INDETERMINATE STRUCTURES AND ENERGY THEOREMS

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.	Static indeterminacy of beams, frames	1	22-02-2024		1,2	
2.	Static indeterminacy of trusses	1	23-02-2024		1,2	
3.	Kinematic indeterminacy of beams, frames, trusses	1	24-02-2024		1,2	
4.	I Mid Examination	1	27-02-2024			
5.	I Mid Examination	1	28-02-2024			
6.	I Mid Examination	1	01-03-2024			
7.	Return of the answer scripts	1	05-03-2024		1	
8.	Introduction to strain energy- axial and shear loads	1	06-03-2024		1	
9.	Strain energy due to bending moment- example	1	07-03-2024		1	
10.	Castigliano's first theorem- applications	1	09-03-2024		1,2	
11.	Deflections in Simple beams	1	12-03-2024		1	
12.	Deflections in Simple beams	1	13-03-2024		1	
13.	Deflections in Simple beams	1	14-03-2024		1	
14.	Deflections in trusses	1	15-03-2024		1	
15.	Deflections in trusses	1	16-03-2024		1	
16.	Castigliano's second theorem-applications	1	19-03-2024		1	
17.	Castigliano's second theorem-applications	1	20-03-2024		1	

No. of classes required to complete UNIT-III: 13   **No. of classes taken:**

UNIT-IV: FIXED BEAMS AND PROPPED CANTILEVERS

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 -fixed beams- differential equations approach	1	21-03-2024		1,2	
2.	Fixed beam with UDL and point load	1	23-03-2024		1,2	
3.	Fixed beam with UVL and couple	1	24-03-2024		1	
4.	Fixed beam with combined loads	1	27-03-2024		1	
5.	Moment area method	1	28-03-2024		1	
6.	Tutorial	1	30-03-2024		1	
7.	Effect of sinking and rotation in fixed beams	1	31-03-2024		1	
8.	Introduction -propped cantilever beams- differential equations approach	1	03-04-2024		1,2	
9.	propped cantilever beams with UDL and point load	1	04-04-2024		1	
10.	Propped cantilever beams with UVL and couple	1	06-04-2024		1	
11.	Tutorial	1	07-04-2024		1	
12.	Deflections in propped cantilever beams	1			1	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

UNIT-V: UNIT-V CONTINUOUS BEAMS AND SLOPE DEFLECTION METHOD:

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.	Derivation of three moment theorem	1	11-04-2024		1,2	
2.	Continuous beams with one end fixed and other	1	12-04-2024		1	
3.	Continuous beams with overhang	1	13-04-2024		1	
4.	Continuous beams with both ends fixed	1	17-04-2024		1	
5.	Continuous beams with varying MI	1	18-04-2024		1	
6.	Continuous beams with support settlement	1	19-04-2024		1	
7.	Tutorial	1	20-04-2024		1	
8.	Introduction to slope deflection method	1	21-04-2024		1,2	
9.	Analysis of continuous beams by slope deflection method	1	24-04-2024		1	
10.	Analysis of continuous beams by slope deflection method	1	25-04-2024		1	
11.	Effect of sinking in slope deflection method	1	26-04-2024		1	
12.	Tutorial	1	27-04-2024		1	
No. of classes required to complete UNIT-IV: 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 (R20Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Module Coordinator	Head of the Department
Name of the Faculty	Dr. J.Venkateswara Rao	Dr.C. Rajamallu	Dr. J.Venkateswara Rao
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr. V. Ramakrishna
Course Name & Code : Universal Human Values-II (20HS01)
L-T-P Structure : 3-0-0   **Credits:** 3
Program/Sem/Sec : B.Tech/IV/A   **A.Y.: 2023-24**

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

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

CO1	Apply the value inputs in life and profession **(Apply – L3)**
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body **(Understand – L2)**
CO3	Understand the role of a human being in ensuring harmony in society **(Understand – L2)**
CO4	Understand the role of a human being in ensuring harmony in the nature and existence. **(Understand – L2)**
CO5	Distinguish between ethical and unethical practices **(Apply – L3)**

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

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

TEXTBOOKS:
1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE:
1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION

S. No.	Topics to be covered	No of classes required	Date of Completion Tentative	Date of Completion Actual	Teaching Learning Methods	HOD Sign
1	Introduction	1	2.1.24		TLM2	
2	Introduction	1	4.1.24		TLM2	
3	Understanding Value Education	1	6.1.24		TLM2	
4	Self Exploration	1	8.1.24		TLM2	
5	Continuous Happiness and Prosperity	1	9.1.24		TLM2	
6	Holistic Development	1	11.1.24		TLM2	
7	Role of Education	1	18.1.24		TLM2	
8	Cases	1	20.1.24		TLM2	
9	Happiness and Prosperity	1	22.1.24		TLM2	
10	Happiness and Prosperity	1	23.1.24		TLM2	
11	Cases	1	25.1.24		TLM2	
12	Fulfilling Basic Human aspirations	1	27.1.24		TLM2	
No. of classes required to complete UNIT-I: 12					**No. of classes taken:**	

UNIT-II: UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!

S. No.	Topics to be covered	No. of Classes Required	Date of Completion Tentative	Date of Completion Actual	Teaching Learning Methods	HOD Sign
1	Understanding human being as a co-existence of the self and Body	1	29.1.24		TLM2	
2	Understanding human being as a co-existence of the self and Body	1	30.1.24		TLM2	
3	Understanding needs of Self and body	1	1.2.24		TLM2	
4	Understanding needs of Self and body	1	3.2.24		TLM2	
5	Body as an instrument of Self	1	5.2.24		TLM2	
6	Body as an instrument of Self	1	6.2.24		TLM2	
7	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	8.2.24		TLM2	
8	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	10.2.24		TLM2	
9	Understanding the harmony of I with the Body	1	12.2.24		TLM2	
10	Correct appraisal of Physical needs	1	13.2.24		TLM2	
11	Meaning of Prosperity in detail	1	15.2.24		TLM2	
No. of classes required to complete UNIT-II: 11					**No. of classes taken:**	

UNIT-III: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP

S. No.	Topics to be covered	No. of Classes Required	Date of Completion Tentative	Actual	Teaching Learning Methods	HOD Sign
1	Understanding values in human-human relationship	1	17.2.24		TLM2	
2	Meaning of Justice	1	19.2.24		TLM2	
3	Fulfillment of Justice	1	20.2.24		TLM2	
4	Trust and respect	1	22.2.24		TLM2	
5	Trust and respect	1	24.2.24		TLM2	
6	Understanding harmony in society	1	4.3.24		TLM2	
7	Understanding harmony in society	1	5.3.24		TLM2	
8	Universal harmonious order in society	1	7.3.24		TLM2	
9	Universal harmonious order in society	1	9.3.24		TLM2	
10	Gratitude as universal value in relationship	1	11.3.24		TLM2	
11	Cases	1	12.3.24		TLM2	
12	Cases	1	14.3.24		TLM2	
No. of classes required to complete UNIT-III: 12					**No. of classes taken:**	

Mid-1: 26.2.24 to 2.3.24

UNIT-IV: UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE – WHOLE EXISTENCE AS COEXISTENCE

S. No.	Topics to be covered	No. of Classes Required	Date of Completion Tentative	Actual	Teaching Learning Methods	HOD Sign
1	Understanding harmony in nature	1	16.3.24		TLM2	
2	Understanding harmony in nature	1	18.3.24		TLM2	
3	Interconnectedness and mutual fulfillment among four orders of nature	1	19.3.24		TLM2	
4	Recyclability and self regulation in Nature	1	21.3.24		TLM2	
5	Understanding existence as co-existence of mutually interacting units	1	23.3.24		TLM2	
6	Understanding existence as co-existence of mutually interacting units	1	26.3.24		TLM2	
7	Understanding existence as co-existence of mutually interacting units	1	28.3.24		TLM2	
8	Holistic perception of harmony at all levels	1	30.3.24		TLM2	
9	Holistic perception of harmony at all levels	1	1.4.24		TLM2	
10	Cases	1	2.4.24		TLM2	
No. of classes required to complete UNIT-IV: 10					**No. of classes taken:**	

