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: D. Vijay Kumar
Course Name & Code : Numerical Methods & Integral Calculs&20FE10
L-T-P Structure : 2-1 -0 **Credits:3**
Program/Sem/Sec : II B.Tech/III sem/B **A.Y.:** 2021 - 22

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	-	2	-	-	-	-	-	-	-	1			
CO4	2	1	-	1	-	-	-	-	-	-	-	1			
CO5	3	2	-	2	-	-	-	-	-	-	-	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	26/10/21		TLM1	
2.	Introduction to UNIT I	1	27/10/21		TLM2	
3.	Forward Differences	1	28/10/21		TLM1	
4.	Backward differences	1	30/10/21		TLM1	
5.	Central Differences	1	02/11/21		TLM1	
6.	Symbolic relations and separation of symbols	1	03/11/21		TLM1	
7.	Symbolic relations and separation of symbols	1	04/11/21		TLM1	
8.	Newton's forward formulae for interpolation	1	06/11/21		TLM1	
9.	Newton's backward formulae for interpolation	1	09/11/21		TLM1	
10.	Lagrange's Interpolation	1	10/11/21		TLM1	
11.	TUTORIAL I	1	11/11/21		TLM1	
12.	Lagrange's Interpolation	1	13/11/21		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
1.	Introduction to UNIT II	1	16/11/21		TLM2	
2.	Algebraic and Transcendental Equations	1	17/11/21		TLM1	
3.	False Position method	1	18/11/21		TLM1	
4.	False Position method	1	20/11/21		TLM1	
5.	Newton- Raphson Method in one variable	1	23/11/21		TLM1	
6.	Newton- Raphson Method applications	1	24/11/21		TLM1	
7.	Tutorial II	1	25/11/21		TLM3	
8.	Trapezoidal rule	1	27/11/21		TLM1	
9.	Simpson's 1/3 Rule, Simpson's 3/8 Rule	1	30/11/21		TLM1	
No. of classes required to complete UNIT-II: 9				**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
1.	Introduction to Unit-III	1	01/12/21		TLM2	
2.	Double Integrals -Cartesian coordinates	1	02/12/21		TLM1	
3.	Double Integrals- Polar co ordinates, Spherical Co ordinates	1	04/12/21		TLM1	
4.	Triple Integrals - Cartesian coordinates	1	07/12/21		TLM1	
5.	TUTORIAL - III	1	08/12/21		TLM1	
6.	Triple Integrals - Polar coordinates	1	09/12/21		TLM3	
7.	Triple Integrals - Spherical coordinates	1	11/12/21		TLM 1	

8.	Change of order of Integration	1	21/12/21		TLM1	
9.	Change of order of Integration	1	22/12/21		TLM1	
No. of classes required to complete UNIT-III: 9				**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
1.	Introduction to UNIT IV	1	23/12/21		TLM1	
2.	Determination of Fourier coefficients, Even and Odd Functions	1	28/12/21		TLM1	
3.	Fourier Series in the [0,2pi]	1	29/12/21		TLM1	
4.	Fourier Series in the [0,2pi]	1	30/12/21		TLM1	
5.	Fourier Series in an arbitrary interval	1	04/01/22		TLM1	
6.	TUTORIAL IV	1	05/01/22		TLM3	
7.	Fourier Series in an arbitrary interval	1	06/01/22		TLM1	
8.	Fourier series in an arbitrary interval odd and even functions		08/01/22		TLM1	
9.	Half-range Sine and Cosine series	1	11/01/22		TLM1	
10.	Half-range Sine and Cosine series	1	12/01/22		TLM1	
No. of classes required to complete UNIT-IV: 10				**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
1.	Introduction to UNIT V	1	18/01/22		TLM1	
2.	Vector Differentiation	1	19/01/22		TLM1	
3.	Gradient	1	20/01/22		TLM1	
4.	Directional Derivative	1	22/01/22		TLM1	
5.	Divergence	1	25/01/22		TLM1	
6.	TUTORIAL - VII	1	27/01/22		TLM3	
7.	Curl	1	29/01/22		TLM1	
8.	Solenoidal fields, Irrotational fields, potential surfaces	1	01/02/22		TLM1	
9.	Laplacian, second order operators	1	02/02/22		TLM1	
10.	TUTORIAL - VIII	1	03/02/22		TLM 1	
11.	Properties	1	05/02/22		TLM1	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (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	**D. Vijay Kumar**	**Y.P.C.S. Anil Kumar**	**Dr. A. Rami Reddy**	**Dr. A. Rami Reddy**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : 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 : 2021-22
PRE-REQUISITE : Applied Mechanics

