



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	: B.Tech., V -Sem., CIVIL
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: Design of Reinforced Concrete Structures (20CE12)
L-T-P STRUCTURE	: 2-1-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Dr. K.V. Ramana
COURSE COORDINATOR	: Dr. K.V. Ramana
PRE-REQUISITE	: Applied Mechanics, Strength of Materials, SA

Course Educational Objective:

Learn the design principles of Working stress and Limit state designs as per IS: 456-2000, Identify the procedures of shear design parameters, Understand the design aspects of beams, slabs and columns as per IS: 456-2000

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

CO1: Understand the fundamental procedures and guidelines given in relevant IS Codes for design of various RCC elements such as beams, columns, foundations, slabs, shear reinforcement, under Working stress and Limit State methods (Understand-L2)

CO2: Design the RCC beams using both working stress and limit state methods (Apply-L3)

CO3: Design the shear reinforcement and Columns subjected to axial load, uni-axial and bi-axial moments using Limit state of collapse theory (Apply-L3)

CO4: Design the different types of shallow foundations, the one way and two-way slabs with different end conditions using appropriate design guidelines (Apply-L3)

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

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

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

1- Slight (Low),

2 – Moderate (Medium),

3 - Substantial (High).

BOS APPROVED TEXT BOOKS:

- T1** B.C.Punmia, AshokKumarJain, ArunKumarJain “ComprehensiveRCCDesign”, LaxmiPublications(P)Ltd, New Delhi, 2015.
- T2** N.Krishnaraju, “AdvancedReinforcedConcretedesign”, CBSPublishers&Distributors, NewDelhi, 2005.

BOS APPROVED REFERENCE BOOKS:

1. P.C.Varghese, “LimitStateDesignofReinforcedConcrete”, PrenticeHallofIndiaPvt.,Ltd., New Delhi, 2008.
- 2 .P.C.Varghese, “AdvancedReinforcedConcreteDesign”, PrenticeHallofIndiaPvt.,Ltd., NewDelhi, 2002.
3. Design of Reinforced Concrete Structures, NPTEL video lectures

ISCODES:

1. IS456-2000
2. SP – 16 (Interaction charts- rectangular & circular sections)

NOTE: These IS codes are permitted in the End Examinations

COURSE DELIVERY PLAN (LESSON PLAN): Civil**UNIT-I: DESIGN OF BEAMS**

S.No.	Topics 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.	Principles of Limit State method of design	1	18-07-22		TLM-1	CO1	
2.	characteristic load and strength – Partial safety factor	1	19-07-22		TLM-1	CO1	
3.	-Limit State of collapse	2	21-07-22 23-07-22		TLM-1	CO1	
4.	balance and under reinforced–design of SRB	2	25-07-22 26-07-22		TLM-1	CO1	
5.	balance and under reinforced–design of SRB	2	28-07-22 30-07-22		TLM-1	CO1	
6.	L/d ratio for deflection calculation	1	01-08-22		TLM-1	CO1	
7.	Concept of Working Stress Method	1	02-08-22		TLM-1	CO1	
8.	Analysis and design of flexural member using working stress method	1	04-08-22		TLM-1	CO1	
9.	Design of SRB	2	06-08-22 08-08-22		TLM-1	CO1	
10.	Design of DRB	2	09-08-22 11-08-22		TLM-1	CO1	
11.	Deflection calculation	1	13-08-22		TLM-1	CO1	
12.	short term and long term deflection	2	16-08-22 18-08-22		TLM-1	CO1	
No. of classes required to complete UNIT-II:18					No. of classes taken: 18		

UNIT-II: DESIGN OF SHEAR REINFORCEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
13.	Limit State of collapse – shear and torsion	1	20-08-22		TLM-1	CO2	

14.	design of a rectangular section for shear	2	22-08-22 23-08-22		TLM-1	CO2	
15.	shear-torsion and bending-torsion	1	25-08-22		TLM-1	CO2	
16.	Design for development length	1	27-08-22		TLM-1	CO2	
17.	End anchorages	1	29-08-22		TLM-1	CO2	
18.	Reinforcement details in beam for flexure,	1	30-08-22		TLM-1	CO2	
19.	shear and torsion	1	01-09-22		TLM-1	CO2	
20.	serviceability requirements.	1	03-09-22		TLM-1	CO2	
No. of classes required to complete UNIT-II: 9					No. of classes taken: 9		

UNIT-III: DESIGN OF SLABS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
21.	Design of slabs - one way SS	2	05-09-22 06-09-22		TLM-1	CO3	
22.	Design of slabs - Two way SS	2	08-09-22 10-09-22		TLM-1	CO3	
23.	Continuous Slabs	2	12-09-22 13-09-22		TLM-1	CO3	
24.	Restrained One Way Slabs	2	15-09-22 17-09-22		TLM-1	CO3	
25.	Restrained Two Way Slabs	2	19-09-22 20-09-22		TLM-1	CO3	
26.	Numerical Problems	2	22-09-22 24-09-22		TLM-1	CO3	
No. of classes required to complete UNIT-III : 12					No. of classes taken: 12		

UNIT-IV: DESIGN OF COLUMNS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
27.	Limit State of Collapse compression	2	10-10-22 11-10-22		TLM-1	CO4	
28.	design of columns for axial load	2	13-10-22 15-10-22		TLM-1	CO4	

29.	Numerical Problems	2	17-10-22 18-10-22		TLM-1	CO4	
30.	Reinforcement details for columns	2	20-10-22 22-10-22		TLM-1	CO4	
31.	Design of short and long columns for uni-axial.	2	25-10-22 27-10-22		TLM-1	CO4	
32.	Design of short and long columns for bi-axial	2	29-10-22 31-10-22		TLM-1	CO4	
33.	serviceability requirements	2	01-11-22 03-11-22		TLM-1	CO4	
No. of classes required to complete UNIT-IV:14					No. of classes taken: 14		

