LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC&NBA(UnderTier-I), ISO9001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM   **:** II B. Tech., IV-Sem., CIVIL
ACADEMIC YEAR   **:** 2022-23
COURSE NAME & CODE   **:** PROBABILITY AND STATISTICS
L-T-P STRUCTURE   **:** 3-0-0
COURSE CREDITS   **:** 3
COURSE INSTRUCTOR   **:** M. Rami Reddy
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	31-01-23		TLM1	
2.	Basic concepts of probability	1	02-02-23		TLM1	
3.	problems on basic probability	1	03-02-23		TLM1	
4.	Addition theorem, problems	1	06-02-23		TLM1	
5.	Problems on Addition theorem	1	07-02-23		TLM1	
6.	Multiplication theorem, examples	1	09-02-23		TLM1&2	
7.	Independent events, theorems	1	10-02-23		TLM1	
8.	Problems	1	13-02-23		TLM1	
9.	Baye's theorem, Examples	1	14-02-23		TLM1&2	
10.	Problems on Baye's theorem	1	16-02-23		TLM1	
11.	Random variables, Expectations	1	17-02-23		TLM1	
12.	Problems on PMF	1	20-02-23		TLM1	
13.	Problems on PMF	1	21-02-23		TLM1	
14.	Problems on PDF	1	23-02-23		TLM1	
15.	Problems on PDF	1	24-02-23		TLM1	
No. of classes required to complete UNIT-I: 15				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	27-02-23		TLM1&2	
2.	Problems on Binomial distribution	1	28-02-23		TLM1	
3.	Applications of Binomial	1	02-03-23		TLM1	
4.	Fitting of binomial distribution	1	03-03-23		TLM1	
5.	Poisson distribution, mean and variance	1	06-03-23		TLM1&2	
6.	Problems on Poisson distribution	1	07-03-23		TLM1	
7.	Fitting of Poisson distribution	1	09-03-23		TLM1	
8.	Normal distribution: mean &variance	1	10-03-23		TLM1&2	
9.	Problems on Normal Distribution	1	13-03-23		TLM1	
10.	Problems on Normal Distribution	1	14-03-23		TLM1	
11.	Applications	1	16-03-23		TLM1	
12.	Exponential distribution:	1	17-03-23		TLM1	
No. of classes required to complete UNIT-II: 12				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	20-03-23		TLM1&2	
2.	Sampling distribution of mean, variance	1	21-03-23		TLM1	
3.	Central limit theorem, Examples	1	23-03-23		TLM1	
4.	Problems on Central Limit Theorem	1	24-03-23		TLM1	
5.	**Mid-I examinations**		27-03-23 to 01-04-23			
6.	Estimation –Point and Interval	1	03-04-23		TLM1	
7.	Confidence interval of Mean	1	04-04-23		TLM1&2	
8.	Confidence Interval of mean	1	06-04-23		TLM1	
9.	Confidence Interval of proportion	1	10-04-23		TLM1	
10.	Confidence Interval of proportion	1	11-04-23		TLM1	
11.	Confidence Interval of mean (n<30)	1	13-04-23		TLM1	
12.	problems	1	17-04-23		TLM1	
No. of classes required to complete UNIT-III: 11				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	18-04-23		TLM1&2	
2.	Z-test for single mean	1	20-04-23		TLM1	
3.	Z-test for difference of means	1	21-04-23		TLM1	
4.	Applications on mean tests	1	24-04-23		TLM1	
5.	Z-test for single Proportion	1	25-04-23		TLM1	
6.	Z-test for difference of Proportions	1	27-04-23		TLM1	
7.	t-test for single mean	1	28-04-23		TLM1	
8.	t-test for difference of means	1	01-05-23		TLM1	
9.	Paired t-test	1	02-05-23		TLM1	
10.	Applications on t-tests	1	04-05-23		TLM1	
11.	F-test for variances	1	05-05-23		TLM1	
12.	χ^2-test for goodness of fit	1	08-05-23		TLM1	
13.	χ^2-test for independence of attributes	1	09-05-23		TLM1	
No. of classes required to complete UNIT-IV: 11				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	11-05-23		TLM1&2	
2.	Problems on Pearson's Correlation	1	12-05-23		TLM1	
3.	Regression lines	1	15-05-23		TLM1	
4.	Problems on Regression lines	1	16-05-23		TLM1	
5.	Properties of Regression coefficients	1	18-05-23		TLM1&2	
6.	Problems on Regression coefficients	1	19-05-23		TLM1	
7.	Problems on rank Correlation	1	22-05-23		TLM1	
8.	Problems on repeated ranks	1	23-05-23		TLM1	
9.	Practice problems	1	25-05-23		TLM1	
10.	Revision	1	26-05-23		TLM1	
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/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 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.

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 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
(M.Rami Reddy)	(M.Rami Reddy)	(Dr.A.Rami Reddy)	(Dr.A.Rami Reddy)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor	: S.RAMI REDDY		
Course Name & Code	: H&HMS	**Regulation**: R20	
L-T-P Structure	: 3-0-0	**Credits:** 3	
Program/Sem/Sec	: II B.TECH.,/II SEM	**A.Y.:** 2022-23	

PREREQUISITE: 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, applicationsof 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	-
	1 - Low				**2** –Medium					**3 -** 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.