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course teaches about 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	26-10-2021		1	
2.	Mechanical Properties of	1	28-10-2021		1	
3.	Types of stresses and strains	1	29-10-2021		1	
4.	Stress strain diagram and salient features	1	30-10-2021		1	
5.	Problems on Stress strain Relationship	1	02-11-2021		1	
6.	Analysis of Varying bars	1	04-11-2021		1	
7.	Problems on Compound bars	1	05-11-2021		1	
8.	Relation between Elastic constants	1	06-11-2021		1	
9.	Temperature stresses	1	09-11-2021		1	
10.	Problems on Temperature stresses	1	11-11-2021		1	
11.	Strain energy concept	1	12-11-2021		1,2	
12.	Problems on strain energy	1	16-11-2021		1,2	
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	18-11-2021		1	
2.	Stresses on inclined plane-Uniaxial stress system	1	19-11-2021		1	
3.	Stresses on inclined plane-Biaxial & pure shear stress	1	20-11-2021		1	
4.	Stresses on inclined plane-Complex stress system	1	23-11-2021		1	
5.	Principal stresses and planes	1	25-11-2021		1	
6.	Construction of Mohr's circle	1	26-11-2021		1,2	
7.	Determination of Principal stresses and planes		27-11-2021		1,2	
8.	Determination of Stresses on inclined plane		30-11-2021		1	
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	Tentative Date of	Actual Date of	Teaching Learning	HOD Sign

		Required	Completion	Completion	Methods	Weekly
1.	Types of beams and loads on beams	1	02-12-2021		1,2	
2.	Reactions in SS beam with elementary loads	1	03-12-2021		1	
3.	SFD and BMD in SS beam with elementary loading	1	04-12-2021		1	
4.	SFD and BMD in Cantilever beam with elementary	1	07-12-2021		1	
5.	SFD and BMD of SS beam with combined loading	1	09-12-2021		1	
6.	Relation B/W shear force loading and BMD- Loading and BMD from SFD	1	10-12-2021		1	
7.	Pure bending equation derivation	1	11-12-2021		1	
8.	I MID Examinations	1	14-12-2021		1	
9.	I MID Examinations	1	16-12-2021		1	
10.	I MID Examinations	1	17-12-2021		1,2	
11.	Finding bending stress in Rectangular section	1	21-12-2021		1	
12.	Finding bending stress in I,T section	1	23-12-2021		1	
13.	Design of simple beam for bending	1	24-12-2021		1	
No. of classes required to complete UNIT-III: 10				**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	28-12-2021		1,2	
2.	Horizontal shear stress in Rec. sec	1	3012-2021		1,2	
3.	Horizontal shear stress in Circular and Triangular sec	1	31-12-2021		1	
4.	Horizontal shear stress in I section	1	04-01-2022		1	
5.	Torsion formula Derivation	1	06-01-2022		1	
6.	Problems on finding shear stress in shafts	1	07-01-2022		1	
7.	Problems on finding power transmitted in shafts	1	08-01-2022		1	
8.	Problems on design of shaft diameter	1	18-01-2022		1	
9.	Combined bending and Torsion	1	20-01-2022		1,2	
No. of classes required to complete UNIT-V: 9				**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	21-01-2022		1,2	
2.	Critical load for both ends hinged and fixed support conditions of columns	1	22-01-2022		1,2	

3.	Critical load for one end hinged/free and other end fixed	1	25-01-2022		1,2	
4.	Empirical formulae in Columns	1	27-01-2022		1,2	
5.	Introduction to direct and bending stresses	1	28-01-2022		1,2	
6.	Stresses due to eccentric loading in columns	1	29-01-2022		1	
7.	Core of section in rectangular and circular sections	1	30-01-2022		1	
8.	Determination of stresses in the case of chimneys	1	01-02-2022		1	
9.	Determination of stresses in the case of dams	1	03-02-2022		1	
10.	Determination of stresses in the case of retaining walls	1	04-02-2022		1	
11.	Review on Unit V	1	05-02-2022		1	
12.	II MID Examinations		08-02-2022			
13.	II MID Examinations		10-02-2022			
14.	II MID Examinations		11-02-2022			
15.	II MID Examinations		12-02-2022			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: K. HARISH KUMAR
Course Name & Code : CONCRTEE TECHNOLOGY & 20CE07
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech, III SEM **A.Y.:** 2021-22