UNIT-V: DESIGN OF SHALLOW FOUNDATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
34.	Design of shallow foundation	2	05-11-22 07-11-22		TLM-1	CO5	
35.	Square Footings	2	08-11-22 10-11-22		TLM-1	CO5	
36.	Rectangular Footings	2	12-11-22 14-11-22		TLM-1	CO5	
37.	isolated footing of uniform thickness	2	15-11-22 17-11-22		TLM-1	CO5	
38.	sloped footing	2	19-11-22 21-11-22		TLM-1	CO5	
39.	Numerical Problems	2	22-11-22 24-11-22		TLM-1	CO5	
40.	Revision	1	26-11-22		TLM-1	CO5	
No. of classes required to complete UNIT-V:13					No. of classes taken:		

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

EVALUATION PROCESS (R17 Regulations):

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

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor
(Dr. K.V.Ramana)

Course Coordinator
(Dr. K.V.Ramana)

Module Coordinator
(B.RamaKrishna)

HOD
(Dr. V.RamaKrishna)



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DEPARTMENT OF CIVIL ENGINEERING COURSE HANDOUT

PROGRAM	: B.Tech., V -Sem., CIVIL
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: H & WRE (20CE13)
L-T-P STRUCTURE	: 3-0-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: P. Keerthi
COURSE COORDINATOR	: P. Keerthi
PRE-REQUISITE	: Applied Mechanics of Fluids, Hydraulics and Hydraulic Machinery Systems.

Course Educational Objective:

The course allows the student to get the fundamentals of hydrology and its importance in development of water resources. The student is exposed to the different types of irrigation methods, significance of soil-water relationship, and design of irrigation channels.

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

- CO1: Understand the basic concepts and factors affecting in hydrology such as Hydrologic cycle, Precipitation, Rain gauges, Runoff, Abstractions, Hydrographs, ground water geology and its occurrence.
- CO2: Compute the average rainfall occurring in an area and estimate the abstractions for a given data.
- CO3: Estimate the ground water potential based on available data, develop different hydrographs and analyze them for the required information.
- CO4: Understand the fundamental and functional components of Irrigation, Irrigation canals and Canal lining.
- CO5: Estimate the water requirements, irrigation efficiencies using fundamental principles of Irrigation, and sizing of irrigation channels using Lacey's & Kennedy theories.

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	1	1	2	2		1			2		2		1
CO2	2	1	1	1	2	2		1			2		2		1
CO3	2	2	1	2	2	2		1			2		2		1
CO4	2	2	1	2	2	2		1			2		2		1
CO5	2	3	1	3	2	3		1			2		2		1

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

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

BOS APPROVED TEXT BOOKS:

- T1** Punmia.B.C, “Irrigation and Water Power Engineering,” Standard Publishers, New Delhi, 1997.
T2 Santhosh Kumar Garg, “Irrigation Engineering and Hydraulics Structures,” Khanna Publishers, New Delhi, 2003.

BOS APPROVED REFERENCE BOOKS:

- R1** Sharma R.K., “Irrigation Engineering and Hydraulic Structures,” Oxford and IBH Publishing company, New Delhi, 1994.
R2 Modi.P.N., “Irrigation Water Resources and Water Power Engineering”, standard Book House, Delhi, 1995.
R3 Subramanya.K., “Engineering Hydrology”, Tata Mc Graw Hill, New Delhi, 1999.
R4 Jayarami Reddy.P., “Hydrology”, Tata Mc Graw Hill, New Delhi, 1999.

COURSE DELIVERY PLAN (LESSON PLAN): Civil**UNIT-I**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Hydrology	1	18-07-22		TLM-1	CO1	R3	
2.	Engineering Hydrology & its applications	1	21-07-22		TLM-1	CO1	R3	
3.	Hydrologic cycle	1	22-07-22		TLM-1	CO1	R3	
4.	Precipitation – Types & Forms	1	23-07-22		TLM-1	CO1	T1	
5.	Types of Rain gauges	1	25-07-22		TLM-1	CO1	T1	
6.	Rain gauge Network	1	28-07-22		TLM-1	CO1	T1	
7.	Estimation of missing rainfall data	2	29-07-22 30-07-22		TLM-1	CO1	T1	
8.	Average rainfall over a basin	1	01-08-22		TLM-1	CO1	T1	
9.	Evaporation – factors affecting.	1	04-08-22		TLM-2	CO1	T1	
10.	Evapotranspiration – factors affecting.	1	05-06-22		TLM-1	CO1	T1	
11.	Infiltration – factors affecting.	1	06-08-22		TLM-1	CO1	T1	
No. of classes required to complete UNIT-I		12			No. of classes taken:			

UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
12.	Runoff – factors affecting.	1	08-08-22		TLM-1	CO2	R2	
13.	Components of Runoff	1	11-08-22		TLM-1	CO2	R2	
14.	Runoff estimation by Infiltration Indices	1	12-08-22		TLM-1	CO2	R2	
15.	Ground water - Occurrence	1	18-08-22		TLM-1	CO2	R2	
16.	Types of aquifers	1	20-08-22		TLM-1	CO2	R2	
17.	Aquifer properties - Darcy's law	1	22-08-22		TLM-1	CO2	R2	
18.	Dupuits equation - Assumptions	1	25-08-22		TLM-1	CO2	R2	
19.	Steady radial flow to wells in Confined aquifer	2	25-08-22 26-08-22		TLM-1	CO2	R2	
20.	Steady radial flow to wells in Unconfined aquifer	2	27-08-22 29-08-22		TLM-1	CO2	R2	
21.	Yield of an open well – Recuperation test.	1	01-09-22		TLM-1	CO2	R2	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
22.	Hydrograph & its components	1	02-09-22		TLM-1	CO3	R2	
23.	Separation of Baseflow	1	03-09-22		TLM-1	CO3	R2	
24.	ERH & DRH	1	05-09-22		TLM-1	CO3	R2	
25.	Unit Hydrograph - Assumptions	1	08-09-22		TLM-1	CO3	R2	
26.	Limitations & applications of UH	1	09-09-22		TLM-6	CO3	R2	
27.	Derivation of UH	1	10-09-22		TLM-1	CO3	R2	
28.	Unit hydrograph of different duration- Method of super position	2	10-10-22 13-10-22		TLM-1	CO3	R2	
29.	S-curve method	2	14-10-22 15-10-22		TLM-1	CO3	R2	
No. of classes required to complete UNIT-III		10			No. of classes taken:			

