LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & 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, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. K. Bhanu Lakshmi
Course Name & Code **:** Numerical Methods & Integral Calculus & 20FE10
L-T-P Structure **:** 3-1 -0 **Credits:3**
Program/Sem/Sec : II B.Tech/III sem/CIVIL **A.Y.:** 2023 – 24.

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is to enable the students learn Numerical Techniques for solving the equations and apply interpolation techniques. They will also learn about the Fourier analysis of single valued functions, Multiple Integrals in different coordinate systems and Vector differentiation.

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

CO1	Estimate the best fit polynomial for the given tabulated data using Interpolation.(Understand – L2)
CO2	Apply numerical techniques in solving of equations and evaluation of integrals. (Apply – L3)
CO3	Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes. (Apply – L3)
CO4	Generate the single valued functions in the form of Fourier series and obtain Fourier series representation of periodic function. (Apply – L3)
CO5	Evaluate the directional derivative, divergence and angular velocity of a vector function. (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	3	2	-	2	-	-	-	-	-	-	-	1			
CO3	3	2	-	1	-	-	-	-	-	-	-	1			
CO4	3	1	-	-	-	-	-	-	-	-	-	1			
CO5	3	1	-	1	-	-	-	-	-	-	-	1			
1 - Low				**2 –**Medium							**3 -** High				

TEXTBOOKS:

T1	Dr. B.S. Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, New Delhi, 2012.
T2	Dr. B. V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.
T3	S. S. Sastry, "Introductory Methods of Numerical Analysis" 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

REFERENCE BOOKS:

R1	M. D. Greenberg, "Advanced Engineering Mathematics", 2nd Edition, TMH Publications, New Delhi, 2011.
R2	Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & sons, New Delhi, 2011.

R3	W.E. Boyce and R. C. Diprima, " Elementary Differential Equations" , 7th Edition, John Wiley & sons, New Delhi,2011.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Interpolation and Finite Differences

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 the course, Course Outcomes	1	08/08/23		TLM1	
2.	Introduction to UNIT I	1	10/08/23		TLM2	
3.	Forward Differences	1	11/08/23		TLM1	
4.	Backward differences	1	17/08/23		TLM1	
5.	Central Differences	1	17/08/23		TLM1	
6.	Symbolic relations and separation of symbols	1	18/08/23		TLM1	
7.	Symbolic relations and separation of symbols	1	19/08/23		TLM1	
8.	Newton's forward formulae for interpolation	1	22/08/23		TLM1	
9.	Newton's backward formulae for interpolation	1	24/08/23		TLM1	
10.	Lagrange's Interpolation	1	25/08/23		TLM1	
11.	Lagrange's Interpolation	1	26/08/23		TLM1	
12.	Tutorial I	1	2908/23		TLM3	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Numerical solutions of Equations and Numerical Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to UNIT II	1	31/08/23		TLM2	
14.	Algebraic and Transcendental Equations	1	31/08/23		TLM1	
15.	False Position method	1	01/09/23		TLM1	
16.	False Position method	1	02/09/23		TLM1	
17.	Newton- Raphson Method in one variable	1	05/09/23		TLM1	
18.	Newton- Raphson Method applications	1	07/09/23		TLM1	
19.	Trapezoidal rule	1	08/09/23		TLM1	
20.	Simpson's 1/3 Rule	1	12/09/23		TLM1	
21.	Simpson's 3/8 Rule	1	14/09/23		TLM1	
22.	Problems on Numerical Integration	1	15/09/23		TLM3	
23.	Tutorial II	1	16/09/23		TLM3	
24.	Revision on Unit-II	1	19/09/23		TLM3	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: Multiple Integrals

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.	Introduction to Unit-III	1	21/09/23		TLM1	
26.	Double Integrals -Cartesian coordinates	1	22/09/23		TLM1	
27.	Double Integrals- Polar co ordinates	1	23/09/23		TLM1	

28.	Problems	1	26/09/23		TLM1	
29.	Applications to Double integrals (Content Beyond the syllabus)	1	29/09/23		TLM2	
30.	Problems on double integrals	1	30/09/23		TLM1	
I MID EXAMINATIONS (02-10-2023 TO 07-10-2023)						
31.	Triple Integrals - Cartesian coordinates	1	10/10/23		TLM1	
32.	Triple Integrals - Spherical coordinates	1	12/10/23		TLM1	
33.	Change of order of Integration	1	13/10/23		TLM 3	
34.	Change of order of Integration	1	14/10/23		TLM1	
35.	Problems on change of order Integration.	1	17/10/23		TLM1	
36.	Tutorial III	1	19/10/23		TLM1	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Fourier Series

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Introduction to UNIT IV	1	20/10/23		TLM1	
38.	Determination of Fourier coefficients, Even and Odd Functions	1	21/10/23		TLM1	
39.	Fourier Series expansion in the interval $[0,2\pi]$	1	26/10/23		TLM1	
40.	Fourier Series expansion in the interval $[-\pi,\pi]$	1	27/10/23		TLM1	
41.	Fourier Series in an arbitrary interval	1	28/10/23		TLM1	
42.	Fourier series in an arbitrary interval odd and even functions	1	31/10/23		TLM1	
43.	Half-range Sine and Cosine series	1	02/11/23		TLM1	
44.	Half-range Sine and Cosine series	1	03/11/23		TLM1	
45.	Introduction to Fourier transforms (Content Beyond the Syllabus)	1	04/11/23		TLM3	
46.	Miscellaneous Problems on Fourier series	1	07/11/23		TLM2	
47.	Revision on Unit-IV	1	09/11/23		TLM1	
48.	Tutorial IV	1	10/11/23		TLM1	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Vector Differentiation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
49.	Introduction to UNIT V	1	11/11/23		TLM1	
50.	Vector Differentiation	1	14/11/23		TLM1	
51.	Gradient	1	16/11/23		TLM1	
52.	Directional Derivative	1	17/11/23		TLM1	
53.	Divergence	1	18/11/23		TLM1	
54.	Curl	1	21/11/23		TLM1	
55.	Solenoidal and Irrotational functions, potential surfaces	1	23/11/23		TLM1	
56.	Laplacian and second order operators	1	24/11/23		TLM1	
57.	Properties	1	25/11/23		TLM3	

58.	Problems on properties	1	28/11/23		TLM1	
59.	Problems on Irrotational vector	1	30/11/23		TLM1	
60.	Revision on Unit -V	1	01/12/23			
61.	TUTORIAL - V	1	02/12/23			
No. of classes required to complete UNIT-V: 13				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. K. Bhanu Lakshmi**	**Dr. K. R. Kavitha**	**Dr. A. Rami Reddy**	**Dr. A. Rami Reddy**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr V. Ramakrishna
Course Name & Code : 20CE05: Mechanics of Fluids
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech., Civil, A Sec **A.Y.:** 2023-24

PREREQUISITE: Applied Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Understand the basic properties of fluids, and fundamental aspects of fluid mechanics such as pressure, types of flow, conservation of mass, energy, momentum, energy losses, dimensionless numbers & model laws (Understand – L2)
CO2	Determine the pressure at a point using pressure measuring devices and by applying hydrostatic pressure principles, and compute center of pressure for thee given conditions. (Apply-L3)
CO3	Determine the flow parameters using Continuity equation, Bernoulli equation and compute the forces acting on pipe bends. (Apply – L3)
CO4	Compute the energy losses in pipes and estimate the flow parameters in viscous flows using Hagen – Poiseuille equation. (Apply – L3)
CO5	Apply dimensional analysis as a tool in solving problems in the field of fluid mechanics and apply the laws of similarity. (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											1	1		1
CO2	3	2										1	1		1
CO3	3	2										1	1		1
CO4	3	2										1	1		1
CO5	3	2										1	1		1
1 - Low						**2 –**Medium						**3 –** High			

TEXTBOOKS:

T1 R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd.