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	25.10.2021		**TLM2**	
2.	Portland cement –Chemical composition	1	26.10.2021		**TLM2**	
3.	Hydration & types of cement	1	28.10.2021		**TLM2**	
4.	Cement tests and specifications	1	29.10.2021		**TLM2**	
5.	Classification of aggregate –gradation of aggregate	1	01.11.2021		**TLM2**	
6.	fineness modulus – Bulking of sand	1	02.11.2021		**TLM1**	
7.	Tutorial -1	1	05.11.2021		**TLM3**	
8.	Aggregate tests and specifications	1	08.11.2021		**TLM2**	
9.	Alkali aggregate reaction-Quality of mixing water	1	09.11.2021		**TLM2**	
10.	Test – 1/ Assignment	1	11.11.2021			
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
1.	Properties of fresh concrete –workability	1	12.11.2021		**TLM2**	
2.	Tests- slump, compaction factor, flow test, vee bee consistometer, Kelly ball	2	15.11.2021 16.11.2021		**TLM2**	
3.	segregation – bleeding of concrete	1	18.11.2021		**TLM2**	
4.	Properties of hardened concrete-Water / Cement ratio – Abram's Law	1	19.11.2021		**TLM2**	
5.	Gel space ratio –strength development	1	22.11.2021		**TLM2**	
6.	elastic properties of concrete	1	23.11.2021		**TLM2**	
7.	Tutorial -2	1	25.11.2021		**TLM3**	
8.	Durability and thermal properties	1	26.11.2021		**TLM2**	
9.	Creep and Shrinkage -types of shrinkage	1	29.11.2021		**TLM2**	
10.	Test – 2/ Assignment	1	30.11.2021			
No. of classes required to complete UNIT-II:11				**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
1.	Introduction - Quality Control of concrete	2	02.12.2021 03.12.2021		**TLM2**	
2.	techniques –batching –mixing – placing-	2	06.12.2021 07.12.2021		**TLM2**	
3.	transporting ––compacting –finishing-curing	2	09.12.2021 10.12.2021		**TLM2**	
4.	Admixtures- Accelerators – retarders – plasticizers- super plasticizer	1	20.12.2021		**TLM2**	
5.	Admixtures- air entraining agents– workability agents –bonding admixtures	1	21.12.2021		**TLM2**	
6.	Mineral admixtures – silica fume	1	23.12.2021		**TLM2**	
7.	fly ash –blast furnace slag	1	24.12.2021		**TLM2**	
8.	Tutorial -3	1	27.12.2021		**TLM3**	

9.	Test – 3/ Assignment	1	28.12.2021			
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
1.	Light weight concrete – lightweight aggregate concrete –no fines concrete	2	30.12.2021 31.12.2021		**TLM2**	
2.	high density concrete – Sulphur infiltrated concrete –fiber reinforced concrete	2	03.01.2022 04.01.2022		**TLM2**	
3.	polymer concrete –ready mixed concrete	1	06.01.2022		**TLM2**	
4.	high strength concrete –High performance concrete- Self compacting concrete	1	07.01.2022		**TLM2**	
5.	Bacterial concrete –Shotcrete	1	10.01.2022		**TLM2**	
6.	prepacked concrete-Ferrocement	1	11.01.2022		**TLM2**	
7.	Tutorial -4	1	17.01.2022		**TLM3**	
8.	Test – 4/ Assignment	1	18.01.2022			
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
1.	Concept of mix design – objects of mix design	1	20.01.2022		**TLM2**	
2.	Factors in the choice of mix proportions	1	21.01.2022		**TLM2**	
3.	Introduction to different methods of mix design	1	24.01.2022		**TLM1**	
4.	concrete mix design by I. S method	2	25.01.2022 27.01.2022		**TLM1**	
5.	Fly ash concrete mix design by I. S method	2	28.01.2022 31.01.2022		**TLM1**	
6.	Tutorial -5	1	01.02.2022		**TLM3**	
7.	Test – 5/ Assignment	1	03.02.2022			
8.	Revision	1	04.02.2022		**TLM2**	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 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)
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: EESHWAR RAM.J
Course Name & Code **:** ENGINEERING GEOLOGY
L-T-P Structure **:3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech -III **A.Y.:** 2021-22

PREREQUISITE: 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, student will be able to

CO1	: Understand and interpret fundamental geological processes and geological formations. (L2-Understand)
CO2	Differentiate various properties of minerals and rocks. (L2-Understand)
CO3	Illustrate geological structural features. (L3-Apply)
CO4	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															
CO2															
CO3															
CO4															
CO5															
1 - Low			**2 –**Medium							**3 -** High					

TEXTBOOKS:

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 Book Company, 2006.
R2 Blyth. "Geology for Engineers", 7th Edition, ELBS, 1995.
R3 KVGK Gokhale, "Principles of Engineering Geology", B.S Publications, 2005
R4 F.G. Bell, "Fundamental of Engineering Geology", Butterworths Publications, Aditya Books Pvt. Ltd., New Delhi, 1992.
R5 Krynine& Judd, "Principles of Engineering Geology & Geotechnics", CBS Publishers & Distribution, First Edition, 1998.