UNIT-IV

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
30.	Necessity & importance of irrigation	1	17-10-22		TLM-2	CO4	T1	
31.	Advantages & ill effects of irrigation	1	20-10-22		TLM-2	CO4	T1	
32.	Types of irrigation	1	21-10-22		TLM-1	CO4	T1	
33.	Methods of application of irrigation	2	22-10-22		TLM-2	CO4	T1	
34.	Principal crops and crop seasons- crop rotation	1	27-10-22		TLM-1	CO4	T1	
35.	Soil-water-plant relationship	2	28-10-22 29-10-22		TLM-2	CO4	T1	
36.	Estimation of consumptive use-problems	1	31-10-22		TLM-1	CO4	T1	
37.	Duty & delta – factors affecting.	1	03-11-22		TLM-1	CO4	T1	
38.	Depth & frequency of irrigation	1	04-11-22		TLM-2	CO4	T1	
39.	Irrigation efficiencies	1	05-11-22		TLM-2	CO4	T1	
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
40.	Classification of canals	1	07-11-22		TLM-2	CO5	T1	
41.	Cross-section of an irrigation channel – Balancing depth	1	10-11-22		TLM-2	CO5	T1	
42.	Kennedy's theory- Design of channels	2	11-11-22 14-11-22		TLM-2	CO5	T1	
43.	Lacey's regime theory – Design of channels	2	17-11-22 18-11-22		TLM-2	CO5	T1	
44.	Drawbacks, Comparison of Kennedy's theory & Lacey's theory	1	19-11-22		TLM-1	CO5	T1	

45.	Lining of irrigation channel-necessity, Advantages & disadvantages	1	21-11-22		TLM-2	CO5	T1	
46.	Types of lining-	1	24-11-22		TLM-2	CO5	T1	
47.	Design of lined canal-problems	1	25-11-22		TLM-2	CO5	T1	
48.	Revision	1	26-11-22		TLM-3	CO5	T1	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
49.								
50.								
51.								

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

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	18-07-2022	10-09-2022	8 W
I Mid Examinations	26-09-2022	01-10-2022	1 W
II Phase of Instructions	03-10-2022	26-11-2022	8 W
II Mid Examinations	28-11-2022	03-12-2022	1 W
Preparation and Practicals	05-12-2022	10-12-2022	1 W
Semester End Examinations	12-12-2022	24-12-2022	2 W

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10

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

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor

Course Coordinator

Module Coordinator

HOD



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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 : Environmental Engineering, 20CE14

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

Credits: 3

Program/Sem/Sec : B. Tech / V/ A

A.Y.:

2022-23

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Estimate the water demand for the community and assess the significance of water/wastewater, sludge quality parameters and fundamental aspects of water and wastewater treatment, sludge handling (Understand - L2)
CO2	Evaluate the various unit operations and design the elements in sedimentation/coagulation - based water treatment systems (Apply - L3).
CO3	Illustrate the working of filtration and disinfection systems and design them for water treatment systems (Apply - L3)
CO4	Analyze the various unit operations and design the primary treatment units for wastewater treatment (Apply - L3)
CO5	Analyze the salient operational considerations in secondary biological systems and sludge handling systems and design them for wastewater treatment (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	2	2										1	1		1	
CO3	2	2										1	1		1	
CO4	2	2										1	1		1	
CO5	2	2										1	1		1	
	1 - Low			2 -Medium					3 - High							

TEXTBOOKS:

- T1** B.C. Punmia, A.K. Jain and A.K. Jain, "Water Supply Engineering", Laxmi Publications. 2nd Edition 1995, Reprint 2005.
- T2** B.C. Punmia, A.K. Jain and A.K. Jain, "Wastewater Engineering", Laxmi Publications, 2nd Edition 1998, Reprint 2014.

REFERENCE BOOKS:

- R1** S.K. Garg, "Water Supply Engineering", Khanna Publishers, 26th revised Edition, New Delhi. 2010.
- R2** S.K. Garg, "Sewage disposal and Air Pollution Engineering", Khanna Publishers New Delhi. 36th Edition, 2017.
- R3** H.S. Peavy, D. Rowe, and G. Tchobanoglous, "Environmental Engineering", McGraw Hill

Publishers, New Delhi. 1985.

R4 Manual on Sewerage and Sewage treatment, CPHEEO, Ministry of urban affairs and employment, Govt. of India, New Delhi, 2001

R5 Water and Wastewater Engineering, NPTEL video lectures and web notes

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: WATER DEMAND AND WATER QUALITY

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.	Overview of the course	1	19.7.22	19.7.22	1	
2.	Introduction	1	20.7.22	20.7.22	1	
3.	Basics of water supply systems	1	21.7.22	21.7.22	1	
4.	Population forecast	1	23.7.22	23.7.22	1	
5.	Population forecast	1	26.7.22	26.7.22	1	
6.	Population growth factors	1	27.7.22	27.7.22	1	
7.	Water Demand	1	28.7.22	28.7.22	1	
8.	Water Demand	1	30.7.22	30.7.22	1	
9.	Physical quality of water	1	2.8.22	2.8.22	1	
10.	Chemical quality of water	1	3.8.22	3.8.22	1	
11.	Bacteriological quality	1	4.8.22	6.8.22	1	
No. of classes required to complete UNIT-I: 11				No. of classes taken: 11		

UNIT-II: WATER TREATMENT - SEDIMENTATION AND COAGULATION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Water Treatment Basics	1	6.8.22	11.8.22	1	
13.	Settling Analysis	1	10.8.22	16.8.22	1	
14.	Stokes law	1	11.8.22	17.8.22	1	
15.	Sedimentation tank - Design	1	13.8.22	18.8.22	1	
16.	Coagulation	1	16.8.22	20.8.22	1	
17.	Flash mixer	1	17.8.22	23.8.22	1	
18.	Flocculator	1	18.8.22	24.8.22	1	
19.	Clari flocculator	1	20.8.22	25.8.22	1	
20.	Coagulation Problems	1	23.8.22	27.8.22	3	
No. of classes required to complete UNIT-II: 9				No. of classes taken: 9		