<div align="center">

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

</div>

UNIT – I: UNIFORM FLOW

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.	Review of basics	1	31-01-2023		TLM1	
2.	Introduction to open channel flow, Classification of flows in channels.	1	02-02-2023		TLM1	
3.	Chezy, manning's, bazin, Kutter's formulae	1	03-02-2023		TLM1	
4.	Most economical Rectangular Sections	1	06-02-2023		TLM1	
5.	Problems	1	07-02-2023		TLM3	
6.	Most economical Trapezoidal Sections	1	09-02-2023		TLM1	
7.	Problems	1	10-02-2023		TLM1	
8.	Problems	1	13-02-2023		TLM1	
9.	Most economical Circular sections-	1	14-02-2023		TLM1	
10.	Problems	1	16-02-2023		TLM3	
11.	Problems	1	17-02-2023		TLM1	
12.	Problems	1	20-02-2023		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT – II: NON – UNIFORM FLOW

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.	Specific energy curves; - critical depth, critical velocity, minimum Specific energy	1	21-02-2023		TLM1	
2.	Problems	1	23-02-2023		TLM3	
3.	Critical flow in rectangular channels	1	24-02-2023		TLM1	
4.	Problems	1	27-02-2023		TLM1	
5.	Gradually Varied Flow: Dynamic equation	1	28-02-2023		TLM1	
6.	Problems	1	02-03-2023		TLM3	
7.	Surface Profiles; Computation of surface profiles by single step method	1	03-03-2023		TLM1	
8.	Back water Curves and Draw down curves	1	06-03-2023		TLM1	
10.	Hydraulic jump Types of hydraulic jumps; Location and applications of hydraulic jump, Energy loss in a hydraulic jump.	1	07-03-2023		TLM1	

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

UNIT-III: BASICS OF TURBO MACHINERY

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.	Stationary flat, inclined and curved vanes,	1	09-03-2023		TLM1	
2.	Problems	1	10-03-2023		TLM3	
3.	Moving flat, inclined vanes,	1	13-03-2023		TLM1	
4.	Problems	1	14-03-2023		TLM1	
5.	Moving curved vanes,	1	16-03-2023		TLM1	
6.	Problems	1	17-03-2023		TLM1	
7.	Problems	1	20-03-2023		TLM3	
8.	Jet striking centrally and at tip	1	21-03-2023		TLM1	
9.	Velocity triangles at inlet and outlet	1	23-03-2023		TLM1	
10.	Expressions for work done and efficiency	1	24-03-2023		TLM1	
11.	Problems	1	03-04-2023		TLM3	
12.	Problems	1	04-04-2023		TLM1	
13.	Angular momentum principle	1	06-04-2023		TLM1	
No. of classes required to complete UNIT-III: 13				No. of classes taken:		

UNIT-IV: HYDRAULIC TURBINES

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.	Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines	1	10-04-2023		TLM1	
2.	Pelton wheel	1	11-04-2023		TLM1	
3.	Problems	1	13-04-2023		TLM3	
4.	Problems	1	17-04-2023		TLM1	
5.	Francis turbine	1	18-04-2023		TLM1	
6.	Problems	1	20-04-2023		TLM1	
7.	Kaplan turbine	1	21-04-2023		TLM1	
8.	Problems	1	24-04-2023		TLM3	
9.	Draft tube – theory and efficiency	1	25-04-2023		TLM1	

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Problems	1	27-04-2023		TLM1	
11.	Specific turbines	1	28-04-2023		TLM1	
12.	Unit speed - unit quantity - unit power	1	01-05-2023		TLM1	
13.	Problems	1	02-05-2023		TLM3	
14.	Specific speed characteristics-geometric similarity-cavitation	1	04-05-2023		TLM1	
No. of classes required to complete UNIT-IV: 14				**No. of classes taken:**		

UNIT-V: PUMPS

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.	Centrifugal Pumps: Classification, work done, , losses and efficiencies,	1	05-05-2023		TLM1	
2.	Minimum starting speed, specific speed	1	08-05-2023		TLM1	
3.	Multistage pumps	1	09-05-2023		TLM1	
4.	Problems	1	11-05-2023		TLM3	
5.	Specific speed, characteristic curves,	1	12-05-2023		TLM1	
6.	NPSH, Cavitation in pumps	1	15-05-2023		TLM1	
7.	Reciprocating Pumps: Types, working, Work done	1	16-05-2023		TLM1	
8.	Problems	1	18-05-2023		TLM3	
9.	Problems	1	19-05-2023		TLM1	
10.	Coefficient of discharge and slip	1	22-05-2023		TLM1	
11.	Effects of acceleration and frictional resistance	1	23-05-2023		TLM1	
12.	Indicator diagrams, separation	1	25-05-2023		TLM1	
13.	Revision	1	26-05-2023		TLM1	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Ma
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 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	S.Rami Reddy	J.Rangaiah	J.Rangaiah	Dr.V.Ramakrishna
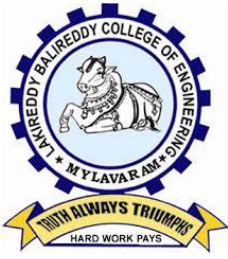
LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
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.,/II SEM	**A.Y.:** 2022-23