T2 R.K. Rajput "Textbook of Fluid Mechanics and Hydraulic Machinery", Revised edition, S. Chand & Company, Ltd., New Delhi, 2005.

REFERENCE BOOKS:

R1 K.R. Arora, "Fluid Mechanics, Hydraulic and Hydraulic Machines", Standard Publishers and Distributors, New Delhi, 2005.

R2 A.K. Jain, Fluid Mechanics 2nd edition, Khanna Publishers, Delhi.2001 revised edition, Standard Book Home, New Delhi, 2005.

R3 P.N. Modi, and S.M. Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Rajson Publications Pvt Ltd., Standard Book House, New Delhi, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: FLUID PROPERTIES AND FLUID STATICS

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-Basic Properties	1	9.8.23		TLM1	
2.	Basic properties	1	10.8.23		TLM1	
3.	Viscosity	1	11.8.23		TLM1	
4.	Problems	1	16.8.23		TLM3	
5.	Types of fluids, Surface Tension	1	17.8.23		TLM1	
6.	Capillarity	1	19.8.23		TLM1	
7.	Compressibility and Bulk Modulus	1	23.8.23		TLM1	
8.	Fluid Pressure Basics	1	24.8.23		TLM1	
9.	Peizometer and manometer	1	25.8.23		TLM1	
10.	Differential manometer	1	26.8.23		TLM1	
11.	Inverted manometer	1	30.8.23		TLM1	
12.	Problems	1	31.8.23		TLM3	
13.	Problems	1	1.9.23		TLM3	
No. of classes required to complete UNIT-I: 13						

UNIT-II: HSF ON IMMERSED BODIES AND FLUID KINEMATICS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	HSF on vertical surfaces	1	2.9.23		TLM1	
15.	HSF on inclined surfaces	1	7.9.23		TLM1	
16.	HSF on horizontal surfaces	1	8.9.23		TLM1	
17.	Fluid Kinematics: Types of flow	1	13.9.23		TLM1	
18.	Continuity Equation	1	14.9.23		TLM1	
19.	Velocity potential, Stream function	1	15.9.23		TLM1	
20.	Rotational flows	1	16.9.23		TLM1	
21.	Acceleration	1	20.9.23		TLM1	
22.	Problems	1	21.9.23		TLM3	
23.	Problems	1	22.9.23		TLM3	
24.	Problems	1	23.9.23		TLM3	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: FLUID DYNAMICS

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.	Bernoulli equation	1	27.9.23		TLM1	
26.	Venturimeter	1	29.9.23		TLM1	
27.	Orifice meter	1	30.9.23		TLM1	
28.	Pitot tube	1	11.10.23		TLM1	
29.	Impulse Momentum Equation	1	12.10.23		TLM1	
30.	Problems	1	13.10.23		TLM3	
31.	Problems	1	18.10.23		TLM1	
32.	Flow over notches	1	19.10.23		TLM1	
33.	Flow over notches	1	20.10.23		TLM1	
34.	Problems	1	21.10.23		TLM3	
No. of classes required to complete UNIT-III: 10						

UNIT-IV: CLOSED CONDUIT FLOWS AND HEAD LOSSES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Reynolds experiment	1	25.10.23		TLM1	
36.	Fluid friction-Darcy's law	1	26.10.23		TLM1	
37.	Minor losses	1	27.10.23		TLM1	
38.	Pipes in series, parallel	1	28.10.23		TLM1	
39.	Problems	1	1.11.23		TLM3	
40.	Total energy line and HGL	1	2.11.23		TLM1	
41.	Laminar flow-HP equation	1	3.11.23		TLM1	
42.	Problems	1	4.11.23		TLM3	
43.	Problems	1	8.11.23		TLM3	
No. of classes required to complete UNIT-IV: 9						

UNIT-V: DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Dimensional analysis - Applications	1	9.11.23		TLM1	
45.	Rayleigh method – Problems	1	10.11.23		TLM1	
46.	Buckingham method – Problems	1	15.11.23		TLM1	
47.	Dimensionless numbers	1	16.11.23		TLM1	
48.	Hydraulic models	1	17.11.23		TLM1	
49.	Problems	1	18.11.23		TLM3	
50.	Problems	1	22.11.23		TLM3	
51.	Revision classes	7	23.11.23 to 2.12.23		TLM 3/6	
No. of classes required to complete UNIT-V: 7						

MID-1 Exam: 2.10.23 to 7.10.23, MID-2 Exam: 4.12.23 to 9.12.23

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 OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural, sciences and engineering sciences
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components, processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
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 teamwork**: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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	Module Coordinator	Head of the Department
Name of the Faculty	Dr V. Ramakrishna	Dr V. Ramakrishna	J. Rangaiah	Dr V. Ramakrishna
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.J.Venkateswara Rao
Course Name & Code : SOLID MECHANICS & 20CE06
L-T-P Structure : 2-1-0 Credits : 3
Program/Sem/Sec : B.Tech., CE., III-Sem., A.Y : 2022-23
PRE-REQUISITE : Applied Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course teaches mechanical properties of engineering materials such as tensile, compression strength, torsion & bending strength. The behaviour of beam / Column elements with different support conditions and loading system will be discussed.

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

CO 1	Recall the terminology associated with the structural members viz. bars, beams, column, shafts which are subjected to practical loads. (Remember-L1)
CO 2	Relate the required input parameters for finding the reactions / internal forces in the structural elements subjected to axial, shear, bending and torsional forces (Understand-L2)
CO 3	Solve for the axial, shear, bending and twisting moment in columns/ Beams/ Shafts/ subjected to longitudinal, transverse and twisting loads and their combinations. (Apply-L3)
CO 4	Construct the shear, bending moment and stress variation diagrams at every cross section along the length of determinate structures subjected to applied loads. (Apply-L3)
CO5	Identify the maximum values of stresses/ moments in structural members of various cross sections subjected to axial/ transverse/ torsional loads. (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
CO2	2											2			2
CO3	3											3			2
CO4	3											3			2
CO5	3											3			2

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

TEXT BOOKS

T1 R.K.Bansal, "Introduction to Strength of Materials", Laxmi publications, 6th edition, 2018.

T2 Punmia. B. C., Jain, A. K.Jain. "Strength of Materials and Theory of Structures", Vols. I & II", 9thEdition, Laxmi Publications (P) Ltd, New Delhi, 2004.