UNIT-III: WATER TREATMENT - FILTRATION & DISINFECTION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
21.	Filtration basics	1	27.8.22	30.8.22	1	
22.	RSF Basics	1	25.8.22	1.9.22	1	
23.	RSF Design	1	27.8.22	3.9.22	3	
24.	SSF	1	30.8.22	6.9.22	1	
25.	Problems	1	1.9.22	7.9.22	3	
26.	Disinfection basics	1	3.9.22	8.9.22	1	
27.	Chlorination	1	6.9.22	13.9.22	1	
28.	Breakpoint Chlorination	1	7.9.22	14.9.22	1	
No. of classes required to complete UNIT-III: 8				No. of classes taken: 8		

UNIT-IV: SEWAGE QUALITY & PRIMARY TREATMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Wastewater generation	1	8.9.22	15.9.22	1	
30.	Physical parameters	1	10.9.22	17.9.22	1	
31.	Physical parameters	1	13.9.22	20.9.22	1	
32.	BOD rate equation	1	14.9.22	21.9.22	1	
33.	BOD determination	1	15.9.22	22.9.22	1	
34.	BOD Problems	1	17.9.22	24.9.22	3	
35.	COD	1	20.9.22	1.10.22	1	
36.	Chemical parameters	1	21.9.22	11.10.22	1	
37.	Chemical parameters	1	22.9.22	12.10.22	1	
38.	Types of treatment	1	24.9.22	13.10.22	1	
39.	Screens	1	11.10.22	15.10.22	1	
40.	Grit channel	1	12.10.22	18.10.22	1	
41.	Skimming tank	1	13.10.22	19.10.22	1	
42.	Primary sedimentation tank	1	15.10.22	20.10.22	1	
43.	Design	1	16.10.22	22.10.22	3	
No. of classes required to complete UNIT-IV: 15				No. of classes taken: 15		

UNIT-V: SECONDARY TREATMENT & SLUDGE HANDLING

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Bacterial growth patterns	1	18.10.22	25.10.22	1	
45.	Suspended growth process	1	19.10.22	26.10.22	1	
46.	ASP Mechanism	1	20.10.22	27.10.22	1	
47.	ASP design parameters	1	22.10.22	29.10.22	1	
48.	Complete Mix process	1	25.10.22	1.11.22	1	
49.	Diffused aeration	1	26.10.22	2.11.22	1	
50.	Secondary solids settling	1	27.10.22	3.11.22	1	
51.	SST Design	1	29.10.22	5.11.22	1	
52.	Sludge properties	1	1.11.22	8.11.22	1	
53.	Problems	1	2.11.22	9.11.22	3	
54.	Sludge Digestion	1	3.11.22	10.11.22	1	
55.	Problems	1	5.11.22	15.11.22	3	
56.	Sludge Drying Bed	1	8.11.22	16.11.22	1	
57.	Trickling Filter	1	9.11.22	17.11.22	1	
58.	Low rate TF	1	10.11.22	19.11.22	1	
59.	High rate TF	1	12.11.22	20.11.22	1	
60.	Septic tank	1	15.11.22	23.11.22	1	
61.	Soak pit	1	18.11.22	24.11.22	1	
No. of classes required to complete UNIT-V: 18				No. of classes taken: 18		

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 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	HOD
Faculty	Dr V. Ramakrishna	Dr V. Ramakrishna	J. Rangaiah	Dr V. Ramakrishna
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PROGRAM	: B.Tech., V -Sem., CIVIL
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: R S AND GIS APPLICATIONS (20CE15)
L-T-P STRUCTURE	: 3-0-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: M.Satyanarayana
COURSE COORDINATOR	: M.Satyanarayana
PRE-REQUISITE	: Nil

Course Educational Objective:

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

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

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

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	1	1	2	2		1			2		2		1
CO2	2	1	1	1	2	2		1			2		2		1
CO3	2	2	1	2	2	2		1			2		2		1
CO4	2	2	1	2	2	2		1			2		2		1
CO5	2	3	1	3	2	3		1			2		2		1

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

1- Slight (Low),

2 – Moderate (Medium),

3 - Substantial (High).

BOS APPROVED TEXT BOOKS:

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

BOS APPROVED REFERENCE BOOKS:

- R1** Sujit Choudhury, Deepankar Chakrabarti, Suchandra Choudhury, “An Introduction to Geographic Information Technology” I.K. International Publishing House Pvt. Ltd. 2009.
R2 Shivangi Somvanshi, Maya Kumari, “A Introduction to Remote Sensing and Its Applications”, S.K. Kataria & Sons 2014.
R3 Basudeb Bhatta, “Remote sensing and GIS” Oxford University press, 2011.
R4 S. Kumar, “Basics of Remote sensing and GIS”, Laxmi Publications, 2016.
R5 K Elangovan, “GIS Fundamentals, Applications and Implementations” New India Publishing Agency, 2006.
R6 Remote sensing and Geographical Information Technology, NPTEL video lectures and web notes