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	31-1-23		**TLM1**	
2.	Introduction to soil	1	1-2-23		**TLM1**	
3.	Types of soil	1	4-2-23		**TLM1**	
4.	Physical properties of soil	1	6-2-23		**TLM3**	
5.	Basic definition on mass, volumes	1	7-2-23		**TLM1**	
6.	Basic definition on weights	1	8-2-23		**TLM1**	
7.	Three phase diagram	1	13-2-23		**TLM1**	
8.	Relationships among basic definitions	1	14-2-23		**TLM1**	
9.	Derive an expression on volumes	1	15-2-23		**TLM1**	
10.	Derive an expression on weights	1	20-2-23		**TLM1**	
11.	Derive an expression on saturation	1	21-2-23		**TLM1**	
12.	Derive an expression on unit weights	1	22-2-23		**TLM1**	
13.	Over view of inter relationship	1	25-2-23		**TLM1**	
14.	Classification of soils based on grain size distribution	1	27-2-23		**TLM1**	
15.	Hydrometer analysis	1	28-2-23		**TLM4**	
16.	Problems and Tutorial	1	1-3-23		**TLM3**	
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	4-3-23		**TLM1**	
18.	Determination of LL, PL and SL	1	6-3-23		**TLM4**	
19.	Plasticity characteristics of soil	1	7-3-23		**TLM1**	
20.	Laboratory methods of compaction of soils	1	11-3-23		**TLM4**	
21.	Field compaction methods and factors affecting compaction of soil	1	13-3-23		**TLM1**	
22.	Field compaction control	1	14-3-23		**TLM3**	
23.	Problems	1	15-3-23		**TLM1**	
24.	Problems and Tutorial	1	18-3-23			
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
25.	Darcy's law , Factors affecting permeability	1	20-3-23		**TLM4**	
26.	laboratory determination of permeability of cohesion less and cohesive soils	1	21-3-23		**TLM1**	
27.	Permeability of layered soil deposits	1	25-3-23		**TLM1**	
28.	Terzaghi's effective stress concept	1	3-4-23		**TLM1**	
29.	Seepage flow and seepage pressure	1	4-4-23		**TLM1**	
30.	Quick Sand Condition, Critical hydraulic gradient	1	8-4-23		**TLM1**	
31.	Problems	1	10-4-23		**TLM1**	
32.	Problems and Tutorial	1	11-4-23		**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
33.	Analysis of shear failure	1	12-4-23		**TLM1**	
34.	Shear and normal stress at a point	1	15-4-23		**TLM1**	
35.	Mohr's circle and Tutorial	1	17-4-23		**TLM3**	
36.	Relationship with Mohr's circle	1	18-4-23		**TLM1**	
37.	Mohrs strength theory	1	19-4-23		**TLM4**	
38.	Mohr's coulomd failure theory	1	24-4-23		**TLM1**	
39.	Direct shear test	1	25-4-23		**TLM4**	
40.	Triaxial test	1	26-4-23		**TLM4**	
41.	UCC test	1	29-4-23		**TLM1**	
42.	Vane shear test	1	1-5-23		**TLM3**	
43.	Advantages of triaxial tests	1	2-5-23		**TLM1**	
44.	Classification of shear test based on drainage conditions	1	3-5-23		**TLM1**	
45.	Problems	1	6-5-23		**TLM1**	
46.	Problems	1	8-5-23		**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
47.	Boussinesq's theory& Westergaard's theory for point load	1	9-5-23		**TLM1**	
48.	Boussinesq's and Westergaard's theory comparison	1	10-5-23		**TLM1**	
49.	Approximate methods for stresses and its validilty	1	13-5-23		**TLM1**	
50.	Computation of stresses beneath circular and Square loaded areas	1	15-5-23		**TLM3**	
51.	Concept of pressure bulb and Newmarks chart and its application	1	16-5-23		**TLM1**	
52.	Terzaghi's theory of 1- D consolidation	1	17-5-23		**TLM1**	
53.	Concept consolidation	1	20-5-23		**TLM1**	
54.	Consolidometer test	1	22-5-23		**TLM3**	
55.	consolidation settlement	1	23-5-23		**TLM1**	
56.	Problems	1	24-5-23		**TLM1**	
57.	Problems	1	27-5-23		**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

PART-D
PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

DEPARTMENT OF CIVIL ENGINEERING

Name of Course Instructor : C.Rajamallu
Course Name & Code : Structural Analysis
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech.,CE., IV-Sem., Sections- A A.Y : 2022-2023