UNIT-V: IMPLICATIONS OF THE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

S. No.	Topics to be covered	No. of Classes Required	Date of Completion Tentative	Actual	Teaching Learning Methods	HOD Sign
1	Natural acceptance of human values	1	4.4.24		TLM2	
2	Definitiveness of ethical human conduct	1	6.4.24		TLM2	
3	Basis for humanistic education	1	8.4.24		TLM2	
4	Basis for humanistic constitution	1	13.4.24		TLM2	
5	Basis for humanistic universal order	1	15.4.24		TLM2	
6	Competence in professional ethics	1	16.4.24		TLM2	
7	Strategy for transition from present state to universal human order	1	18.4.24		TLM2	
8	Strategy for transition from present state to universal human order	1	20.4.24		TLM2	
9	Cases	1	22.4.24		TLM2	
10	Cases	1	23.4.24		TLM2	

No. of classes required to complete UNIT-V: 10	No. of classes taken:

Mid-II from 29.4.24 to 4.5.24

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))	D1=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): D+Q+A	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.
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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 test required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Title	Course Instructor	Course Coordinator	HOD
Name of faculty	Dr V. Ramakrishna	Dr B. Srinivasa Rao	Dr J. Venkateswara Rao
Signature			

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : J.RANGAIAH
                           K.HARISH KUMAR

Course Name & Code : H & H M LAB & 20CE57   **Regulation**: R20
L-T-P Structure : 0-0-3   **Credits:** 1.5
Program/Sem/Sec : II B.Tech,. II sem   **A.Y.:** 2023-24

PREREQUISITE : Mechanics of Fluids, Hydraulics and Hydraulic Machinery Systems

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

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

CO1	Develop knowledge on the fundamental principles of fluid flow. (Apply-L3)
CO2	Apply the laws of conservation of mass, energy, and momentum to solve practical problems in fluid mechanics. (Apply-L3)
CO3	Practically visualize the functioning and performance of hydraulic turbines and pumps. (Understand-L2)

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

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

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

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

COURSE: IV SEMESTER   **A.Y: 2023-24**

PART-B

LIST OF EXPERIMENTS

I CYCLE

1. Determination of coefficient of discharge of given Notches

2. Calibration of given Venturimeter.

3. Experiment on Orifice meter set-up

4. Determine of Darcy's Friction Co-efficient

5. Verification of Bernoulli's theorem

II CYCLE

1. Experiment on Friction in pipes.

2. Impact of jet on vanes.

3. Calibration of Turbine Flow Meter.

4. Performance characteristics of Pelton Wheel Turbine.

5. Operating characteristics of Centrifugal Pump.

LIST OF BATCHES

BATCH:A (Wednesday)	BATCH:B (Monday)
A_1 -----22761A0101 to 22761A0106	B_1 ----22761A0132 to 22761A0137
A_2 -----22761A0108 to 22761A0114	B_2 ---- 23765A0102 to 23765A0108
A_3 -----22761A0115 to 22761A0119	B_3 ---- 23765A0109 to 23765A0113
A_4 ----- 22761A0120 to 22761A0126	B_4 ---- 23765A0114 to 23765A0118
A_5 ----- 22761A0127 to 22761A0131	B_5 ---- 23765A0119 to 23765A0123

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

COURSE: IV SEMESTER   **A.Y: 2023-24**

I CYCLE SCHEDULE: BATCH-A (WEDNESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
03/01/2024		Demo	Demo	Demo	Demo	Demo
10/01/2024		A_1	A_2	A_3	A_4	A_5
24/01/2024		A_2	A_3	A_4	A_5	A_1
31/01/2024		A_3	A_4	A_5	A_1	A_2
07/02/2024		A_4	A_5	A_1	A_2	A_3
14/02/2024		A_5	A_1	A_2	A_3	A_4

I CYCLE SCHEDULE: BATCH-B (MONDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
08/01/2024		Demo	Demo	Demo	Demo	Demo
22/01/2024		B_1	B_2	B_3	B_4	B_5
29/01/2024		B_2	B_3	B_4	B_5	B_1
05/02/2024		B_3	B_4	B_5	B_1	B_2
12/02/2024		B_4	B_5	B_1	B_2	B_3
19/02/2024		B_5	B_1	B_2	B_3	B_4