PART-B

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 Engineering Geology-Discussion CEO&CO	1	27-10-2021			
2.	GENERAL GEOLOGY Geology in Civil Engineering	1	28-10-2021			
3.	Branches of geology – Earth's structure	1	29-10-2021			
4.	composition – Continental drift	1	30-10-2021			
5.	Plate tectonics, Weathering	1	03-11-2021			
6.	products and soil profile	1	05-11-2021			
7.	Geological work of Rivers	1	06-11-2021			
8.	Wind and Sea	1	10-11-2021			
9.	Seismic zones of India.	1	11-11-2021			
No. of classes required to complete UNIT-I: 9				**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.	MINEROLOGY Physical properties of Minerals	1	12-11-2021			
2.	Crystallographic systems	1	17-11-2021			
3.	Silicate structures	1	18-11-2021			
4.	Study of following families of rock forming minerals	1	19-11-2021			
5.	Study of following families of rock forming minerals Quartz,	1	20-11-2021			
6.	Study of following families of rock forming minerals Feldspar,	1	24-11-2021			
7.	Study of following families of rock forming minerals Pyroxene, Amphibole,	1	25-11-2021			
8.	Study of following families of rock forming minerals Mica, Calcite, Gypsum and Clay.	1	26-11-2021			
9.	Study of following families of rock forming minerals Gypsum and Clay	1	27-11-2021			
No. of classes required to complete UNIT-II:				**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.	Classification of Rocks – Igneous, Sedimentary and Metamorphic Rocks	1	01-12-2021			
2.	Origin, Structure,	1	02-12-2021			
3.	texture and Classification - Study of physical properties	1	03-12-2021			
4.	distribution and occurrence of important rock types viz. Granite, Diorite,	1	04-12-2021			

5.	Gabbro, Dolerite	1	08-12-2021			
6.	Basalt,	1	09-12-2021			
7.	Limestone	1	10-12-2021			
8.	Conglomerate,	1	22-12-2021			
9.	Breccia.	1	23-12-2021			
10.	Sandstone, Quartzite	1	24-12-2021			
11.	Marble, Gneiss, and Schist etc.	1	29-12-2021			
No. of classes required to complete UNIT-III:				**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.	Outcrop, Dip and Strike	1	30-12-2021			
2.	Dip	1	31-12-2021			
3.	Strike	1	05-01-2022			
4.	Study of common structures associated with rocks such as Folds	1	06-01-2022			
5.	Study of common structures associated with rocks such as Faults,	1	07-01-2022			
6.	Study of common structures associated with rocks such as Faults,	1	08-01-2022			
7.	Unconformities and Joints.	1	17-01-2022			
8.	classification,	1	18-01-2022			
9.	classification,	1	19-01-2022			
10.	Types- their relevance	1	20-01-2022			
11.	Their relevance importance in civil engineering.	1	21-01-2022			
No. of classes required to complete UNIT-IV:				**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	22-01-2022			
2.	Brief introduction of principles of geophysical studies	1	23-01-2022			
3.	- Gravity method	1	27-01-2022			
4.	Magnetic methods,	1	28-01-2022			
5.	Electrical methods	1	29-01-2022			
6.	Seismic methods	1	30-01-2022			
7.	Radio metric methods	1	02-02-2022			
8.	geothermal method.	1	03-02-2022			
9.	Geological considerations in construction of Dam,	1	04-02-2022			
10.	Reservoir, Tunnel	1	05-02-2022			
No. of classes required to complete UNIT-V:				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (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 modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Eeshwar Ram.J)	(Eeshwar Ram.J)	(B.Narasimha Rao)	(Dr.V.Ramakrishna)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr V. Ramakrishna
Course Name & Code : 20CE05: Mechanics of Fluids
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech., Civil, A Sec **A.Y.:** 2021-22

PREREQUISITE: Python Programming

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.	Basic Properties	1	25.10.21	25.10.21	TLM1	
2.	Viscosity	1	27.10.21	27.10.21	TLM1	
3.	Problems	1	28.10.21	28.10.21	TLM4	
4.	Types of fluids, Surface Tension	1	29.10.21	29.10.21	TLM1	
5.	Capillarity	1	1.11.21	1.11.21	TLM1	
6.	Compressibility and Bulk Modulus	1	3.11.21	3.11.21	TLM1	
7.	Fluid Pressure Basics	1	4.11.21	4.11.21	TLM1	
8.	Peizometer and manometer	1	5.11.21	5.11.21	TLM1	
9.	Differential manometer	1	8.11.21	8.11.21	TLM1	
10.	Inverted manometer	1	10.11.21	10.11.21	TLM1	
11.	Problems	1	18.11.21	18.11.21	TLM4	
12.	Problems	1	19.11.21	19.11.21	TLM4	
No. of classes required to complete UNIT-I: 12						