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.	Introduction about SA	1	30-1-2023	30-1-2023	TLM1	
2.	Introduction about Arches, Three hinged arches.	1	30-1-2023	30-1-2023	TLM1	
3.	Elastic theory of arches – Eddy's theorem	1	1-2-2023	1-2-2023	TLM1	
4.	Determination of horizontal thrust, bending moment	1	4-2-2023	4-2-2023	TLM1	
5.	Problems on three hinged arches	1	6-2-2023	6-2-2023	TLM1	
6.	Normal thrust and radial shear	1	6-2-2023	6-2-2023	TLM1	
7.	Effect of temperature.	1	8-2-2023	8-2-2023	TLM1	
8.	Problems on three hinged arches	1	11-2-2023	11-2-2023	TLM1	
9.	Introduction to cables, General Cable Theorem	1	13-2-2023	13-2-2023	TLM3	
10.	Uniformly Loaded Cable	1	15-2-2023	15-2-2023	TLM1	
11.	Anchor Cable	1	18-2-2023	18-2-2023	TLM1	
12.	Tutorial-I	1	20-2-2023	20-2-2023	TLM3	
No. of classes required to complete UNIT-I:12				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	20-2-2023	20-2-2023	TLM 1	
2.	Bending into a circular arc, slope, deflection and radius of curvature	1	22-2-2023	22-2-2023	TLM 1	
3.	Differential Equation for the elastic line of a beam	1	25-2-2023	25-2-2023	TLM 1	
4.	Double integration Determination of slope and deflection for cantilever	1	27-2-2023	27-2-2023	TLM 1	
5.	Determination of slope and deflection for simply supported beams	1	27-2-2023	27-2-2023	TLM 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
6.	Macaulay's methods- Determination of slope and deflection for cantilever	1	1-3-2023	1-3-2023	TLM 1	
7.	Determination of slope and deflection for simply supported beams	1	4-3-2023	4-3-2023	TLM 1	
8.	Mohr's theorems – Moment Area method	1	6-3-2023	6-3-2023	TLM 1	
9.	application to simple cases including overhanging beams	1	11-3-2023	11-3-2023	TLM 1	
10.	Problems on Deflection of Beams	1	13-3-2023	13-3-2023	TLM 1	
11.	Tutorial-II	1	13-3-2023	13-3-2023	TLM 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.	Determinacy of static indeterminacies for beams, Frames, Trusses	1	15-3-2023	15-3-2023	TLM1	
2.	Determinacy of kinematic indeterminacies for beams, Frames, Trusses	1	18-3-2023	18-3-2023	TLM1	
3.	Problems on Indeterminate Structures	1	20-3-2023	20-3-2023	TLM1	
4.	Introduction-Strain energy in linear elastic system	1	22-3-2023	22-3-2023	TLM1	
5.	expression of strain energy due to axial load	1	25-3-2023	25-3-2023	TLM1	
6.	bending moment and shear forces	1	3-4-2023	3-4-2023	TLM1	
7.	Castigliano's first theorem-Deflections of simple beams	1	5-4-2023	5-4-2023	TLM3	
8.	pin jointed trusses	1	8-4-2023	8-4-2023	TLM1	
9.	application of Castigliano's second theorem	2	10-4-2023	10-4-2023	TLM1	
10.	Problems on Castigliano's theorems	2	10-4-2023	10-4-2023	TLM1	
11.	Tutorial-III	1	12-4-2023	12-4-2023	TLM1	

No. of classes required to complete UNIT-III:11   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 to Fixed Beams	1	15-4-2023	15-4-2023	TLM1	
2.	statically indeterminate beams with U.D.load central point load	1	17-4-2023	17-4-2023	TLM1	
3.	Eccentric Point Load and Number of point loads	1	17-4-2023	17-4-2023	TLM1	
4.	uniformly varying load	1	19-4-2023	19-4-2023	TLM1	
5.	couple and combination of loads shear force and bending moment diagrams	1	18-5-2023	18-5-2023	TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
6.	Deflection of fixed beams effect of sinking of support	1	24-5-2023	24-5-2023	TLM1	
7.	Effect Of Rotation of A Support	1	26-5-2023	26-5-2023	TLM3	
8.	Analysis of propped cantilevers-shear force and bending moment diagrams	1	29-5-2023	29-5-2023	TLM1	
9.	Deflection of propped cantilevers	1	1-5-2023	1-5-2023	TLM1	
10.	Problems on propped cantilevers	1	3-5-2023	3-5-2023	TLM1	
11.	Tutorial-IV	1	6-5-2023	6-5-2023	TLM3	
No. of classes required to complete UNIT-IV:11				No. of classes taken:		

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.	Introduction-Clapeyron's theorem of three moments	1	8-5-2023	8-5-2023	TLM1	
2.	Analysis of continuous beams with constant moment of inertia	1	8-5-2023	8-5-2023	TLM1	
3.	continuous beams with overhang	1	10-5-2023	10-5-2023	TLM1	
4.	continuous beams with different moment of inertiafor different Spans	1	13-5-2023	13-5-2023	TLM1	
5.	Effects of sinking of supports	1	15-5-2023	15-5-2023	TLM1	
6.	Shear Force and Bending moment diagrams.	1	15-5-2023	15-5-2023	TLM1	
7.	Introduction to slope deflection method, Sign Conventions	1	17-5-2023	17-5-2023	TLM3	
8.	Fundamental Equations	1	20-5-2023	20-5-2023	TLM1	
9.	Continuous Beams with Sinking of Supports.	1	22-5-2023	22-5-2023	TLM1	
10.	Continuous Beams without Sinking of Supports.	1	22-5-2023	22-5-2023	TLM1	
11.	Tutorial-V	1	24-5-2023	24-5-2023	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