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

II CYCLE SCHEDULE: BATCH-A (WEDNESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
21/02/2024		A_1	A_2	A_3	A_4	A_5
06/03/2024		A_2	A_3	A_4	A_5	A_1
13/03/2024		A_3	A_4	A_5	A_1	A_2
20/03/2024		A_4	A_5	A_1	A_2	A_3
27/03/2024		A_5	A_1	A_2	A_3	A_4
03/04/2024		Repetition Lab				
10/04/2024		Internal Exam				

II CYCLE SCHEDULE: BATCH-B (MONDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
06/03/2024		B_1	B_2	B_3	B_4	B_5
11/03/2024		B_2	B_3	B_4	B_5	B_1
18/03/2024		B_3	B_4	B_5	B_1	B_2
01/03/2024		B_4	B_5	B_1	B_2	B_3
08/04/2024		B_5	B_1	B_2	B_3	B_4
15/04/2024		Repetition Lab				
22/04/2024		Internal Exam				

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

COURSE: IV SEMESTER   **A.Y: 2023-24**

LAB TIME TABLE

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

Batch – A: 22761A0101 to 22761A0131

Batch – B: 22761A0132 to 20761A0137 & 23765A0102 to 21765A0123

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I Mid Examinations	26-02-2024	02-03-2024	1 W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	29-04-2024	04-05-2024	1 W
Preparation and Practicals	06-05-2024	11-05-2024	1 W
Semester End Examinations	13-05-2024	25-05-2024	2 W

Lab-In charge

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Ex. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8,9,10	A=05
Record = **B**	1,2,3,4,5,6,7,8,9,10	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8,9,10	C = 05
Cumulative Internal Examination: A + B + C = 15	1,2,3,4,5,6,7,8,9,10	15
Semester End Examinations = D	1,2,3,4,5,6,7,8,9,10	D = 35
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8,9,10	50

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

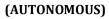|	
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problem
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PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
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	knowledge of, and need for sustainable development.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

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PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands.
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: M. KARTHIK KUMAR
  B. NARASIMHARAO
Course Name & Code : GEOTECHNICAL ENGINEERING LAB & 20CE58 **Regulation**: R20
L-T-P Structure **: 0-0-3** **Credits:** 1.5
Program/Sem/Sec : II B.Tech,IV sem **A.Y.:** 2023-24

PREREQUISITE **:** GEOTECHNICAL ENGINEERING

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course aims to train the students in performing laboratory experiments to find the basic properties soil. The course coverage includes the various field applications of soil.

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

CO1	Identify the tools, equipment required, and experimental procedure used in soil investigation **(Understand-L2)**
CO2	Determine the index and engineering properties of soil **(Apply-L3)**
CO3	Perform field and laboratory tests for soil investigations to compute desired parameters **(Apply-L3)**
CO4	Apply field conditions for computing and analyzing the experimental data **(Understand-L2)**