COURSE DELIVERY PLAN (LESSON PLAN): Civil**UNIT-I: INTRODUCTION TO PHOTOGRAMMETRY**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Principle and types of aerial photograph	1	18-07-22		TLM-2	CO1	T1	
2.	Geometry of vertical aerial photograph	1	20-07-22		TLM-2	CO1	T1	
3.	Scale and height measurement on single vertical aerial photograph	1	21-07-22		TLM-2	CO1	T1	
4.	Height measurement based on relief displacement	1	22-07-22		TLM-2	CO1	T1	
5.	Fundamentals of stereoscopy	1	23-07-22		TLM-2	CO1	T1	
6.	Fudicial points, parallax	1	25-07-22		TLM-2	CO1	T1	
7.	Measurements using fudicial points.	2	28-07-22 29-07-22		TLM-2	CO1	T1	
8.	Aerial Mosanics	1	30-07-22		TLM-3	CO1	T1	
9.	Types of Aerial Mosanics	1	01-08-22					
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-II: REMOTE SENSING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
10.	Basic concept of remote sensing	1	04-08-22		TLM-2	CO2	R2	
11.	Remote sensing data collection	1	05-08-22		TLM-2	CO2	R2	
12.	Remote sensing advantages and limitations	1	06-08-22		TLM-2	CO2	R2	
13.	Remote sensing process, Electromagnetic spectrum	1	08-08-22		TLM-2	CO2	R2	
14.	Energy interactions with atmosphere and with earth surface features (soil, water, vegetation)	1	11-08-22		TLM-2	CO2	R2	
15.	Indian satellites and sensors characteristics	1	12-08-22		TLM-2	CO2	R2	
16.	Resolution, map and image and false color composite	1	13-08-22 18-08-22		TLM-2	CO2	R2	
17.	Introduction to digital data, elements of visual interpretation techniques.	1	20-08-22 22-08-22		TLM-2	CO2	R2	
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-III: GEOGRAPHIC INFORMATION SYSTEM

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18.	Introduction to GIS, Components of a GIS	1	25-08-22		TLM-2	CO3	R2	
19.	Geospatial data: Spatial data, attribute data, joining spatial and attribute data	1	26-08-22		TLM-2	CO3	R2	
20.	GIS operations: Spatial data input, attribute data management	1	27-08-22		TLM-2	CO3	R2	
21.	Data display, data exploration, data analysis.	1	29-08-22		TLM-2	CO3	R2	
22.	Geographic coordinate system: Approximation of the earth, datum.	1	01-09-22		TLM-2	CO3	R2	

23.	Types of map projections Map projection parameters, commonly used map projections.	1	02-09-22 03-09-22		TLM-2	CO3	R2	
24.	Projected coordinate systems.	1	05-09-22 08-09-22		TLM-2	CO3	R2	
25.	Map Projections	1	09-09-22 10-09-22		TLM-3	CO3	R2	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: VECTOR AND RASTER DATA MODEL

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	Vector Data Model: Representation of simple features,	1	10-10-22		TLM-2	CO4	T1	
27.	Topology and its importance Coverage and its data structure, Shape file;	1	13-10-22		TLM-2	CO4	T1	
28.	Geometric representation of spatial feature and data structure, topology rules.	1	14-10-22		TLM-1	CO4	T1	
29.	Raster Data Model: Elements of the raster data model, types of raster data, raster data structure	1	15-10-22		TLM-2	CO4	T1	
30.	Data conversion, integration of raster and vector data.	2	17-10-22 20-10-22		TLM-2	CO4	T1	
31.	Data Input: Metadata, conversion of existing data, Creating new data	2	21-10-22 22-10-22		TLM-2	CO4	T1	
32.	Digitizing, scanning, on screen digitizing, importance of	2	27-10-22 28-10-22		TLM-2	CO4	T1	

	source map, data editing.							
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V: CIVIL ENGINEERING APPLICATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
33.	Surface water mapping and inventory, Rainfall runoff relations	2	29-10-22 03-11-22		TLM-1	CO5	T1	
34.	Watershed management for sustainable development	2	03-11-22 04-11-22		TLM-2	CO5	T1	
35.	Reservoir sedimentation	2	05-11-22 07-11-22		TLM-2	CO5	T1	
36.	Ground water targeting, and identification for groundwater recharge	2	10-11-22 11-11-22		TLM-2	CO5	T1	
37.	Waste management facilities	2	12-11-22 14-11-22		TLM-2	CO5	T1	
38.	Water Quality Modeling and Mapping	2	17-11-22 18-11-22		TLM-2	CO5	T1	
39.	Revision	2	19-11-22 21-11-22		TLM-3	CO5	T1	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
40.			24-11-22					
41.			25-11-22					
42.			26-11-22					

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

ACADEMIC CALENDAR

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

EVALUATION PROCESS (R17 Regulations):

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

PROGRAMME OUTCOMES (POs):

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

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

Course Instructor

Course Coordinator

Module Coordinator

HOD



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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. P.GANDHI PRAKASH

Course Name & Code : INTRODUCTION TO ARTIFICIAL INTELLIGENCE – 20AD81

L-T-P Structure : 3-0-0

Credits: 3

Program/Branch/Sem : B.Tech/CIVIL/V-A A.Y.:
2022-23

PRE-REQUISITE: Basic Engineering Mathematics Knowledge

Course Educational Objective:

The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, reasoning, and learning. Students will implement a small AI system in a team environment. The knowledge of artificial intelligence plays a considerable role in some applications students develop for courses in the program.

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

CO1	Enumerate the history and foundations of Artificial Intelligence. (Understand-L2)
CO2	Apply the basic principles of AI in problem solving. (Apply-L3).
CO3	Explain the different searching algorithms to find and optimize the solution for the given Problem. (Understand-L2)
CO4	Illustrate the different gaming algorithms and identify the importance of knowledge Representation in Artificial Intelligence. (Apply-L3)
CO5	Describe the use of predicate logic and rule-based system to represent the knowledge in AI domain. (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	PSO2
CO1	2	3	2	-	3	-	-	-	-	-	-	2	3	-	-
CO2	2	3	3	3	3	-	-	-	-	-	-	2	3	-	-
CO3	2	3	3	-	3	-	-	-	-	-	-	2	3	-	-
CO4	2	3	3	2	3	-	-	-	-	-	-	2	3	-	-
CO5	2	3	3	2	3	-	-	-	-	-	-	2	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).

BOS APPROVED TEXT BOOKS:

T1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd edition,

Prentice Hall, 2009. Can also use 2nd Ed., Pearson Education International, 2003.