Course Instructor	Course Coordinator	Module Coordinator	HOD
C.Rajamallu	C.Rajamallu	B.Ramakrishna	Dr.V.Ramakrishna

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A
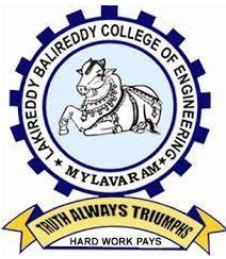
Name of Course Instructor: Dr. V. Ramakrishna
Course Name & Code   : Universal Human Values-II (20HS01)
L-T-P Structure   : 3-0-0   **Credits:** 3
Program/Sem/Sec   : B.Tech/IV/A   **A.Y.:** 2022-23

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

1

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	Actual	Teaching Learning Methods	HOD Sign
1	Introduction	1	1.2.23		TLM1	
2	Introduction	1	3.2.23		TLM1	
3	Understanding Value Education	1	4.2.23		TLM2	
4	Self Exploration	1	6.2.23		TLM2	
5	Continuous Happiness and Prosperity	1	8.2.23		TLM2	
6	Holistic Development	1	10.2.23		TLM2	
7	Role of Education	1	13.2.23		TLM2	
8	Cases	1	15.2.23		TLM2	
9	Happiness and Prosperity	1	17.2.23		TLM2	
10	Happiness and Prosperity	1	20.2.23		TLM2	
11	Cases	1	22.2.23		TLM2	
12	Fulfilling Basic Human aspirations	1	24.2.23		TLM2	
No. of classes required to complete UNIT-I: 12					**No. of classes taken: 12**	

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	Actual	Teaching Learning Methods	HOD Sign
1	Understanding human being as a co-existence of the self and Body	1	25.2.23		TLM2	
2	Understanding human being as a co-existence of the self and Body	1	27.2.23		TLM2	
3	Understanding needs of Self and body	1	1.3.23		TLM2	
4	Understanding needs of Self and body	1	3.3.23		TLM2	
5	Body as an instrument of Self	1	4.3.23		TLM2	
6	Body as an instrument of Self	1	6.3.23		TLM2	
7	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	10.3.23		TLM2	
8	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	20.3.23		TLM2	
9	Understanding the harmony of I with the Body	1	24.3.23		TLM2	
10	Correct appraisal of Physical needs	1	25.3.23		TLM2	
11	Meaning of Prosperity in detail	1	27.3.23		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	Date of Completion Actual	Teaching Learning Methods	HOD Sign
1	Understanding values in human-human relationship	1	3.4.23		TLM2	
2	Meaning of Justice	1	8.4.23		TLM2	
3	Fulfillment of Justice	1	10.4.23		TLM2	
4	Trust and respect	1	12.4.23		TLM2	
5	Trust and respect	1	15.4.23		TLM2	
6	Understanding harmony in society	1	17.4.23		TLM2	
7	Understanding harmony in society	1	19.4.23		TLM2	
8	Universal harmonious order in society	1	21.4.23		TLM2	
9	Universal harmonious order in society	1	24.4.23		TLM2	
10	Gratitude as universal value in relationship	1	26.4.23		TLM2	
11	Cases	1	28.4.23		TLM2	
12	Cases	1	29.4.23		TLM2	
No. of classes required to complete UNIT-III: 12					**No. of classes taken:**	

<mark>**Mid-I from 27-3-2023 to 1-4-2023**</mark>

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	Date of Completion Actual	Teaching Learning Methods	HOD Sign
1	Understanding harmony in nature	1	1.5.23		TLM2	
2	Understanding harmony in nature	1	3.5.23		TLM2	
3	Interconnectedness and mutual fulfillment among four orders of nature	1	5.5.23		TLM2	
4	Recyclability and self regulation in Nature	1	6.5.23		TLM2	
5	Understanding existence as co-existence of mutually interacting units	1	8.5.23		TLM2	
6	Understanding existence as co-existence of mutually interacting units	1	10.5.23		TLM2	
7	Understanding existence as co-existence of mutually interacting units	1	12.5.23		TLM2	
8	Holistic perception of harmony at all levels	1	13.5.23		TLM2	
9	Holistic perception of harmony at all levels	1	15.5.23		TLM2	
10	Cases	1	17.5.23		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	19.5.23		TLM2	
2	Definitiveness of ethical human conduct	1	20.5.23		TLM2	
3	Basis for humanistic education	1	22.5.23		TLM2	
4	Basis for humanistic constitution	1	24.5.23		TLM2	
5	Basis for humanistic universal order	1	26.5.23		TLM2	
6	Competence in professional ethics	1	27.5.23		TLM2	
7	Strategy for transition from present state to universal human order	1	29.5.23		TLM2	
8	Strategy for transition from present state to universal human order	1	31.5.23		TLM2	
9	Cases	1	2.6.23		TLM2	
10	Cases	1	3.6.23		TLM2	
No. of classes required to complete UNIT-V: 10					**No. of classes taken:**	