REFERENCES

R1 Bhavikatti. S. S., "Strength of Materials", Vikas Publishing House (P) Ltd., New Delhi, Third Edition, 2013

R2 Gere and Timoshenko. "Mechanics of Materials", 6th, PWS Publishing Company, 2009

R3 R.K.Rajput, "Mechanics of Structures", S. Chand Publication Revised Edition, 2007.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: SIMPLE STRESSES AND STRAINS:

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 Solid Mechanics	1	07-08-23		TLM1	
2.	Mechanical Properties of	1	08-08-23		TLM1	
3.	Types of stresses and strains	1	09-08-23		TLM1	
4.	Stress strain diagram and salient features	1	10-08-23		TLM1	
5.	Problems on Stress strain Relationship	1	14-08-23		TLM1	
6.	Analysis of Varying bars	1	16-08-23		TLM1	
7.	Problems on Compound bars	1	17-08-23		TLM1	
8.	Relation between Elastic constants	1	21-08-23		TLM1,2	
9.	Temperature stresses	1	22-08-23		TLM1,2	
10.	Problems on Temperature stresses	1	23-08-23		TLM1,2	
11.	Strain energy concept	1	24-08-23		TLM1,2	
12.	Problems on strain energy	1	28-08-23		TLM1,2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: PRINCIPAL STRESSES AND STRAINS:

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 Principal Stresses	1	29-08-23		TLM1	
2.	Stresses on inclined plane-Uniaxial stress system	1	30-08-23		TLM1	
3.	Stresses on inclined plane-Biaxial & pure shear stress	1	31-08-23		TLM1	
4.	Stresses on inclined plane-Complex stress system	1	04-09-23		TLM1	
5.	Principal stresses and planes	1	05-09-23		TLM1	
6.	Construction of Mohr's circle	1	07-09-23		TLM1,2	
7.	Determination of Principal stresses and planes		11-09-23		TLM1,2	

8.	Determination of Stresses on inclined plane		12-09-23		TLM1,2	
No. of classes required to complete UNIT-II: 8				**No. of classes taken:**		

UNIT-III: SHEAR FORCE AND BENDING MOMENT & FLEXURAL STRESSES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Types of beams and loads on beams	1	13-09-23		TLM1,2	
2.	Reactions in SS beam with elementary loads	1	14-09-23		TLM1,2	
3.	SFD and BMD in SS beam with elementary loading	1	19-09-23		TLM1,2	
4.	SFD and BMD in Cantilever beam with elementary	1	20-09-23		TLM1,2	
5.	SFD and BMD of SS beam with combined loading	1	21-09-23		TLM1,2	
6.	Relation B/W shear force loading and BMD- Loading and BMD from SFD	1	25-09-23		TLM1,2	
7.	Pure bending equation derivation	1	26-09-23		TLM1,2	
8.	Types of problems on bending	1	27-09-23		TLM1,2	
9.	I MID Examinations		03-10-23			
10.	I MID Examinations	1	04-10-23			
11.	I MID Examinations	1	05-10-23			
12.	Finding bending stress in rectangular section	1	09-10-23		TLM1,2	
13.	Finding bending stress in T section	1	10-10-23		TLM1,2	
14.	Finding bending stress in I section	1	11-10-23		TLM1,2	
15.	Design of simple beam for bending	1	12-10-23		TLM1,2	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Shear Stresses & Torsion of Circular Shafts

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.	Horizontal shear stress derivation	1	16-10-23		TLM1,2	
2.	Horizontal shear stress in Rec. sec	1	17-10-23		TLM1,2	
3.	Horizontal shear stress in Circular and Triangular sec	1	18-10-23		TLM1,2	
4.	Horizontal shear stress in I section	1	19-10-23		TLM1,2	
5.	Torsion formula Derivation	1	23-10-23		TLM1,2	
6.	Problems on finding shear stress in shafts	1	28-10-23		TLM1,2	
7.	Problems on finding power transmitted in shafts	1	29-10-23		TLM1,2	
8.	Problems on design of shaft diameter	1	30-10-23		TLM1,2	

9.	Combined bending and Torsion	1	31-10-23		TLM1,2	
10.	Problems on combined torsion	1	01-11-23		TLM1,2	
11.	Review on Unit-IV	1	02-11-23		TLM1	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

UNIT-V: Columns & Direct and Bending Stresses

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.	Terminology in columns and Euler's long column	1	06-11-23		TLM1,2	
2.	Critical load for both ends hinged and fixed support conditions of	1	07-11-23		TLM1,2	
3.	Critical load for one end hinged/free and other end fixed	1	08-11-23		TLM1,2	
4.	Empirical formulae in Columns	1	09-11-23		TLM1,2	
5.	Problems on columns	1	13-11-23		TLM1,2	
6.	Problems on columns	1	14-11-23		TLM1,2	
7.	Introduction to direct and bending stresses	1	15-11-23		TLM1,2	
8.	Stresses due to eccentric loading in columns	1	16-11-23		TLM1,2	
9.	Core of section in rectangular and circular sections	1	20-11-23		TLM1,2	
10.	Determination of stresses in the case of chimneys	1	21-11-23		TLM1,2	
11.	Determination of stresses in the case of dams	1	22-11-23		TLM1,2	
12.	Determination of stresses in the case of dams	1	23-11-23		TLM1,2	
13.	Determination of stresses in the case of retaining walls	1	27-11-23		TLM1,2	
14.	Determination of stresses in the case of retaining walls	1	28-11-23		TLM1,2	
15.	Review on Unit V	1	29-11-23		TLM1	
16.	Review on Unit V	1	30-11-23		TLM1	
No. of classes required to complete UNIT-V: 16				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (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 team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr. J.Venkateswara Rao	Mr.B.Rama Krishna	Dr. V.Rama Krishna
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: EESHWAR RAM.J
Course Name & Code : CONCRTEE TECHNOLOGY & 20CE07
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech, III SEM **A.Y.:** 2023-24

PREREQUISITE: Building Materials

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course aims to teach the basic properties of concrete making materials, various tests on concrete and different admixtures to be used in concrete. The course also provides insight on various types of special concrete and their usage, determination of mix proportions as per IS codes.

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

CO1	Understand the basic ingredients of concrete, their role in the production of concrete and its behavior in the field. (Understand-L2)
CO2	Differentiate the fresh and hardened properties of concrete. (Understand-L2)
CO3	Describe the main operations of concreting i.e., selection of materials and its proportional mixing towards mixing, placing, compaction, curing and finishing. (Understand-L2)
CO4	Perceiving & broadening the knowledge of new concrete types and concrete mix design methods. (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	1	-	-	-	2	-	2	-	-	-	-	-	2	-	2
CO2	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-
CO3	1	-	-	-	2	-	2	-	-	-	-	-	-	-	2
CO4	1	-	-	3	1	2	2	-	-	-	-	3	-	-	3
1 - Low					**2** –Medium							**3** - High			

TEXTBOOKS:

T1 M.S. Shetty, "Concrete Technology" S. Chand & Co., Ltd., Revised Edition - New Delhi, 2003.

T2 Rangwala "Engineering Materials (Material science)" Charotar Publishing House Pvt ltd., Edition-2012.

T3 M.L. Gambhir, "Concrete Technology", Revised Edition - Tata McGraw Hill Publishing Co., New Delhi 1998.