BOS APPROVED REFERENCE BOOKS:

- R1. Nils Nilsson, “Artificial Intelligence: A New Synthesis”, Morgan Kaufmann, 1998.
- R2. David Poole, Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge Univ. Press, 2010.
- R3. Ronald Brachman, “Knowledge Representation and Reasoning”, Morgan Kaufmann, 2004.
- R4. Frank van Harmelen, Vladimir Lifschitz, Bruce Porter (Eds), “Handbook of Knowledge representation”, Elsevier, 2008.
- R5. Ivan Bratko, “Prolog Programming for Artificial Intelligence”, 4th Ed., Addison-Wesley, 2011.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I : INTRODUCTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
62.	Discussion of CEO’s and CO’s, Introduction to programming.	1	18-07-2022		-	CO1	-	
63.	Introduction: What Is AI?,	1	19-07-2022		TLM1	CO1	T1,T2	
64.	The Foundations of Artificial Intelligence	1	21-07-2022		TLM1	CO1	T1,T2	
65.	The History of Artificial Intelligence,	1	22-07-2022		TLM1	CO1	T1,T2	
66.	The State of the Art,.	1	25-07-2022		TLM1	CO1	T1,T2	
67.	Agents and Environments	1	26-07-2022		TLM1	CO1	T1,T2	
68.	Types of agents	1	28-07-2022		TLM2	CO1	T1,T2	
69.	Types of agents	1	29-07-2022		TLM2	CO1	T1,T2	
70.	Types of agents	1	01-08-2022		TLM2	CO1	T1,T2	
71.	Good Behavior: The Concept of Rationality	1	02-08-2022		TLM1	CO1	T1,T2	
72.	Omniscience vs Rational agent	1	04-08-2022		TLM1	CO1	T1,T2	
73.	The Nature of Environments	1	05-08-2022		TLM1	CO1	T1,T2	
74.	The Structure of Agents	1	08-08-2022		TLM1	CO1	T1,T2	

75.	Assignment/Quiz-2	1	11-08-2022		TLM1	CO1	-	
No. of classes required to complete UNIT-I				14	No. of classes taken:			

UNIT-II : PROBLEM SOLVING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
76.	Problem-Solving Agents, Example Problems	1	12-08-2022		TLM1	CO2	T1,T2	
77.	searching for Solutions, Uninformed Search Strategies	1	16-08-2022		TLM1	CO2	T1,T2	
78.	Search algorithms terminologies	1	18-08-2022		TLM1	CO2	T1,T2	
79.	Properties of search algorithms	1	22-08-2022		TLM1	CO2	T1,T2	
80.	Types of search algorithms.	1	23-08-2022		TLM1	CO2	T1,T2	
81.	Best first search algorithm	1	25-08-2022		TLM2	CO2	T1,T2	
82.	A* Algorithm	1	26-08-2022		TLM2	CO2	T1,T2	
83.	AO* Algorithm	1	29-08-2022		TLM2	CO2	T1,T2	
84.	Local Search Algorithms	1	30-08-2022		TLM2	CO2	T1,T2	
85.	Local Search Algorithms	1	01-09-2022		TLM2	CO2	T1,T2	
86.	Searching with Nondeterministic Actions.	1	02-09-2022		TLM2	CO2	T1,T2	
87.	Assignment/Quiz-2	1	05-09-2022		TLM1	CO2	T1,R1	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III : SEARCH ALGORITHMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
88.	Introduction	1	06-09-2022		TLM1	CO3	T1,T2	
89.	Uniformed/Blind Search Algorithms:	1	08-09-2022		TLM1	CO3	T1,T2	

90.	Breadth-first Search,	1	09-09-2022		TLM2	CO3	T1,T2	
91.	Depth-first Search,	1	04-10-2022		TLM2	CO3	T1,T2	
92.	Depth limited search	1	06-10-2022		TLM2	CO3	T1,T2	
93.	Iterative deepening depth-first search	1	07-10-2022		TLM2	CO3	T1,T2	
94.	Uniform cost search	1	10-10-2022		TLM2	CO3	T1,T2	
95.	Bidirectional Search.	1	11-10-2022		TLM2	CO3	T1,T2	
96.	Assignment/Quiz-3	1	13-10-2022		TLM1	CO3	-	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: ADVERSARIAL SEARCH/ GAME PLAYING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
97.	Introduction	1	14-10-2022		TLM1	CO4	T1,T2	
98.	Minimax algorithm	1	17-10-2022		TLM2	CO4	T1,T2	
99.	Alpha-Beta pruning	1	18-10-2022		TLM2	CO4	T1,T2	
100.	Knowledge Based Agent, Architecture	1	20-10-2022		TLM1	CO4	T1,T2	
101.	Knowledge base Levels and types	1	21-10-2022		TLM1			
102.	Representation mappings	1	25-10-2022		TLM1	CO4	T1,T2	
103.	Inference Engine:Forward chaining/reasoning	1	27-10-2022		TLM1	CO4	T1,T2	
104.	Backward chaining/reasoning	1	28-10-2022		TLM1	CO4	T1,T2	
105.	Approaches of knowledge representation,	1	31-10-2022		TLM1	CO4	T1,T2	
106.	issues in knowledge representation	1	01-11-2022		TLM1	CO4	T1,T2	
107.	Assignment/Quiz-4	1	03-11-2022		TLM1	CO4	-	
No. of classes required to complete UNIT-IV		11			No. of classes taken:			

UNIT-V: KNOWLEDGE REPRESENTATION TECHNIQUES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
108.	Introduction	1	04-11-2022		TLM1	CO5	T1,T2	T1,T2

109.	Logic, Propositional Logic:	1	07-11-2022		TLM1	CO5	T1,T2	
110.	A Very Simple Logic,	1	10-11-2022		TLM1	CO4	T1,T2	
111.	Ontological Engineering	1	11-11-2022		TLM2	CO4	T1,T2	
112.	Categories and Objects, Events	1	14-11-2022		TLM2	CO5	T1,T2	
113.	Mental Events and Mental Objects	1	15-11-2022		TLM1	CO5	T1,T2	
114.	What is reasoning and Types	1	17-11-2022		TLM1	CO4	T1,T2	
115.	Types of reasoning	1	18-11-2022		TLM1	CO4	T1,T2	
116.	Reasoning Systems for Categories	1	21-11-2022		TLM2	CO5	T1,T2	
117.	The Internet Shopping World	1	22-11-2022		TLM1	CO5	T1,T2	
118.	Assignment/Quiz-5	1	24-11-2022		TLM1	CO5	-	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
119.	Turing test, Interview Questions	1	25-11-2022		TLM1			