==Mid-II from 5-6-2023 to 10-6-2023==

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : S.RAMI REDDY&D.MALLIKARJUNARAO
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.:** 2022-23

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: 2022-23**

PART-B

LIST OF EXPERIMENTS

I CYCLE

1. Determination of coefficient of discharge of Mouth-piece apparatus

2. Determination of coefficient of discharge of given Notches

3. Calibration of given Venturimeter.

4. Experiment on Orifice meter set-up

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 (Tuesday)	BATCH:B (Friday)
A_1--------21761A0137 to 21761A0143	B_1------ 21761A0101 to 21761A0108
A_2--------21761A0144,145 &22765A0101 to 105	B_2-------21761A0109 to 21761A0115
A_3--------22765A0106 to 22765A0112	B_3-------21761A0116 to 21761A0122
A_4--------22765A0113 to 22765A0119	B_4-------21761A0123 to 20761A0130
A_5--------22765A0120 to 22765A0125	B_5--------21765A0131 to 21765A0136

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

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

I CYCLE SCHEDULE: BATCH-A (TUESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
31/01/2023		Demo	Demo	Demo	Demo	Demo
07/02/2023		A_1	A_2	A_3	A_4	A_5
14/02/2023		A_2	A_3	A_4	A_5	A_1
21/02/2023		A_3	A_4	A_5	A_1	A_2
28/02/2023		A_4	A_5	A_1	A_2	A_3
07/03/2023		A_5	A_1	A_2	A_3	A_4
14/03/2023		A_1	A_2	A_3	A_4	A_5

I CYCLE SCHEDULE: BATCH-B (FRIDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
03/02/2023		Demo	Demo	Demo	Demo	Demo
10/02/2023		B_1	B_2	B_3	B_4	B_5
17/02/2023		B_2	B_3	B_4	B_5	B_1
24/02/2023		B_3	B_4	B_5	B_1	B_2
03/03/2023		B_4	B_5	B_1	B_2	B_3
10/03/2023		B_5	B_1	B_2	B_3	B_4
17/03/2023		B_1	B_2	B_3	B_4	B_5

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

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

II CYCLE SCHEDULE: BATCH-A (TUESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
21/03/2023		A_1	A_2	A_3	A_4	A_5
04/04/2023		A_2	A_3	A_4	A_5	A_1
11/04/2023		A_3	A_4	A_5	A_1	A_2
18/04/2023		A_4	A_5	A_1	A_2	A_3
25/04/2023		A_5	A_1	A_2	A_3	A_4
02/05/2023		A_1	A_2	A_3	A_4	A_5
09/05/2023		**REPETITION**				
16/05/2023		**REPETITION**				
23/05/2023		**INTERNAL EXAMINATION**				

II CYCLE SCHEDULE: BATCH-B (FRIDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V
24/03/2023		B_1	B_2	B_3	B_4	B_5
21/04/2023		B_2	B_3	B_4	B_5	B_1
28/04/2023		B_3	B_4	B_5	B_1	B_2
05/05/2023		B_4	B_5	B_1	B_2	B_3
12/05/2023		B_5	B_1	B_2	B_3	B_4
19/05/2023		B_1	B_2	B_3	B_4	B_5
26/05/2023		**INTERNAL EXAMINATION**				

Lab-In charge

HYDRAULICS AND HYDRAULIC MACHINERY LAB (20CE57)

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

LAB TIME TABLE

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

Batch – A: 21761A0101-21761A0136=33

Batch – B: 21761A0137-21761A0145 &22765A0101-22765A0125=34

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	30-01-2023	25-03-2023	8W
I Mid Examinations	27-03-2023	01-04-2023	1 W
II Phase of Instructions	03-04-2023	27-05-2023	8 W
II Mid Examinations	05-06-2023	10-06-2023	1 W
Preparation and Practicals	12-06-2023	17-06-2023	1 W
Semester End Examinations	03-07-2023	15-07-2023	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
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	S.Rami Reddy/D.Malli karjuna rao	J.Rangaiah	J.Rangaiah	Dr. V.Ramakrishna
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

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.:** 2022-23

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 water content by over dry method(EXP-I)