REFERENCE BOOKS:

R1 B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain. "Building Construction"- Laxmi Publications (P) Ltd.

R2 K.T. Krishnaswamy, "Concrete Technology" Dhanpat Rai Publications.

CODE BOOK: IS 10262-2019 "Concrete Mix Design"

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: CONCRETE MAKING MATERIALS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction CO's & PO's, Subject	1	09/08/2023		**TLM2**	
2.	Portland cement –Chemical composition	1	10/08/2023		**TLM2**	
3.	Hydration & types of cement	1	11/08/2023		**TLM2**	
4.	Cement tests and specifications	1	16/08/2023		**TLM2**	
5.	Classification of aggregate –gradation of aggregate	1	17/08/2023		**TLM2**	
6.	fineness modulus – Bulking of sand	1	18/08/2023		**TLM1**	
7.	Tutorial -1	1	19/08/2023		**TLM3**	
8.	Aggregate tests and specifications	1	23/08/2023		**TLM2**	
9.	Alkali aggregate reaction-Quality of mixing water	1	24/08/2023		**TLM2**	
10.	Test – 1/ Assignment	1	25/08/2023			
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: PROPERTIES OF CONCRETE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Properties of fresh concrete – workability	1	26/08/2023		**TLM2**	
12.	Tests- slump, compaction factor, flow test, vee bee consistometer, Kelly ball	1	30/08/2023		**TLM2**	
13.	segregation – bleeding of concrete	1	31/08/2023		**TLM2**	
14.	Properties of hardened concrete-Water / Cement ratio – Abram's Law	1	01/09/2023		**TLM2**	
15.	Gel space ratio –strength development	1	02/09/2023 07/09/2023		**TLM2**	
16.	elastic properties of concrete	1	08/09/2023		**TLM2**	
17.	Tutorial -2	1	13/09/2023		**TLM3**	
18.	Durability and thermal properties	1	14/09/2023		**TLM2**	
19.	Creep and Shrinkage -types of shrinkage	1	15/09/2023 16/09/2023		**TLM2**	
20.	Test – 2/ Assignment	1	20/09/2023			
No. of classes required to complete UNIT-II:10				**No. of classes taken:**		

UNIT-III: QUALITY CONTROL AND ADMIXTURES IN CONCRETE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
21.	Introduction - Quality Control of concrete	2	21/09/2023 22/09/2023		**TLM2**	
22.	techniques –batching –mixing – placing-	2	25/09/2023 26/09/2023		**TLM2**	
23.	transporting ––compacting –finishing-curing	2	27/09/2023 29/09/2023		**TLM2**	

24.	Admixtures- Accelerators – retarders – plasticizers- super plasticizer	1	30/09/2023		**TLM2**	
25.	Admixtures- air entraining agents– workability agents –bonding admixtures	1	11/10/2023		**TLM2**	
26.	Mineral admixtures – silica fume	1	12/10/2023		**TLM2**	
27.	fly ash –blast furnace slag	1	13/10/2023		**TLM2**	
28.	Tutorial -3	1	18/10/2023		**TLM3**	
29.	Test – 3/ Assignment	1	19/10/2023			
No. of classes required to complete UNIT-III:12				**No. of classes taken:**		

UNIT-IV: SPECIAL CONCRETES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Light weight concrete – lightweight aggregate concrete –no fines concrete	2	20/10/2023 21/10/2023		**TLM2**	
31.	high density concrete – Sulphur infiltrated concrete –fiber reinforced concrete	2	25/10/2023 26/10/2023		**TLM2**	
32.	polymer concrete –ready mixed concrete	1	27/10/2023		**TLM2**	
33.	high strength concrete –High performance concrete- Self compacting concrete	1	28/10/2023		**TLM2**	
34.	Bacterial concrete –Shotcrete	1	01/11/2023		**TLM2**	
35.	prepacked concrete-Ferrocement	1	02/11/2023		**TLM2**	
36.	Tutorial -4	1	03/11/2023		**TLM3**	
37.	Test – 4/ Assignment	1	04/11/2023			
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: MIX DESIGN

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38.	Concept of mix design – objects of mix design	1	08/11/2023		**TLM2**	
39.	Factors in the choice of mix proportions	1	09/11/2023 10/11/2023		**TLM2**	
40.	Introduction to different methods of mix design	2	11/11/2023 15/11/2023		**TLM1**	
41.	concrete mix design by I. S method	4	16/11/2023 17/11/2023 18/11/2023 22/11/2023		**TLM1**	
42.	Fly ash concrete mix design by I. S method	2	23/11/2023 24/11/2023		**TLM1**	
43.	Tutorial -5	02	25/11/2023 29/11/2023		**TLM3**	
44.	Test – 5/ Assignment	02	30/11/2023 01/12/2023			
45.	Revision	1	02/12/2023		**TLM2**	
No. of classes required to complete UNIT-V: 15				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty				
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (Autonomous)
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COURSE HANDOUT
PART-A

Name of Course Instructor : B NARASIMHARAO
Course Name & Code : ENGINEERING GEOLOGY & 20CE08
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CE., III-Sem., A.Y : 2023-24

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course introduces the concepts of Geology in civil engineering perspective. The student is exposed to properties of different minerals and rocks. The importance of structural geological features and geophysical principles will be addressed for their interpretation in civil engineering designs.

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

CO 1	Understand and interpret fundamental geological processes and geological formations. (L2-Understand)
CO 2	Differentiate various properties of minerals and rocks. (L2-Understand)
CO 3	Illustrate geological structural features. (L3-Apply)
CO 4	Apply geological principles in civil engineering applications. (L3-Apply)

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

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

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

TEXT BOOKS:

T1 Parbin Singh., "Engineering and General Geology", Katson Publication House, 2009.

T2 ChennaKesavulu N., "Text book of Engineering Geology", Macmillan India Ltd, 2003.

REFERENCE BOOKS:

R1 Legget., "Geology and Engineering", 2nd Edition, McGraw Hill Boom Company, 2006.

R2 Blyth. "Geology for Engineers", 7th Edition, ELBS, 1995.

PART-B

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COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: GENERAL GEOLOGY

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 engineering geology	1	09.08.2023		**TLM2**	
2.	Geology in civil engineering	1	10.08.2023		**TLM2**	
3.	Branches of geology	1	11.08.2023		**TLM2**	
4.	Earth structure	1	16.08.2023		**TLM2**	
5.	Earth composition	1	17.08.2023		**TLM2**	
6.	Continental drift	1	18.08.2023		**TLM2**	
7.	Plate tectonics	1	19.08.2023		**TLM2**	
8.	Weathering- types and products	1	23.08.2023		**TLM2**	
9.	Soil profile	1	24.08.2023		**TLM2**	
10.	Geological work of rivers, wind and sea	1	25.08.2023		**TLM2**	
11.	Seismic zones of India	1	26.08.2023		**TLM2**	
12.	REVISION	1	27.08.2023		**TLM2**	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