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

CYCLE-I

1. Determination of specific gravity by Pycnometer method (EXP-I)

2. Particle size distribution curve by Mechanical Sieve Analysis(EXP-II)

3. Determination of Atterberg limits (EXP-III)

4. Determination of field unit weight of soil by Core cutter method (EXP-IV)

5. Determination of field unit weight of soil by Sand replacement method. (EXP-V)

CYCLE-II

6. Determination of coefficient of permeability of Coarse-grained soil by Constant head permeameter. (EXP-VI)

7. Determination of MDD and OMC of given soil by Standard proctor test. (EXP-VII)

8. Determination of MDD and OMC of given soil by Modified proctor test. (EXP-VIII)

9. Determination of shear strength parameters of given soil by direct shear test. (EXP-IX)

10. Determination of shear strength of given soil by Vane Shear test. (EXP-X)

CYCLE-I

DATE	A-1	A-2	A-3	A-4	A-5
08-01-2024	DEMO	DEMO	DEMO	DEMO	DEMO
22-01-2024	EXP-I	EXP-II	EXP-III	EXP-IV	EXP-V
29-01-2024	EXP-II	EXP-III	EXP-IV	EXP-V	EXP-VI
05-02-2024	EXP-III	EXP-IV	EXP-V	EXP-VI	EXP-VII
12-02-2024	EXP-IV	EXP-V	EXP-VI	EXP-VII	EXP-I
19-02-2024	EXP-V	EXP-VI	EXP-VII	EXP-I	EXP-II
DATE	B-1	B-2	B-3	B-4	B-5
02-01-2024	DEMO	DEMO	DEMO	DEMO	DEMO
09-01-2024	EXP-I	EXP-II	EXP-III	EXP-IV	EXP-V
23-01-2024	EXP-II	EXP-III	EXP-IV	EXP-V	EXP-VI
30-01-2024	EXP-III	EXP-IV	EXP-V	EXP-VI	EXP-VII
06-02-2024	EXP-IV	EXP-V	EXP-VI	EXP-VII	EXP-I
13-02-2024	EXP-V	EXP-VI	EXP-VII	EXP-I	EXP-II

| 20-02-2024 | REVISION | REVISION | REVISION | REVISION | REVISION |

CYCLE-II

DATE	A-1	A-2	A-3	A-4	A-5
04-03-2024	EXP-VIII	EXP-IX	EXP-X	EXP-XI	EXP-XII
11-03-2024	EXP-IX	EXP-X	EXP-XI	EXP-XII	EXP-VIII
18-03-2024	EXP-X	EXP-XI	EXP-XII	EXP-VIII	EXP-IX
1-4-2024	EXP-XI	EXP-XII	EXP-VIII	EXP-IX	EXP-X
8-4-2024	EXP-XII	EXP-VIII	EXP-IX	EXP-X	EXP-XI
15-04-2024	REVISION	REVISION	REVISION	REVISION	REVISION
22-04-2024	INTERNAL	INTERNAL	INTERNAL	INTERNAL	INTERNAL
DATE	B-1	B-2	B-3	B-4	B-5
05-03-2024	EXP-VIII	EXP-IX	EXP-X	EXP-XI	EXP-XII
12-03-2024	EXP-IX	EXP-X	EXP-XI	EXP-XII	EXP-VIII
19-03-2024	EXP-X	EXP-XI	EXP-XII	EXP-VIII	EXP-IX
26-03-2024	EXP-XI	EXP-XII	EXP-VIII	EXP-IX	EXP-X
2-4-2024	EXP-XII	EXP-VIII	EXP-IX	EXP-X	EXP-XI
16-04-2024	REVISION	REVISION	REVISION	REVISION	REVISION
23-04-2024	INTERNAL	INTERNAL	INTERNAL	INTERNAL	INTERNAL

BATCHES

BATCH-A	BATCH-B
A1-22761A0101,102,103,104,105	B1-22761A0132,133,134,135,136
A2-22761A0106,108,110,111,113	B2-22761A0137,23765A0102,103,104,105
A3-22761A0114,115,116,117,118	B3-23765A0108,109,110,111,112
A4-22761A0119,120,122,123,124	B4-23765A0113,114,115,116,117
A5- 22761A0126,127,128,129,130,131	B5-23765A0118,119,120, 121,122,123

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A=05
Record = **B**	1,2,3,4,5,6,7,8	B=05
Internal Test = **C**	1,2,3,4,5,6,7,8	C = 05
Cumulative Internal Examination: A + B + C = 15	1,2,3,4,5,6,7,8	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8	**50**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	M. KARTHIK KUMAR	M. KARTHIK KUMAR	B. NARASIMHARAO	Dr. J.Venkateswara rao
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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DEPARTMENT OF CIVIL ENGINEERING

ADVANCED SURVEYING LAB (20CE59)

LIST OF EXPERIMENTS

COURSE: IV SEMESTER   **A. Y: 2023-24**

Pre-requisites: Surveying, Survey Field Work Lab Course Educational Objective:
The course allows the student to gain practical exposure in taking angular measurements, horizontal distances and vertical heights of objects by using advanced surveying equipment.