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

3. Determination of specific gravity by Pycnometer method. (EXP-III)

4. Determination of Atterberg limits (EXP-IV)

5. Determination of free swell index. (EXP-V)

6. Determination of field unit weight of soil by Core cutter method. EXP-VI

7. Determination of field unit weight of soil by Sand replacement method. EXP- VII

CYCLE-II

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

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

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

11. Determination of shear strength parameters of given soil by direct shear test. (EXP-XI)

12. Determination of undrained shear strength of soil by unconfined compression test. (EXP-XII)

CYCLE-I

DATE	A-1	A-2	A-3	A-4	A-5	A-6
02-02-2023	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
09-02-2023	EXP-I	EXP-II	EXP-III	EXP-IV	EXP-V	EXP-VI
16-02-2023	EXP-II	EXP-III	EXP-IV	EXP-V	EXP-VI	EXP-VII
23-02-2023	EXP-III	EXP-IV	EXP-V	EXP-VI	EXP-VII	EXP-I
02-03-2023	EXP-IV	EXP-V	EXP-VI	EXP-VII	EXP-I	EXP-II
09-03-2023	EXP-V	EXP-VI	EXP-VII	EXP-I	EXP-II	EXP-III
16-03-2023	EXP-VI	EXP-VII	EXP-I	EXP-II	EXP-III	EXP-IV
23-03-2023	EXP- VII	EXP-I	EXP-II	EXP-III	EXP-IV	EXP-V
DATE	B-1	B-2	B-3	B-4	B-5	B-6
03-02-2023	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO

10-02-2023	EXP-I	EXP-II	EXP-III	EXP-IV	EXP-V	EXP-VI
17-02-2023	EXP-II	EXP-III	EXP-IV	EXP-V	EXP-VI	EXP-VII
24-02-2023	EXP-III	EXP-IV	EXP-V	EXP-VI	EXP-VII	EXP-I
03-03-2023	EXP-IV	EXP-V	EXP-VI	EXP-VII	EXP-I	EXP-II
10-03-2023	EXP-V	EXP-VI	EXP-VII	EXP-I	EXP-II	EXP-III
17-03-2023	EXP-VI	EXP-VII	EXP-I	EXP-II	EXP-III	EXP-IV
24-03-2023	EXP- VII	EXP-I	EXP-II	EXP-III	EXP-IV	EXP-V

CYCLE-II

DATE	A-1	A-2	A-3	A-4	A-5	A-6
06-04-2023	EXP-VIII	EXP-IX	EXP-X	EXP-XI	EXP-XII	EXP-VIII
13-04-2023	EXP-IX	EXP-X	EXP-XI	EXP-XII	EXP-VIII	EXP-IX
20-04-2023	EXP-X	EXP-XI	EXP-XII	EXP-VIII	EXP-IX	EXP-X
27-04-2023	EXP-XI	EXP-XII	EXP-VIII	EXP-IX	EXP-X	EXP-XI
04-05-2023	EXP-XII	EXP-VIII	EXP-IX	EXP-X	EXP-XI	EXP-XII
11-05-2023	REVISION	REVISION	REVISION	REVISION	REVISION	REVISION
18-05-2023	REVISION	REVISION	REVISION	REVISION	REVISION	REVISION
25-05-2023	INTERNAL	INTERNAL	INTERNAL	INTERNAL	INTERNAL	INTERNAL
DATE	B-1	B-2	B-3	B-4	B-5	B-6
21-04-2023	EXP-VIII	EXP-IX	EXP-X	EXP-XI	EXP-XII	EXP-VIII
28-04-2023	EXP-IX	EXP-X	EXP-XI	EXP-XII	EXP-VIII	EXP-IX
05-05-2023	EXP-X	EXP-XI	EXP-XII	EXP-VIII	EXP-IX	EXP-X
12-05-2023	EXP-XI	EXP-XII	EXP-VIII	EXP-IX	EXP-X	EXP-XI
19-05-2023	EXP-XII	EXP-VIII	EXP-IX	EXP-X	EXP-XI	EXP-XII
26-05-2023	INTERNAL	INTERNAL	INTERNAL	INTERNAL	INTERNAL	INTERNAL

<div align="center">

BATCHES

</div>

BATCH-B	BATCH-A
B1-21761A0101,102,104,105,106,107	A1-21761A0137,138,139,140,141,142
B2-21761A0108,109,110,111,112,113	A2-21761A0143,144,145,22765A0101,102,103
B3-21761A0114,115,116,117,118,119	A3-22765A0104,105,106,107,108,109
B4-21761A0120,121,122,123,124	A4-22765A0110,111,112,113,114,115
B5- 21761A0125,126,129,130,131	A5-22765A0116,117,118, 119,120
B6-21761A0132,133,134,135,136	A6- 22765A0121,122,123,124,125

<div align="center">

PART-C

</div>

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. V. Ramakrishna**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (Autonomous)
L.B. Reddy Nagar, Mylavaram-521230, A.P, INDIA
Affiliated to JNTUK, Kakinada & Approved by AICTE New Delhi
NAAC Accredited with "A" grade, New Delhi & Certified by ISO 9001:2015
DEPARTMENT OF CIVIL ENGINEERING
http://www.lbrce.ac.in, hodcivil@lbrce.ac.in Ph: 08659-222933, Fax: 08659-222931

Name of Course Instructor   : C.Rajamallu

Course Name & Code   : Advanced Survey Field Work (L186)

Program/Sem/Sec   : B.Tech.,CE., IV-Sem., Sections- A   A.Y   : 2022-2023

Lesson plan

COURSE: V SEMESTER   **A.Y: 2022-2023**

I Cycle Schedule: BATCH-A Tuesday)