UNIT-II: MINEROLOGY

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 minerology	1	30.08.2023		**TLM2**	
2.	Physical properties of minerals	1	31.08.2023		**TLM2**	
3.	Quartz group minerals	1	01.09.2023		**TLM2**	
4.	Feldspar group minerals	1	02.09.2023		**TLM2**	
5.	Pyroxene group minerals	1	07.09.2023		**TLM2**	
6.	Amphibole group minerals	1	08.09.2023		**TLM2**	
7.	Mica group minerals	1	13.09.2023		**TLM2**	
8.	Calcite group minerals	1	14.09.2023		**TLM2**	
9.	Gypsum group minerals	1	15.09.2023		**TLM2**	
10.	Clay group minerals	1	16.09.2023		**TLM2**	
11.	REVISION	1	20.09.2023		**TLM2**	
No. of classes required to complete UNIT-II:11				No. of classes taken:		

UNIT-III: PETROLOGY

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 of petrology	1	21.09.2023		**TLM2**	
2.	Geological classification of rocks- Igneous	1	22.09.2023		**TLM2**	
3.	Sedimentary and Metamorphic rocks	1	23.09.2023		**TLM2**	
4.	Physical classification of rocks	1	27.09.2023		**TLM2**	
5.	Chemical classification of rocks	1	29.09.2023		**TLM2**	

6.	Physical properties of rocks	1	30.09.2023		**TLM2**	
7.	Physical properties of rocks	1	11.10.2023		**TLM2**	
8.	Occurrence of Importance of rocks	1	12.10.2023		**TLM2**	
9.	Granite, Diorite, Dolerite, Gabbro	1	13.10.2023		**TLM2**	
10.	Basalt, Limestone, Conglomerate, Breccia	1	18.10.2023		**TLM2**	
11.	Sand stone, Quartzite, Marble, Gneiss and Schist etc.,	1	19.10.2023		**TLM2**	
12.	REVISION	1	20.10.2023		**TLM2**	
No. of classes required to complete UNIT-III:12				No. of classes taken:		

UNIT- IV: STRUCTURAL GEOLOGY

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 structural geology	1	21.10.2023		**TLM2**	
2.	Dip and strike in structural geology	1	25.10.2023		**TLM2**	
3.	Classification and types of folds and Faults	1	26.10.2023		**TLM2**	
4.	Relevance of Folds	1	27.10.2023		**TLM2**	
5.	Importance of Folds	1	28.10.2023		**TLM2**	
6.	Relevance of Faults	1	01.11.2023		**TLM2**	
7.	Importance of Faults	1	02.11.2023		**TLM2**	
8.	Classification and types of Unconformities and Joints	1	03.11.2023		**TLM2**	
9.	Relevance of Unconformities and Joints	1	04.11.2023		**TLM2**	
10.	Importance of Unconformities and Joints	1	08.11.2023		**TLM2**	
11.	REVISION	1	09.11.2023		**TLM2**	
No. of classes required to complete UNIT-IV:12				No. of classes taken:		

UNIT-V: ENGINEERING APPLICATIONS IN GEOLOGY

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.	Importance of Geophysical studies	1	10.11.2023		**TLM2**	
2.	Introduction of principles of Geophysical studies	1	15.11.2023		**TLM2**	
3.	Gravity method	1	16.11.2023		**TLM2**	
4.	Magnetic method	1	17.11.2023		**TLM2**	
5.	Electrical methods	1	18.11.2023		**TLM2**	
6.	Seismic methods	1	22.11.2023		**TLM2**	
7.	Radio metric methods	1	23.11.2023		**TLM2**	

8.	Geothermal methods	1	24.11.2023		**TLM2**	
9.	Geological considerations in Dams and Reservoirs	1	25.11.2023		**TLM2**	
10.	Geological considerations in Tunnel	1	29.11.2023		**TLM2**	
11.	REVISION	1	30.11.2023		**TLM2**	
12.	REVISION	1	01.12.2023		**TLM2**	
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 (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
CIE-I (Mid-I, Assignment-I. Quiz-I)	30
CIE-II (Mid-II, Assignment-II. Quiz-II)	30
Cumulative Internal Examination (CIE): 75% best and 25% least	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

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NAAC Accredited 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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
(B NARASIMHARAO)	(B NARASIMHARAO)	(B NARASIMHARAO)	(Dr.V.RAMAKRISHNA)

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Shaheda Niloufer
Course Name & Code : Environmental Science & 20MC03
L-T-P Structure : 2-0-0 Credits : 0
Program/Sem/Sec : B.Tech., CE., IV-Sem. A.Y : 2023-24

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs): The purpose of this course is to provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities and how human activities influence our air, water and soil. It also helps in developing an understanding about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO 1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO 2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO 3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 4	Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.

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

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

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

TEXT BOOKS:

T1 Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, 5th Edition, Delhi, 2016.

T2 Mahua Basu, S. Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 1st Edition, Delhi, 2016.

REFERENCE BOOKS:

R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.

R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press, 2nd Edition, New Delhi, 2012.

R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.

R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.

R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

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 of course and course objectives. Introduction of components of Environment	1	07-08-2023		2	
2.	Population explosion and variations among Nations.	1	10-08-2023		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	14-08-2023		2	
4.	Environmental Hazards	1	17-08-2023		2	
5.	Role of Information Technology in environmental management and human health.	1	21-08-2023		2	
No. of classes required to complete UNIT-I: 5				No. of classes taken:		

UNIT-II: NATURAL RESOURCES AND CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and classification of Natural resources, Forest Resources,	1	24-08-2023		2	
2.	Water Resources	1	28-08-2023		2	
3.	Mineral Resources	1	31-08-2023		2	
4.	Food Resources	1	04-09-2023		2	
5.	Food Resources	1	07-09-2023		2	
6.	Food Resources	1	11-09-2023		2	
7.	Energy Resources	1	14-09-2023		2	
No. of classes required to complete UNIT-II: 7				No. of classes taken:		

UNIT-III: ECOLOGY AND BIODIVERSITY

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.	Definition, structure and functions of an ecosystem	1	18-09-2023		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids,	1	21-09-2023		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species, Bio-geographical classification of	1	25-09-2023		2	

	India. India as a mega diversity nation					
4.	Bio-geo-chemical cycles	1	28-09-2023			
5.	**I MID EXAMINATION**	1	05-10-2023			
6.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Assignment in Unit II	1	09-10-2023		2	
7.	Man and wild life conflicts. Endangered and endemic species of India	1	12-10-2023		2,3	
8.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	16-10-2023		2	
No. of classes required to complete UNIT-III: 7				No. of classes taken:		

UNIT-IV : ENVIRONMENTAL POLLUTION

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.	Air Pollution	1	19-10-2023		2	
2.	Causes, effects and control measures of: Water Pollution	1	26-10-2023		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	30-10-2023			
4.	Noise Pollution		02-11-2023			
5.	Solid Waste Management	1	06-11-2023		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	09-11-2023		2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V : ENVIRONMENTAL MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sustainable Development	1	13-11-2023		2	
2.	Climate disruption-Greenhouse effect, ozone layer depletion and acid rain.	1	16-11-2023		2,3	
3.	Stockholm conference	1	20-11-2023		2	
4.	Environmental Impact Assessment (EIA)		23-11-2023		2	
5.	Green building	1	27-11-2023		2	
6.	Revision	1	30-12-2023		3	
7.	II MID EXAMINATIONS	1	04-12-2023		5	
8.	II MID EXAMINATIONS	1	04-12-2023		5	
No. of classes required to complete UNIT-V: 07				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. A. Rami Reddy**
Signature				

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.J.Venkateswara Rao/ Mr. M. Karthik Kumar

Course Name & Code	**:** Solid Mechanics Lab/20CE 54	**Regulation**:R20
L-T-P Structure	**:0-0-3**	**Credits:** 1.5
Program/Sem/Sec	: B.Tech/III	**A.Y.:** 2022-23

PREREQUISITE: Building Materials, Applied Mechanics, Solid Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course aims at providing hands on practice to observe the behaviour and failure patterns of commonly used construction materials subjected to tensile, compressive, torsion and shear loadings. The course also deals with the relative hardness and impact resistance of metals.