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
1.	HSF on vertical surfaces	1	22.11.21	22.11.21		
2.	HSF on inclined surfaces	1	24.11.21	26.11.21		
3.	HSF on horizontal surfaces	1	25.11.21			
4.	Fluid Kinematics: Types of flow	1	26.11.21			
5.	Continuity Equation	1	29.11.21			
6.	Velocity potential, Stream function	1	1.12.21			
7.	Rotational flows	1	2.12.21			
8.	Acceleration	1	3.12.21			
9.	Problems	1	6.12.21			
10.	Problems	1	8.12.21			
11.	Problems	1	9.12.21			
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
1.	Bernoulli equation	1	10.12.21			
2.	Venturimeter	1	11.12.21			
3.	Orifice meter	1	13.12.21			
4.	Pitot tube	1	15.12.21			
5.	Impulse Momentum Equation	1	16.12.21			
6.	Problems	1	17.12,21			
7.	Problems	1	20.12.21			
8.	Flow over notches	1	22.12.21			
9.	Flow over notches	1	23.12.21			
10.	Problems	1	24.12.21			
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
1.	Reynolds experiment	1	27.12.21			
2.	Fluid friction-Darcy's law	1	29.12.21			
3.	Minor losses	1	30.12.21			
4.	Pipes in series, parallel	1	31.12.21			
5.	Problems	1	3.1.22			
6.	Total energy line and HGL	1	5.1.22			
7.	Laminar flow-HP equation	1	6.1.22			
8.	Problems	1	7.1.22			
9.	Problems	1	17.1.22			
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
1.	Dimensional analysis - Applications	1	19.1.22			
2.	Rayleigh method – Problems	1	20.1.22			
3.	Buckingham method – Problems	1	21.1.22			
4.	Dimensionless numbers	1	24.1.22			
5.	Hydraulic models	1	27.1.22			
6.	Problems	1	28.1.22			
7.	Problems	1	31.1.22			
No. of classes required to complete UNIT-V: 7						

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				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr. V. Bhagya Lakshmi
Course Name & Code : Environmental Science & 20MC03
L-T-P Structure : 2-0-0 Credits : 0
Program/Sem/Sec : B.Tech., CE., III-Sem., A.Y : 2021-22

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	28-10-2021		2	
2.	Population explosion and variations among Nations.	1	29-10-2021		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	04-11-2021		2	
4.	Environmental Hazards	1	05-11-2021		2	
5.	Role of Information Technology in environmental management and human health.	1	11-11-2021		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	12-11-2021		2	
2.	Water Resources	1	18-11-2021		2	
3.	Mineral Resources	1	19-11-2021		2	
4.	Food Resources	1	25-11-2021		2	
5.	Food Resources	1	26-11-2021		2	
6.	Mineral Resources	1	02-12-2021		2	
No. of classes required to complete UNIT-II: 6				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	03-12-2021		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids, Bio-geo-chemical cycles	1	09-12-2021		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species, Bio-geographical classification of India. India as a mega diversity nation	1	10-12-2021		2	

4.	I MID EXAMINATION		16-12-2021			
5.	I MID EXAMINATION		17-12-2021			
6.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity. Assignment in Unit II	1	23-12-2021		2	
7.	Man and wildlife conflicts. Endangered and endemic species of India	1	24-12-2021		2,3	
8.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	30-12-2021		2	
No. of classes required to complete UNIT-III: 8				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	31-12-2021		2	
2.	Causes, effects and control measures of: Water Pollution Causes, effects and control measures of: Soil Pollution,	1	06-01-2022		2	
3.	Noise Pollution		07-01-2022			
4.	Solid Waste Management		13-01-2022			
5.	Solid Waste Management	1	14-01-2022		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	20-01-2022		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	21-01-2022		2	
2.	Climate disruption- Greenhouse effect, ozone layer depletion and acid rain. Stockholm conference	1	27-01-2022		2,3	
3.	Environmental Impact Assessment (EIA),	1	28-01-2022		2	
4.	Green building,	1	03-02-2022		2,3	
5.	Environmental Law	1	04-02-2022		2,3	
No. of classes required to complete UNIT-V: 05				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. V. Bhagya Lakshmi**	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. A. Rami Reddy**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.J.Venkateswara Rao/ Mrs. P.Keerthi