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	(a) Study of Transit Theodolite	31/01/2023	31/01/2023
	(b) Measurement of Horizontal Angle by Repetition Method	07/02/2023	07/02/2023
2	Closed Traversing using Theodolite Survey	14/02/2023	14/02/2023
3	(a) Measurement of Vertical Angles (b) Heights and Distances - Single Plane Method	21/02/2023	21/02/2023
4	(a) Tacheometer Constants (b) Tacheometry - Stadia System	28/02/2023	28/02/2023

I Cycle Schedule: BATCH-B (Thursday)

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	(a) Study of Transit Theodolite	02/02/2023	02/02/2023
	(b) Measurement of Horizontal Angle by Repetition Method	09/02/2023	09/02/2023
2	Closed Traversing using Theodolite Survey	16/02/2023	16/02/2023
3	(a) Measurement of Vertical Angles (b) Heights and Distances - Single Plane Method	23/02/2023	23/02/2023
4	(a) Tacheometer Constants (b) Tacheometry - Stadia System	02/03/2023	02/03/2023

II Cycle Schedule: BATCH-A (Tuesday)

		Tentative Date	Actual Date
1	(a) Study of Total Station (b) Measurement of Horizontal Angle, Horizontal Distance, Vertical Distance and Vertical Angle [Total Station]	07/03/2023	07/03/2023
2	Area and Perimeter by Total Station	14/03/2023	14/03/2023

3	(a) Stake out of The Given Points by Total Station (b) Remote Distance Measurement (RDM) by Total Station	21/03//2023	21/03//2023
4	(a) Distance Between Two Given Points by Total Station (b) Determine the Point Coordinates by Total Station	28/03/2023	28/03/2023
5	Setting out The Foundation Plan of The Building	04/04/2023	04/04/2023
7	Simple Circular Curve by Linear Method	11/04/2023	11/04/2023
8	Simple Circular Curve by Rankine Method	18/04/2023	18/04/2023
9	Internal Test	25/04/2023	25/04/2023

II Cycle Schedule: BATCH-B (Thursday)

		Tentative Date	Actual Date
1	(a) Study of Total Station (b) Measurement of Horizontal Angle, Horizontal Distance, Vertical Distance and Vertical Angle [Total Station]	09/03/2023	09/03/2023
2	Area and Perimeter by Total Station	16/03/2023	16/03/2023
3	(a) Stake out of The Given Points by Total Station (b) Remote Distance Measurement (RDM) by Total Station	23/03/2023	23/03/2023
4	(a) Distance Between Two Given Points by Total Station (b) Determine the Point Coordinates by Total Station	06/04/2023	06/04/2023
5	Setting out The Foundation Plan of The Building	13/04/2023	13/04/2023
6	Simple Circular Curve by Linear Method	20/04/2023	20/04/2023
7	Simple Circular Curve by Rankine Method	27/04/2023	27/04/2023
8	Internal Test	4/05/2023	4/05/2023

Batch – A: 21761A0101 to 21761A0136

Batch – B: 21761A0137 to 21761A0145 & 22765A0101 to 22765A 0125

C.Rajamallu

Lab-In charge

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.B Rajeswari/Mr.M.Siva Sankara Rao/J.Rangaiah
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.:** 2022-23
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	01.02.23			
2.	General commands, Platform dependence, Built-in functions, Tool Boxes.	1	08.02.23			

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	15.02.23			

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	22.02.23			
3.	Working with function file	1	01.03.23			
4.	Working with files and directories, Publishing Reports	1	15.03.23			
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	05.04.23			
2.	Creating and Printing simple 2D/3D plots	1	12.04.23			
3.	Solving linear equations	1	19.04.23			
4.	Curve fitting-polynomial curve	1	03.05.23			
5.	Linear fit, Least squares fitting	1	10.05.23			
6.	Interpolation, Simple statistical data analysis	1	17.05.23			
7.	Solving simple ODE problems	1	24.05.23			
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	01.02.23			
2	Arithmetic operators, trigonometric values, exponential functions and logarithms	3	08.02.23			
3	Working with arrays	3	15.02.23			
4	Working with script file, files and directories	3	22.02.23			
5	Creating simple 2D/3D plots, Matrix operations	3	01.03.23			
6	Solving Linear equations	3	15.03.23			
7	Curve fitting-polynomial curve, linear fit, Least squares fitting and Interpolation	3	05.04.23			
8	Statistical data analysis and solving ODE problems	3	12.04.23			
CYCLE-II(Any three)						
09	Determination of Young's modulus for the given data	3	19.04.23			

	using stress-strain relationship.						
10	Computation of discharge coefficient for flow over a rectangular notch.	3	26.04.23				
11	Determination of shear parameters of a soil sample.	3	03.05.23				
12	Plotting of Longitudinal and cross sectional profile of a given data.	3	10.05.23				
13	Determination of specific energy and hydraulic jump for the given flow parameters.	3	17.05.23				
14	. Plotting SFD and BMD for the given loading conditions of a simple beam.	3	24.05.23				
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
B.Rajeswari/ M.Siva Sankara Rao	Smt. B. Rajeswari	Dr. G. L.N.Murthy	Dr. V. Rama Krishna