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

CO1	: Estimate compressive strength of wood, concrete, brick materials and decide their suitability for the construction purpose
CO2	Determine the tensile strength, hardness/ impact resistance of metals used in construction works comment on their usage (Evaluate-L5)
CO3	Determine the Rigidity /Young's modulus of wood/steel materials (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										3	
CO2	2			3										3	
CO3	2			3										3	
1 - Low				**2 –**Medium							**3 -** High				

TEXTBOOKS:

T1 S. Ramamrutam, "Strength of Materials" Dhanpat Rai Publishing Company (P) Limited, New Delhi

REFERENCE BOOKS:

R1 Strength of Materials Laboratory Manual –Department of Civil Engineering -LBRCE

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.	Study of stress-strain characteristics of mild steel bars by UTM.	1	23-08-23 & 25-08-23		TLM4& TLM6	
2.	Study of stress-strain characteristics of HYSD bars by UTM	1	30-08-23 & 01-09-23		TLM4& TLM6	
3.	Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.	1	06-09-23 & 08-09-23		TLM4& TLM6	
4.	Determination of modulus of elasticity of the material of the beam by conducting bending test on Cantilever beam	1	13-09-23 & 15-09-23		TLM4& TLM6	
5.	Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam with one end overhang.	1	20-09-23 & 22-09-23		TLM4& TLM6	
6.	Determination of modulus of rigidity by conducting torsion test on solid circular shaft	1	27-09-23 & 29-09-23		TLM4& TLM6	
7.	Determination of hardness of the given material by Brinnel's / Vicker's Method.	1	11-10-23 & 13-10-23		TLM4& TLM6	
8.	Determination of hardness of the given material by Rockwell hardness test.	1	18-10-23 & 20-10-23		TLM4& TLM6	
9.	Determination of impact strength of the given material by conducting Charpy / Izod test	1	25-10-23 & 27-10-23		TLM4& TLM6	
10.	Determination of ultimate shear strength of steel by conducting direct shear test	1	01-11-23 & 03-11-23		TLM4& TLM6	
11.	Determination of modulus of rigidity of the material of closely coiled helical spring.	1	08-11-23 & 10-11-23		TLM4& TLM6	
12.	Determination of compressive strength of wood/ brick with grain parallel / perpendicular to loading.	1	15-11-23 & 17-11-23		TLM4& TLM6	
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	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**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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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**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr.J.Venkateswara Rao/ Mr. M. Karthik Kumar	Dr.J.Venkateswara Rao	Dr.V. Rama Krishna
Signature			

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

COURSE HANDOUT

PROGRAM	**:**	B.Tech, III-Sem., CIVIL
ACADEMIC YEAR	**:**	2023-24
COURSE NAME & CODE	**:**	Building Materials and Concrete Technology Lab (20CE55)
L-T-P STRUCTURE	**:**	0-0-3
COURSE CREDITS	**:**	1.5
COURSE INSTRUCTOR	**:**	Sri C. Rajamallu /Sri. K. Harish Kumar
COURSE COORDINATOR	**:**	Sri C. Rajamallu
PRE-REQUISITE	**:**	Concrete Technology, Building Materials

COURSE EDUCATIONAL OBJECTIVE:

The course aims to train the students in performing laboratory experiments to find the basic properties of bricks, tiles, cement, aggregates and concrete

COURSE OUTCOMES:

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

CO1 : Differentiate bricks and tiles based on physical properties
CO2 : Determine the properties of concrete making materials.
CO3 : Identify the properties of concrete

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**3**	**3**	**3**	**1**			**1**			**1**			**3**	**1**	
CO2	**3**	**3**	**3**	**1**			**1**			**1**			**3**	**1**	
CO3	**3**	**3**	**3**	**1**			**1**			**1**			**3**	**1**	
CO4	**3**	**3**	**3**	**1**			**1**			**1**			**3**	**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).

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (Autonomous)
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DEPARTMENT OF CIVIL ENGINEERING

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

LIST OF EXPERIMENTS

COURSE: III SEMESTER **A.Y: 2023-2024**

I CYCLE

1. Classification of bricks by determination of water absorption, shape test, soundness, warping, colour and compressive strength.
2. Determination of a) Normal Consistency of cement b) Fineness of cement using 90 microns IS sieve.
3. Determination of Initial and final setting time of cement.
4. Determination of a) Specific gravity of cement b) Soundness of cement
5. Determination of compressive strength of cement.
6. Determination of fineness modulus of a) Fine aggregate b) Coarse aggregate.

II CYCLE

1. Determination of Bulking of fine aggregate
2. Determination of Bulk density and specific gravity of a) Fine Aggregate b) Coarse Aggregate
3. Determination of workability of concrete by conducting slump cone test.
4. Determination of workability of concrete by conducting compaction factor test.
5. Determination of a) Cube compressive strength b) Split tensile strength of concrete.
6. Non- destructive test on concrete using Rebound Hammer/ Ultrasonic tester.

Lab-In charge

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

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

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

I CYCLE SCHEDULE: BATCH-A (Monday)

Tentative Date of Completion	**Actual Date of Completion**	I	II	III	IV	V	VI
07/08/2023		Demo	Demo	Demo	Demo	Demo	Demo
14/08/2023		A_1	A_2	A_3	A_4	A_5	A_6
21/08/2023		A_6	A_1	A_2	A_3	A_4	A_5
28/08/2023		A_5	A_6	A_1	A_2	A_3	A_4
04/09/2023		A_4	A_5	A_6	A_1	A_2	A_3
11/09/2023		A_3	A_4	A_5	A_6	A_1	A_2
18/09/2023		A_2	A_3	A_4	A_5	A_6	A_1

I CYCLE SCHEDULE: BATCH-B (WEDNESDAY)

Tentative Date of Completion	**Actual Date of Completion**	I	II	III	IV	V	VI
09/08/2023		Demo	Demo	Demo	Demo	Demo	Demo
15/08/2023		B_1	B_2	B_3	B_4	B_5	B_6
22/08/2023		B_6	B_1	B_2	B_3	B_4	B_5
29/08/2023		B_5	B_6	B_1	B_2	B_3	B_4
05/09/2023		B_4	B_5	B_6	B_1	B_2	B_3
12/09/2023		B_3	B_4	B_5	B_6	B_1	B_2
19/09/2023		B_2	B_3	B_4	B_5	B_6	B_1