Course Name & Code : Solid Mechanics Lab/20CE 54 **Regulation**:R20

L-T-P Structure : **Credits:** 1.5

Program/Sem/Sec : B.Tech/III **A.Y.:** 2021-22

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.	Determination of hardness of the given material by Brinnel's / Vicker's Method.	1	01-11-2021 & 06-11-2021		TLM4& TLM6	
2.	Determination of hardness of the given material by Rockwell hardness test.	1	08-11-2021 & 13-11-2021		TLM4& TLM6	
3.	Determination of impact strength of the given material by conducting Charpy / Izod test	1	15-11-2021 & 22-11-2021		TLM4& TLM6	
4.	Determination of ultimate shear strength of steel by conducting direct shear test	1	27-11-2021 & 29-11-2021		TLM4& TLM6	
5.	Study of stress-strain characteristics of mild steel bars by UTM.	1	04-12-2021 & 06-12-2021		TLM4& TLM6	
6.	Study of stress-strain characteristics of HYSD bars by UTM	1	11-12-2021 & 13-12-2021		TLM4& TLM6	
7.	Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.	1	18-12-2021 & 20-12-2021		TLM4& TLM6	
8.	Determination of modulus of elasticity of the material of the beam by conducting bending test on Cantilever beam	1	01-01-2022 & 03-01-2022		TLM4& TLM6	
9.	Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam with one end overhang.	1	08-01-2022 & 10-01-2022		TLM4& TLM6	
10.	Determination of compressive strength of wood/ brick with grain parallel / perpendicular to loading.	1	22-01-2022 & 24-01-2022		TLM4& TLM6	
11.	Determination of modulus of rigidity of the material of closely coiled helical spring.	1	29-01-2022 & 31-01-2022		TLM4& TLM6	
12.	Determination of modulus of rigidity by conducting torsion test on solid circular shaft	1	12-02-2022 & 14-02-2022		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.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	:	B.Tech, III-Sem., CIVIL
ACADEMIC YEAR	:	2021-22
COURSE NAME & CODE	:	Building Materials and Concrete Technology Lab (20CE55)
L-T-P STRUCTURE	:	0-0-3
COURSE CREDITS	:	1.5
COURSE INSTRUCTOR	:	Dr. K.V.Ramana / Sri. K. Harish Kumar
COURSE COORDINATOR	:	Dr. K.V.Ramana
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).

LIST OF EXPERIMENTS

COURSE: III SEMESTER A.Y: 2021-2022

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 90microns 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 Bulking of fine aggregate

II CYCLE

1. Determination of fineness modulus of a) Fine aggregate b) Coarse aggregate.
2. Determination of Bulk density and specific gravity of a) Fine Aggregate b) CoarseAggregate
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

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

COURSE: III SEMESTER A.Y: 2021-22

I CYCLE SCHEDULE: BATCH-A (WEDNESDAY)

Tentative Date of Completion	**Actual Date of Completion**	I	II	III	IV	V	VI
27/10/2021		Demo	Demo	Demo	Demo	Demo	Demo
03/11/2021		A_1	A_2	A_3	A_4	A_5	A_6
10/11/2021		A_6	A_1	A_2	A_3	A_4	A_5
17/11/2021		A_5	A_6	A_1	A_2	A_3	A_4
24/11/2021		A_4	A_5	A_6	A_1	A_2	A_3
01/12/2021		A_3	A_4	A_5	A_6	A_1	A_2
08/12/2021		A_2	A_3	A_4	A_5	A_6	A_1

I CYCLE SCHEDULE: BATCH-B (SATURDAY)

Tentative Date of Completion	**Actual Date of Completion**	I	II	III	IV	V	VI
30/07/2021		Demo	Demo	Demo	Demo	Demo	Demo
06/11/2021		B_1	B_2	B_3	B_4	B_5	B_6
13/11/2021		B_6	B_1	B_2	B_3	B_4	B_5
20/11/2021		B_5	B_6	B_1	B_2	B_3	B_4
27/11/2021		B_4	B_5	B_6	B_1	B_2	B_3
04/12/2021		B_3	B_4	B_5	B_6	B_1	B_2
11/12/2021		B_2	B_3	B_4	B_5	B_6	B_1

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

COURSE: III SEMESTER A.Y: 2021-2022

II CYCLE SCHEDULE: BATCH-A (WEDNESDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
22/12/2021		A_1	A_2	A_3	A_4	A_5	A_6
29/12/2021		A_6	A_1	A_2	A_3	A_4	A_5
05/01/2022		A_5	A_6	A_1	A_2	A_3	A_4
12/01/2022		A_4	A_5	A_6	A_1	A_2	A_3
19/01/2022		A_3	A_4	A_5	A_6	A_1	A_2
26/01/2022		A_2	A_3	A_4	A_5	A_6	A_1
02/02/2022		***INTERNAL TEST***					

II CYCLE SCHEDULE: BATCH-B (THURSDAY)