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam /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 an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. K.VENKATESH	Mr. K.VENKATESH	Dr. O. Rama Devi	Dr. O. Rama Devi
Signature				



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (GSE, 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

COURSE HANDOUT

PROGRAM	: B.Tech., V-Sem., CIVIL
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: ENVIRONMENTAL ENGINEERING LAB (20CE60)
L-T-P STRUCTURE	: 0-0-2
COURSE CREDITS	: 2
COURSE INSTRUCTOR	: Dr.V.RAMAKRISHNA
COURSE COORDINATOR	: Dr.V.RAMAKRISHNA
PRE-REQUISITE	: Nil

COURSE OBJECTIVE:

This course deals with the laboratory approaches of determining certain major parameters related to water and waste water quality and analyzing the laboratory data with respect to permissible limits and field conditions.

COURSE OUTCOMES:

- CO1: Perform the different laboratory techniques for examining the water quality parameters.
CO2: Perform the different laboratory techniques for examining the wastewater quality parameters.
CO3: Analyzing the laboratory data and comment with respect to permissible limits and field conditions

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

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

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

20CE60 – ENVIRONMENTAL ENGINEERING LAB

Course Instructor: Dr. V. RAMAKRISHNA

B.Tech(V Sem)

P. KEERTHI

A.Y 2022-23

CYCLE-1

C-1-1.Determination of pH value and Conductivity.

C-1-2.Determination of TDS in water sample.

C-1-3.Determination of Acidity of water sample.

C-1-4.Determination of Settleable solids using Imhoff cone in sewage sample.

C-1-5.Determination of Turbidity of water sample.

C-1-6.Determination of Optimum dose of coagulant using Jar test.

CYCLE-2

C-2-1.Determination of Total, temporary and permanent hardness of water sample.

C-2-2.Determination of Calcium and Magnesium hardness of water sample.

C-2-3.Determination of Chloride concentration of water sample.

C-2-4.Determination of Alkalinity of water sample.

C-2-5.Determination of Dissolved Oxygen of water sample.(Winkler's method)

C-2-6.Determination of Total, fixed and volatile solids in sewage sample.

CYCLE-3

C-3-1.Determination of Suspended, fixed and volatile solids in sewage sample.

C-3-2.Determination of Sulphates in water sample.

INCHARGE

HOD

20CE60 – ENVIRONMENTAL ENGINEERING LAB

Course Instructor: Dr. V. RAMAKRISHNA

B.Tech(V Sem)

P.KEERTHI

A. Y 2022-23

Batch-A

<u>Tentative Date/Batch</u>	<u>Actual date</u>	<u>A1</u>	<u>A2</u>	<u>A3</u>	<u>A4</u>	<u>A5</u>	<u>A6</u>
<u>18.07.2022</u>		<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>
<u>25.07.2022</u>		<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-5</u> <u>C-1-6</u>
<u>01.08.2022</u>		<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-1</u> <u>C-1-2</u>
<u>08.08.2022</u>		<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-3</u> <u>C-1-4</u>
<u>22.08.2022</u>		<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>
<u>29.08.2022</u>		<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>
<u>05.09.2022</u>		<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>
<u>10.10.2022</u>		<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>
<u>17.10.2022</u>		<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>
<u>31.10.2022</u>		<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>
<u>07.11.2022</u>		<u>C-3-1</u>	<u>C-3-1</u>	<u>C-3-1</u>	<u>C-3-2</u>	<u>C-3-2</u>	<u>C-3-2</u>
<u>14.11.2022</u>		<u>C-3-2</u>	<u>C-3-2</u>	<u>C-3-2</u>	<u>C-3-1</u>	<u>C-3-1</u>	<u>C-3-1</u>
<u>21.11.2022</u>		<u>REVISION</u>					

20CE60 – ENVIRONMENTAL ENGINEERING LAB

Course Instructor: Dr. V. RAMAKRISHNA

B.Tech(V Sem)

P.KEERTHI

A.Y 2022-23

Batch-B

<u>Date/Batch</u>	<u>Actual date</u>	<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>
<u>19.07.2022</u>		<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>	<u>Introduction</u>
<u>26.07.2022</u>		<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-5</u> <u>C-1-6</u>
<u>02.08.2022</u>		<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-1</u> <u>C-1-2</u>
<u>16.08.2022</u>		<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-5</u> <u>C-1-6</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-1</u> <u>C-1-2</u>	<u>C-1-3</u> <u>C-1-4</u>	<u>C-1-3</u> <u>C-1-4</u>
<u>23.08.2022</u>		<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>
<u>30.08.2022</u>		<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>
<u>06.09.2022</u>		<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>
<u>11.10.2022</u>		<u>C-2-4</u>	<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>
<u>18.10.2022</u>		<u>C-2-5</u>	<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>
<u>25.10.2022</u>		<u>C-2-6</u>	<u>C-2-1</u>	<u>C-2-2</u>	<u>C-2-3</u>	<u>C-2-4</u>	<u>C-2-5</u>
<u>01.11.2022</u>		<u>C-3-1</u>	<u>C-3-1</u>	<u>C-3-1</u>	<u>C-3-2</u>	<u>C-3-2</u>	<u>C-3-2</u>
<u>15.11.2022</u>		<u>C-3-2</u>	<u>C-3-2</u>	<u>C-3-2</u>	<u>C-3-1</u>	<u>C-3-1</u>	<u>C-3-1</u>
<u>22.11.2022</u>		<u>REVISION</u>					

INCHARGE

HOD

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor
(P. KEERTHI)

Course Coordinator
(P.KEERTHI)

Module Coordinator
(J RANGAIAH)

HOD
(Dr.V.RAMAKRISH
NA)