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

CO1: Obtain angular measurements in the field using theodolite. (Apply-L3)
CO2: Determine the coordinates/elevations/distances of different points in the field using theodolite and total stations. (Apply-L3)
CO3: Operate the total station to take out the measurements for desired objectives. (Apply-L3)
List of Experiments (Any of the 10 experiments are required to be conducted)

THEODOLITE
1. Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Finding the distance between two inaccessible points.
3. Determination of Height and distances – Single plane method & Double plane method.

TACHEOMETRY
1. To determine the distance and elevation of a point using tacheometric stadia system.
2. To determine the distance and elevation of a point using tangential tacheometric system.
3. Tacheometric contouring – Radial method

TOTAL STATION
1. Study of Instrument – Determination of Distances, Directions and Elevations.
2. Determination of Boundaries of a Field and computation of area.
3. Finding the distance between two inaccessible points.

SETTING OUT
1. Setting of simple circular curve using tape and theodolite.
2. Setting of a simple circular curve using Total Station.
3. Setting out for Building.

TEXT BOOK/REFERENCE Laboratory Manual prepared by Civil Engineering Department

Lab-In charge

ADVANCED SURVEYING LAB (20CE59)

COURSE : IV SEMESTER   **A.Y: 2023-24**

I Cycle Schedule: BATCH-A (Tues Day)

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	Introduction- Advanced Survey Lab/ Demo	02-01-2024	
2	1. Determining the Horizontal and Vertical Angles by the method of repetition method.	09-01-2024	
3	2. Finding the distance between two in accessible points.	23-01-2024	
4	3. Determination of Height and distances – Single plane method & Double plane method.	30-01-2024	
5	**TACHEOMETRY** To determine the distance and elevation of a point using tacheometric stadia system.	06-02-2024	
6	To determine the distance and elevation of a point using tangential tacheometric system.	13-02-2024	
7	Tacheometric contouring – Radial method	20-02-2024	

I Cycle Schedule: BATCH-B (Wednesday)

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	Introduction- Advanced Survey Lab/ Demo	03-01-2024	
2	1. Determining the Horizontal and Vertical Angles by the method of repetition method.	10-01-2024	
3	2. Finding the distance between two inaccessible points.	24-01-2024	
4	3. Determination of Height and distances – Single plane method & Double plane method.	31-01-2024	
5	**TACHEOMETRY** To determine the distance and elevation of a point using tacheometric stadia system.	07-02-2024	
6	To determine the distance and elevation of a point using tangential tacheometric system.	14-02-2024	
7	Tacheometric contouring – Radial method	21-02-2024	

Lab-In charge

ADVANCED SURVEYING LAB (20CE59)

COURSE: IV SEMESTER   **A.Y: 2023-24**

II Cycle Schedule: BATCH-A (Tues day)

Sl.No	Name of the Experiment	A_1, A_2, A_3 Tentative Date	A_1, A_2, A_3 Actual Date
1	**TOTAL STATION -** Study of Instrument – Determination of Distances, Directions and Elevations.	05-03-2024	
2	Determination of Boundaries of a Field and computation of area.	12-03-2024	
3	Finding the distance between two inaccessible points.	19-03-2024	
4	**SETTING OUT** -1. Setting of simple circular curve using tape and theodolite.	26-03-2024	
5	Setting of a simple circular curve using Total Station.	02-04-2024	
6	Setting out forBuilding.	09-04-2024	
7	Revision/ Pending Experiments	16-04-2024	
8	Internal Exam-	23-04-2024	

II Cycle Schedule: BATCH-B (Wednesday)

Sl.No	Name of the Experiment	B_1, B_2, B_3 Tentative Date	B_1, B_2, B_3 Actual Date
1	**TOTAL STATION -** Study of Instrument – Determination of Distances, Directions and Elevations.	28-02-2024	
2	Determination of Boundaries of a Field and computation of area.	06-03-2024	
3	Finding the distance between two inaccessible points.	13-03-2024	
4	**SETTING OUT** -1. Setting of simple circular curve using tape and theodolite.	20-03-2024	
5	Setting of a simple circular curve using Total Station.	27-03-2024	
6	Setting out for Building.	10-04-2024	
7	Internal Exam-	24-04-2024	

Lab-In charge

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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.T.Anil Raju / Mr.Ch.Siva Rama Krishna
Course Name & Code : Problem Solving Using MATLAB- 20CES1
Regulation : R20
L-T-P Structure : 1-0-2 **Credits:** 2
Program/Sem/Sec : B.Tech., CIVIL, IV-Sem. **A.Y.:** 2023-24
PREREQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs):

In this course, student will learn about basic operations and functions of MATLAB and apply them for solving civil engineering problems.