Lab-In charge

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

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

COURSE: III SEMESTER **A.Y: 2023-2024**

II CYCLE SCHEDULE: BATCH-A (WEDNESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
09/10/2023		A_1	A_2	A_3	A_4	A_5	A_6
16/10/2023		A_6	A_1	A_2	A_3	A_4	A_5
30/10/2023		A_5	A_6	A_1	A_2	A_3	A_4
04/11/2023		A_4	A_5	A_6	A_1	A_2	A_3
11/11/2023		A_3	A_4	A_5	A_6	A_1	A_2
18/11/2023		A_2	A_3	A_4	A_5	A_6	A_1
27/11/2023		***REPITATION LAB***					
29/11/2023		***INTERNAL TEST***					

II CYCLE SCHEDULE: BATCH-B (THURSDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
11/10/2023		B_1	B_2	B_3	B_4	B_5	B_6
18/10/2023		B_6	B_1	B_2	B_3	B_4	B_5
01/11/2023		B_5	B_6	B_1	B_2	B_3	B_4
05/11/2023		B_4	B_5	B_6	B_1	B_2	B_3
12/11/2023		B_3	B_4	B_5	B_6	B_1	B_2
19/11/2023		B_2	B_3	B_4	B_5	B_6	B_1
27/11/2023		***REPITATION LAB***					
29/11/2023		***INTERNAL TEST***					

Lab-In charge

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

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

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

BATCH: A (Monday)	**BATCH: B (Wednesday)**
A_1 -----22761A0101to 22761A0104	B_1 ----22761A01033 to 22761A0137
A_2 -----22761A0105 to 22761A0111	B_2-----LE l to LE 5
A_3 -- 22761A0113 to 22761A0117	B_3 ---- LE 6 to LE 10
A_4 ----- 22761A0118 to 22761A0123	B_4 ---- LE l1 to LE 15
A_5 ----- 22761A0124 to22761A0129	B_5 ---- LE l6 to LE 17
A_6----- 22761A0130 to 22761A0132	B_6----- LE l8 to LE 22

Lab-In charge

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

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

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

LAB TIMETABLE

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

Batch – A: 22761A0101 to 22761A0132

Batch – B: 22761A0133 to LE-22

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	07-08-2023	30-09-2023	8 W
I Mid Examinations	02-10-2023	07-10-2023	1 W
II Phase of Instructions	09-10-2023	02-12-2023	8 W
II Mid Examinations	04-12-2023	09-12-2023	1 W
Preparation and Practical	11-12-2023	16-12-2023	1 W
Semester End Examinations	18-12-2023	30-12-2023	2 W

Lab-In charge

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
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PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Module Coordinator	HOD
(Sri C. Rajamallu)	(Sri 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: B. NARASIMHARAO

Course Name & Code : ENGINEERING GEOLOGY LAB & 20CE56 **Regulation**:R20
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : II B.Tech,. I sem **A.Y.:** 2023-24

PREREQUISITE : NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The laboratory course is intended to impart skills in identifying minerals and rocks based on physical properties. Through these practical sessions a student is equipped to interpret geological structural features in civil engineering perspective.

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

CO1	Demonstrate the importance of geological principles. **(Understand-L2)**
CO2	Distinguish various types of minerals and rocks based on physical properties and physical observations. **(Understand-L2)**
CO3	Interpret structural patterns of various geological structures. **(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	1	1	-	-	-	-	-	-	1	2	-	1	-	-	-
CO2	1	-	-	-	-	-	-	-	1	2	-	1	-	-	-
CO3	1	1	-	-	-	-	1	-	1	2	-	1	-	-	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS/REFERENCE BOOKS:

Laboratory manual developed by Civil Engineering Department

ENGINEERING GEOLOGY LAB—20CE56

LIST OF EXPERIMENTS

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

I CYCLE

1. Description of minerals by physical properties.
2. Identify the given mineral properties: Augite, Aragonite, Actinolite, Asbestos, Barite.
3. Identify the given mineral properties: Bauxite, Beryl, Biotite, Calcite, Corundum.
4. Identify the given mineral properties: Chalcopyrite, Dolomite, Epidote, Feldspar, Garnet.
5. Identify the given mineral properties: Galena, Gypsum, Hornblende, Hyperstrene, Jasper.
6. Identify the given mineral properties: Kynite, Muscovite, Nephelene, Olivine, Manganese ore.

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II CYCLE

1. Identify the given mineral properties: Quartz, Steatite, Serpentine, Stilbite, Talc.
2. Study of Igneous Type of Rocks.
3. Study of Sedimentary Type of Rocks.
4. Study of Metamorphic Type of Rocks.
5. Microscopic study of Minerals and Rocks.
6. Fractures Interpretation in geological maps.

Lab-In charge **Head of the Department**

ENGINEERING GEOLOGY LAB--17CE56

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

I CYCLE SCHEDULE: BATCH-A

Exp / Date	I	II	III	IV	V	VI
07-08-2023	Demo	Demo	Demo	Demo	Demo	Demo
14-08-2023	A_1	A_2	A_3	A_4	A_5	A_6
21-08-2023	A_6	A_1	A_2	A_3	A_4	A_5
28-08-2023	A_5	A_6	A_1	A_2	A_3	A_4
04-09-2023	A_4	A_5	A_6	A_1	A_2	A_3
11-09-2023	A_3	A_4	A_5	A_6	A_1	A_2
25-09-2023	A_2	A_3	A_4	A_5	A_6	A_1

I CYCLE SCHEDULE: BATCH-B

Exp / Date	I	II	III	IV	V	VI
11-08-2023	Demo	Demo	Demo	Demo	Demo	Demo
18-08-2023	B_1	B_2	B_3	B_4	B_5	B_6
25-08-2023	B_6	B_1	B_2	B_3	B_4	B_5
01-09-2023	B_5	B_6	B_1	B_2	B_3	B_4
08-09-2023	B_4	B_5	B_6	B_1	B_2	B_3
15-09-2023	B_3	B_4	B_5	B_6	B_1	B_2
22-09-2023	B_2	B_3	B_4	B_5	B_6	B_1

Lab-In charge **Head of the Department**

ENGINEERING GEOLOGY LAB--17CE56

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

II CYCLE SCHEDULE: BATCH-A

Exp/Date	I	II	III	IV	V	VI
09-10-2023	A_1	A_2	A_3	A_4	A_5	A_6
16-10-2023	A_6	A_1	A_2	A_3	A_4	A_5
30-10-2023	A_5	A_6	A_1	A_2	A_3	A_4
06-11-2023	A_4	A_5	A_6	A_1	A_2	A_3
13-11-2023	A_3	A_4	A_5	A_6	A_1	A_2
20-11-2023	A_2	A_3	A_4	A_5	A_6	A_1
27-11-2023	***INTERNAL***					

II CYCLE SCHEDULE: BATCH-B

Exp / Date	I	II	III	IV	V	VI
13-10-2023	B_1	B_2	B_3	B_4	B_5	B_6
20-10-2023	B_6	B_1	B_2	B_3	B_4	B_5
27-10-2023	B_5	B_6	B_1	B_2	B_3	B_4
03-11-2023	B_4	B_5	B_6	B_1	B_2	B_3
10-11-2023	B_3	B_4	B_5	B_6	B_1	B_2
17-11-2023	B_2	B_3	B_4	B_5	B_6	B_1
24-11-2023	***INTERNAL***					