Tentative Date of Completion	Actual Date of Completion	I	II	III	IV	V	VI
25/12/2021		B_1	B_2	B_3	B_4	B_5	B_6
01/01/2022		B_6	B_1	B_2	B_3	B_4	B_5
08/01/2022		B_5	B_6	B_1	B_2	B_3	B_4
15/01/2022		B_4	B_5	B_6	B_1	B_2	B_3
22/01/2022		B_3	B_4	B_5	B_6	B_1	B_2
29/01/2022		B_2	B_3	B_4	B_5	B_6	B_1
05/02/2022		***INTERNAL TEST***					

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

COURSE: III SEMESTER A.Y: 2021-22

BATCH:A (Wednesday)	**BATCH:B (Saturday)**
A_1 -------20761A0133 to 20761A0137	B_1------ 20761A0101 to 20761A0105
A_2 -------20761A0138 to 20761A0143	B_2 -------20761A0106 to 20761A0111
A_3 -------20761A0144 to 20761A0148	B_3 -------20761A0112 to 20761A0116
A_4 -------- 20761A0149 to 20761A0153	B_4 -------20761A0117 to 20761A0122
A_5 -------- 20761A0154 to 20761A0158	B_4 -------20761A0123 to 20761A0127
A_6-------Lateral Entry	B_6 -------20761A0128 to 20761A0132

BUILDING MATERIALS AND CONCRETE TECHNOLOGY LAB (20CE55)

COURSE: III SEMESTER A.Y: 2021-22

LAB TIMETABLE

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

Batch – A: 20761A0133 to 20761A0158

Batch – B: 20761A0101 to 20761A0132

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.
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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Dr. KVR/ KHK)	(Dr. K.V. Ramana)	(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

ENGINEERING GEOLOGY LAB—20CE56

LIST OF EXPERIMENTS

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

I CYCLE

1. Identify the given mineral properties :Augite, Aragonite, Actinolite, Asbestos, Barite
2. Identify the given mineral properties :Bauxite, Beryl, Biotite, Calcite, Corundum,
3. Identify the given mineral properties : Chalcopyrite, Dolomite, Epidote, Feldspar, Garnet
4. Identify the given mineral properties :Galena, Gypsum, Hornblende, Hyperstrene, Jasper,
5. Identify the given mineral properties: Kynatie, Muscovite, Nephelene, Olivine,
6. Identify the given mineral properties: Quartz,Steatite, Serpentite, Stilbite, Talc.

.

II CYCLE

1. Introduction about Rocks and Formation of Rocks and Method of Identification of Igneous, Sedimentary, Metamorphic types of rocks
2. Study of Igneous Type of Rocks
3. Study of Sedimentary Type of Rocks
4. Study of Metamorphic Type of Rocks
5. Study of thin sections of minerals and Study of thin sections of Rocks.
6. Fractures Interpretation in geological maps.

Lab-In charge

ENGINEERING GEOLOGY LAB--17CE-63

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

I CYCLE SCHEDULE: BATCH-A

Exp / Date	I	II	III	IV	V	VI
27-10-2021	Demo	Demo	Demo	Demo	Demo	Demo
03-11-2021	A_1	A_2	A_3	A_4	A_5	A_6
10-11-2021	A_6	A_1	A_2	A_3	A_4	A_5
17-11-2021	A_5	A_6	A_1	A_2	A_3	A_4
24-11-2021	A_4	A_5	A_6	A_1	A_2	A_3
01-12-2021	A_3	A_4	A_5	A_6	A_1	A_2
08-12-2021	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
25-10-2021	Demo	Demo	Demo	Demo	Demo	Demo
01-11-2021	B_1	B_2	B_3	B_4	B_5	B_6
08-11-2021	B_6	B_1	B_2	B_3	B_4	B_5
15-11-2021	B_5	B_6	B_1	B_2	B_3	B_4
22-11-2021	B_4	B_5	B_6	B_1	B_2	B_3
29-11-2021	B_3	B_4	B_5	B_6	B_1	B_2
06-12-2021	B_2	B_3	B_4	B_5	B_6	B_1

Lab-In charge

ENGINEERING GEOLOGY LAB--17CE-63

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

II CYCLE SCHEDULE: BATCH-A

Date Exp	I	II	III	IV	V
15-12-2021	A_1	A_2	A_3	A_4	A_5
22-12-2021	A_1	A_2	A_3	A_4	A_5
29-12-2021	A_5	A_1	A_2	A_3	A_4
05-01-2022	A_4	A_5	A_1	A_2	A_3
19-01-2022	A_3	A_4	A_5	A_1	A_2
02-01-2022	A_2	A_3	A_4	A_5	A_1
	Pending / Repetition				
	INTERNAL				