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

CO1	Understand the basics of MATLAB programming through simple exercises. (Understanding –L2)
CO2	Apply the MATLAB fundamentals to solve Civil engineering problems. (Apply-L3).

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

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

TEXTBOOKS:

T1	Rudra Pratap., Getting started with MATLAB: A Quick Introduction for Scientists and Engineers

PART-A

UNIT-1:MATLAB 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
1.	Introduction to MATLAB, MATLAB windows, On-line help, Input-output, File types	1	05.01.24			
2.	General commands, Platform dependence, Built-in functions, Tool Boxes.	1	12.01.24			
No. of classes required to complete UNIT-I: 02				**No. of classes taken:**		

UNIT – II: MATLAB COMPUTATIONS

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.	Arithmetic operators, simple additions, Subtraction,	1	19.01.24			

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	Trigonometric values, exponential functions, logarithms multiplications, divisions					
2.	Advanced computations: Working with arrays, script file	1	02.02.24			
3.	Working with function file	1	09.02.24			
4.	Working with files and directories, Publishing Reports	1	16.02.24			

No. of classes required to complete UNIT-I: 04 | | **No. of classes taken:** | |

UNIT – III: MATLAB APPLICATIONS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Matrix Operations-addition, subtraction, multiplication, Inverse Calculations	1	23.02.24			
2.	Creating and Printing simple 2D/3D plots	1	15.03.24			
3.	Solving linear equations	1	22.03.24			
4.	Curve fitting-polynomial curve	1	05.04.24			
5.	Linear fit, Least squares fitting	1	12.04.24			
6.	Interpolation, Simple statistical data analysis	1	19.04.24			
7.	Solving simple ODE problems	1	26.04.24			

No. of classes required to complete UNIT-I: 07 | | **No. of classes taken:** | |

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to MATLAB	3	05.01.24			
2	Arithmetic operators, trigonometric values, exponential functions and logarithms	3	12.01.24			
3	Working with arrays	3	19.01.24			
4	Working with script file, files and directories	3	19.01.24			
5	Creating simple 2D/3D plots, Matrix operations	3	02.02.24			
6	Solving Linear equations	3	09.02.24			
7	Curve fitting-polynomial curve, linear fit, Least squares fitting and Interpolation	3	16.02.24			
8	Statistical data analysis and solving ODE problems	3	23.02.24			
	CYCLE-II(Any three)					
09	Determination of Young's modulus for the given data	3	15.03.24			

	using stress-strain relationship.					
10	Computation of discharge coefficient for flow over a rectangular notch.	3	22.03.24			
11	Determination of shear parameters of a soil sample.	3	05.04.24			
12	Plotting of Longitudinal and cross sectional profile of a given data.	3	12.04.24			
13	Determination of specific energy and hydraulic jump for the given flow parameters.	3	19.04.24			
14	. Plotting SFD and BMD for the given loading conditions of a simple beam.	3	26.04.24			

No. of classes required to complete:12   **No. of classes taken:**

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	**Marks**
Semester End Examinations –Mini project	**50**
Total Marks:	**50**

PART-D

Program Educational Objectives (PEOs):

PEO1: 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.

PEO2: 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.

PEO3: 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 (POs):

PO1 - Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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.

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.

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.

PO5 - 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.

PO6 - 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.

PO7 - 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.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - 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.

PO11 - Project Management and Finance: Demonstrate knowledge and understanding of the ring 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.

PO12 - 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: 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	Course Coordinator	Module Coordinator	Head of the Department
T.Anil Raju/ Mr.Ch Siva Rama Krishna	T.Anil Raju	Dr. G. L.N.Murthy	Dr. V. Rama Krishna