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

COURSE HANDOUT

PROGRAM	: B.Tech., V -Sem., CIVIL
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: GIS and C A in Civil Engineering Lab (17CE61)
L-T-P STRUCTURE	: 0-0-2
COURSE CREDITS	: 1
COURSE INSTRUCTOR	: M.Satyanarayana
COURSE COORDINATOR	: J.Rangaiah
PRE-REQUISITE	: Nil

COURSE EDUCATIONAL OBJECTIVE:

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

COURSE OUTCOMES (CO) :

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

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

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

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

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

GIS AND COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

LIST OF EXPERIMENTS

COURSE: VII SEMESTER

A.Y: 2021-22

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

Lab-In charge

GIS AND COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

COURSE: VII SEMESTER

A.Y: 2021-22

LAB SCHEDULE

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	Determination of Permeability of Soil	22-07-2022 29-07-2022	
2	Design of Irrigation Channel by Kennedy's Theory	05-08-2022 12-08-2022	
3	Design of Flexible Pavement	26-08-2022	
4	Design of Singly Reinforced Rectangular Beam for Flexure.	02-09-2022	
5	Determination of Discharge over a Rectangular, Triangular or Trapezoidal Notch.	09-09-2022	
6	Design of Sedimentation Tank	16-09-2022	
7	Design of Compression Member	23-09-2022	
8	Digitization of Map / Toposheet	14-10-2022 21-10-2022	
9	Estimation of Features and Interpretation	28-10-2022 04-11-2022	
10	Creation of Thematic Maps	11-11-2022	
11	Revision	18-11-2022	
12	Internal Test	25-11-2022	

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	18-07-2022	10-09-2022	8 W
I Mid Examinations	26-09-2022	01-10-2022	1 W
II Phase of Instructions	03-10-2022	26-11-2022	8 W
II Mid Examinations	28-11-2022	03-12-2022	1 W
Preparation and Practicals	05-12-2022	10-12-2022	1 W
Semester End Examinations	12-12-2022	24-12-2022	2 W

Lab-In charge

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Course Instructor
M.Satyanarayana

Course Coordinator
M.Satyanarayana

Module Coordinator
(J.RANGAIAH)

HOD
(Dr.V.RAMAKRISHNA)



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COURSE HANDOUT

PROGRAM	: B.Tech., V-Sem., CIVIL
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: COMPUTER AIDED BUILDING DRAWING LAB (20CES2)
L-T-P STRUCTURE	: 1-0-2
COURSE CREDITS	: 2
COURSE INSTRUCTOR	: Dr. K.V.Ramana /C.RAJAMALLU
COURSE COORDINATOR	: Dr. K.V. Ramana
PRE-REQUISITE	: Computer based engineering drawing lab and Building

materials.

COURSE OBJECTIVE:

The course aims to draw different types of doors, windows and trusses using AutoCAD. The student is asked to develop and draw plan, elevation and section for different types of buildings. The student will draw a few 3D civil engineering elements

COURSE OUTCOMES:

CO1: Sketch the different sign conventions used in building drawing (Apply-L3)

CO2: Draw different views of buildings with a suitable scale (Apply-L3)

CO3: Develop 3-D view of building and staircase. (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	-	-	-	2	-	-	-	-	1	-	-	-	1	-
CO2	1	-	-	-	2	-	-	-	-	1	-	-	-	1	-
CO3	1	-	-	-	2	-	-	-	-	1	-	-	-	1	-

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

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DEPARTMENT OF CIVIL ENGINEERING
NOTIFICATION OF CYCLES
COMPUTER AIDED BUILDING DRAWING LAB

Faculty Name: Dr. K.V.Ramana /C.RAJAMALLU subject code: 20CES2

B.Tech (V SEM)

A.Y 2022-2023

CYCLE-I

1. Conventional symbols
2. English bond and Flemish bond
3. Fully Panelled Door & Window
4. Panelled and glazed door with wooden panel
5. King post and Queen post trusses
6. Single floor residential building - Plan, Elevation and Cross section
7. Storied residential building- Plan, Elevation and Cross section

CYCLE-II

8. Public building- Plan, Elevation and Cross section
9. Institutional building- Plan, Elevation and Cross section
10. Foundations- Footings
11. Steel roof truss
12. 3D view of a single floor residential building
13. 3D view of a dog legged stair case
14. 3D view of a spiral stair case

DEPARTMENT OF CIVIL ENGINEERING
NOTIFICATION OF CYCLES
COMPUTER AIDED BUILDING DRAWING LAB

I-

Date / Batch	A1	A2	A3	A4	A5	A6
19/7/2022	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
26/7/2022	1	1	1	1	1	1
2/8/2022	2	2	2	2	2	2
9/8/2022	3	3	3	3	3	3
16/8/2022	4	4	4	4	4	4
23/8/2022	5	5	5	5	5	5
30/8/2022	6	6	6	6	6	6

CYCLESCHEDULE

Date / Batch	B1	B2	B3	B4	B5	B6
18/7/2022	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
25/7/2022	1	1	1	1	1	1
1/8/2022	2	2	2	2	2	2
8/8/2022	3	3	3	3	3	3
15/8/2022	4	4	4	4	4	4
22/8/2022	5	5	5	5	5	5
29/8/2022	6	6	6	6	6	6

II CYCLESCHEDULE

Date / Batch	A1	A2	A3	A4	A5	A6
4/10/2022	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
11/10/2022	7	7	7	7	7	7
18/10/2022	8	8	8	8	8	8
25/10/2022	9	9	9	9	9	9
1/11/2022	10	10	10	10	10	10
8/11/2022	11	11	11	11	11	11
15/11/2022	12	12	12	12	12	12

Date / Batch	B1	B2	B3	B4	B5	B6
3/10/2022	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
10/10/2022	7	7	7	7	7	7
17/10/2022	8	8	8	8	8	8
24/10/2022	9	9	9	9	9	9
31/10/2022	10	10	10	10	10	10
7/11/2022	11	11	11	11	11	11
14/11/2022	12	12	12	12	12	12

Batch A (20761A0137 to 221765A0110), **Monday**

Batch B (20761A0101 to 20761A0136), **Tuesday**

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