II CYCLE SCHEDULE: BATCH-B

Exp / Date	I	II	III	IV	V
13-01-2022	B_1	B_2	B_3	B_4	B_5
20-01-2022	B_1	B_2	B_3	B_4	B_5
27-01-2022	B_5	B_1	B_2	B_3	B_4
03-02-2022	B_4	B_5	B_1	B_2	B_3
10-02-2022	B_3	B_4	B_5	B_1	B_2
24-02-2022	B_2	B_3	B_4	B_5	B_1
	Pending / Repetition				
	INTERNAL				

Lab-In charge

ENGINEERING GEOLOGY LAB--17CE-63

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

BATCH:B	**BATCH:A**
BATCH:A	**BATCH:B**
A1 -----20761A0101 To 20761A0106	B_1 ----20761A0133 To 20761A0138
A2 -----20761A0108 To 20761A0113	B_2 ---- 20761A0139 To 20761A0145
A3 -----20761A0114 To 20761A0120	B3---- 20761A0146-20761A0151
A4 ----- 20761A0122To 20761A0126	B4---20761A0152-20761A0158
A5 ----- 20761A0128 To 20761A0132	B5---Lateral Entry students-

Lab-In charge

ENGINEERNIG GEOLOGY LAB -17CE-63

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

LAB TIME -TABLE

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

Batch – A: 20761A0101 to 20761A0132

Batch – B: 20761A0133 to 20761A0158, Lateral entry Students (LE's)

Lab-In charge

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

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

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

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. Michael Sadgun Rao Kona

Course Name & Code : Programming Using Python Lab (20ITS1)

L-T-P Structure : 1-0-2 Credits : 2

Program/Sem/Sec : B.Tech., C.E, III-Sem., A.Y : 2021-22

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 understand the working of classes and objects in python.

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

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

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

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
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(Module-0): Language basics and example problems

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

Experiments Beyond the Syllabus

i) Implement Python Script to calculate the series: S=1+x+x2+x3+.....xn
j) Implement Python Script to print the following pattern:

```
*

*   *

*   *   *
```

Modue 1: Exercise Programs on Lists.

a) Write a Python script to display elements of a list in reverse order.
b) Write a Python script to find the minimum and maximum elements without using built-inoperations 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 ormore.

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 the 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 differenceof given two sets.
c) Write a 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 the 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 squares 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 thelargest of them.
b) Write a program which makes use of a function to display all such numbers which aredivisible 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 if a given string is palindrome or not.
c) Implement a python script to accept lines of text and find the number of characters, numberof vowels and number of blank spaces in it.
d) Implement a python script that takes a list of words and returns the length of the longestone.

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 thiscase a-z, A-Z and 0-9).
b) Write a Python script to check whether a 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 a 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 Python programming to display a bar chart using different colors for each bar.
e) Write Python programming to create a pie chart with a title.
f) Write a Python program to draw a scatter plot with empty circles taking a randomdistribution 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.	Python Installation, Accessing Python IDLE	3	26.10.2021		TLM4	CO1,CO 4	
2.	**Module -0 :** Language Basics and Example Programs	3	02.11.2021		TLM4	CO1,CO 4	
3.	**Module -0 :** Language Basics and Example Programs	3	09.11.2021		TLM4	CO1,CO 4	
4.	**Module-0:** Language Basics and Example Programs	3	16.11.2021		TLM4	CO1,CO 4	
5.	**Module-0:** Language Basics and Example Programs	3	23.11.2021		TLM4	CO1,CO 4	
6.	**Module-0:** Language Basics and Example Programs	3	30.11.2021		TLM4	CO1,CO 4	
7.	**Module-1:** Programs on Lists	3	7.12.2021		TLM4	CO2,CO 4	
Mid-I Examination 13.12.2021 to 18.12.2021							
8.	**Module-2:** Programs on Tuples	3	21.12.2021		TLM4	CO2,CO 4	
9.	**Module-3 & 4:** Programs on Sets Programs on Dictionaries	3	28.12.2021		TLM4	CO2,CO 4	
10.	**Module-5:** Programs on Functions & Recursions	3	04.01.2022		TLM4	CO2,CO 4	
11.	**Module-6:** Programs on Strings	3	11.01.2022		TLM4	CO3,CO 4	
12.	**Module-7:** Programs on Regular Expressions	3	18.01.2022		TLM4	CO3,CO 4	
13.	**Module-8:** Programs on Matplotlib	3	25.01.2022		TLM4	CO3,CO 4	
14.	Internal Lab Exam	3	01.02.2022		TLM4		

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

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):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. Michael Sadgun Rao Kona	Dr.P.Ashok Reddy	Dr.S.Naganjaneyulu	Dr.V.Rama Krishna