Lab-In charge **Head of the Department**

ENGINEERNIG GEOLOGY LAB -17CE56

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

LAB TIME -TABLE

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

Batch – A 22761A0101 to 22761A0132(27)
Batch – B: 22761A0133 to Lateral entry Students (LE's)

Lab-In charge **Head of the Department**

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

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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http://lbrce.ac.in/it/index.php,hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGH

COURSE HANDOUT

PART-A

Name of Course Instructor : CH. POORNA VENKATA SRINIVASA RAO
Course Name & Code : PROBLEM SOLVING USING PYTHON (20ITS1)
L-T-P Structure : 1-0-2 Credits : 2
Program/Sem/Sec : B.Tech., Civil., III-Sem. A.Y : 2023-24
PRE-REQUISITE : C Programming

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The Objective of Python course is to lead the students from the basics of writing and running Python scripts in problem solving and to design and implement the modules and understands the working of classes and objects in python.

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

CO 1	Identify various programming constructs available in Python and apply them in solving computational problems. (Apply - L3)
CO 2	Demonstrate data structures available in Python and apply them in solving computational problem. (Apply - L3).
CO 3	Implement modular programming, string manipulations and Object-oriented programming in python. (Apply - L3)
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values

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

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

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

PART-B

Introduction: Language basics and example problems (Two weeks)

a) Implement Python Script for checking the given year is leap year or not.
b) Implement Python Script for finding biggest number among 3 numbers.
c) Implement Python Script for displaying reversal of a number.
d) Implement Python Script to check given number is Armstrong or not.
e) Implement Python Script to print sum of N natural numbers.
f) Implement Python Script to check given number is palindrome or not.
g) Implement Python script to print factorial of a number.
h) Implement Python Script to print all prime numbers within the given range.

Module 1: Exercise Programs on Lists.

a) Write a Python script to display elements of list in reverse order.
b) Write a Python script to find the minimum and maximum elements without using built-in operations in the lists.
c) Write a Python script to remove duplicates from a list.
d) Write a Python script to append a list to the second list.
e) Write a Python script to count the number of strings in a list where the string length is 2 or more.

Module 2: Exercise Programs on Tuples.

a) Write a Python script to create a tuple with different data types.
b) Write a Python script to find the repeated items of a tuple.
c) Write a Python script to replace last value of tuples in a list.
   Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]
   Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]
d) Write a Python script to sort a tuple by its float element.
   Sample data: [('item1', '12.20'), ('item2', '15.10'), ('item3', '24.5')]
   Expected Output: [('item3', '24.5'), ('item2', '15.10'), ('item1', '12.20')]

Module 3: Exercise Programs on Sets.

a) Write a Python script to add member(s) in a set.
b) Write a Python script to perform Union, Intersection, difference and symmetric difference of given two sets.
c) Write Python script to test whether every element in S is in T and every element in T is in S.

Module 4: Exercise Programs on Dictionaries

a) Write a Python script to sort (ascending and descending) a dictionary by value.
b) Write a Python script to check whether a given key already exists or not in a dictionary.
c) Write a Python script to concatenate following dictionaries to create a new one.
   Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60}
   Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}
d) Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys.
e) Write a Python program to map two lists into a dictionary.

Module 5: Exercise Programs on functions and recursion.

a) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.
b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between given range X and Y.
c) Define functions to find mean, median, mode for the given numbers in a list.
d) Define a function which generates Fibonacci series up to n numbers.
e) Implement a python script for factorial of number by using recursion.
f) Implement a python script to find GCD of given two numbers using recursion.

Module 6: Exercise programs on Strings

a) Implement Python Script to perform various operations on string using string libraries.
b) Implement Python Script to check given string is palindrome or not.
c) Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
d) Implement python script that takes a list of words and returns the length of the longest one.

Module 7: Exercise programs on Regular Expressions

a) Write a Python script to check that a string contains only a certain set of characters (in this case a-z, A-Z and 0-9).
b) Write a Python script to check whether password is valid or not.

   Conditions for a valid password are:
   Should have at least one number.
   Should have at least one uppercase and one lowercase character.
   Should have at least one special symbol.
   Should be between 6 to 20 characters long.

Module 8: Exercise programs on Matplotlib Library.

a) Write a Python program to draw a line with suitable label in the X axis, Y axis and a title.

b) Write a Python program to plot two or more lines with legends, different widths and colors.
c) Write a Python program to create multiple plots.
d) Write a Python programming to display a bar chart using different color for each bar.
e) Write a Python programming to create pie chart with a title.
f) Write a Python programming to draw a scatter plot with empty circles taking a random distribution in X and Y and plotted against each other

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Installation and Working on Interpreter Language Basics and Example Programs	3	08.08.2023		TLM4	CO1,CO4	
2.	Module 0 program basic programs	3	22.08.2023		TLM4	CO1,CO4	
3.	Module-1 Programs on Lists	3	29.08.2023		TLM4	CO1,CO4	
4.	Module-2 Programs on Tuples	3	05.09.2023		TLM4	CO2,CO4	
5.	Module-3 Programs on Sets	3	12.09.2023		TLM4	CO2,CO4	
6.	Module- 4 Programs on Dictionaries	3	26.09.2023		TLM4	CO2,CO4	
7.	Module-5 Programs on Functions & Recursions	3	03.10.2023		TLM4	CO3,CO4	
	1st MID Examinations						
8.	Module-6 Exercise programs on Strings	3	10.10.2023		TLM4	CO3,CO4	
9.	Module-7 Exercise programs on Regular Expressions	3	17.10.2023		TLM4	CO3,CO4	
10.	Module-7 Exercise programs on Regular Expressions	3	31.10.2023		TLM4	CO3,CO4	
11.	Module-8 Exercise programs on Matplotlib Library	3	07.11.2023		TLM4	CO3,CO4	
12.	Module-8 Exercise programs on Matplotlib Library	3	14.11.2023		TLM4	CO3,CO4	
13.	Module-8 Exercise programs on Matplotlib Library	3	21.11.2023		TLM4	CO3,CO4	
14.	Internal Lab Exam	3	28.11.2023				

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): for LABORATORY COURSES

(a) Continuous Internal Evaluation(CIE)

Parameter	Marks
Day-to-day work	05
Record	05
Internal test	05
Total	**15**

(a) Semester End Examination (SEE)

Parameter	Marks
Procedure / Algorithm	05
Experimentation/Program execution	10
Internal test	10
Observations/Calculations/Validation	05
Result/Inference	05
Viva voce	05
Total	**35**

PART-D

PROGRAMME 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 modelling 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	**Ethic**s: 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 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.
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	Organize, Analyze and interpret the data to extract meaningful conclusions.
PSO2	Design, Implement and Evaluate a computer-based system to meet desired needs
PSO3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mr. Ch. Poorna Venkata Srinivasa Rao**	**Mr. Ch. Poorna Venkata Srinivasa Rao**	**Dr. K. Phaneendra**	**Dr. B. Srinivasa Rao**
Signature				