DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

PROGRAM	:	B.Tech., V -Sem., CIVIL
ACADEMIC YEAR	:	2024-25
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	02-07-24		TLM-1	CO1	
2.	characteristic load and strength – Partial safety factor	1	04-07-24		TLM-1	CO1	
3.	Tutorial	1	04-07-24		TLM-3	CO1	
4.	-Limit State of collapse	1	05-07-24		TLM-1	CO1	
5.	balance and under reinforced–design of SRB	2	06-07-24 09-07-24		TLM-1	CO1	
6.	balance and under reinforced–design of SRB	1	11-07-24		TLM-1	CO1	
7.	Tutorial	1	11-07-24		TLM-3	CO1	
8.	L/d ratio for deflection calculation	1	12-07-24		TLM-1	CO1	
9.	Concept of Working Stress Method	1	16-07-24		TLM-1	CO1	
10.	Analysis and design of flexural member using working stress method	1	18-07-24		TLM-1	CO1	
11.	Tutorial	1	18-07-24		TLM-3	CO1	
12.	Design of SRB	1	19-07-24		TLM-1	CO1	
13.	Design of DRB	2	20-07-24 23-07-24		TLM-1	CO1	
14.	Deflection calculation	1	25-07-24		TLM-1	CO1	
15.	Tutorial	1	25-07-24		TLM-3	CO1	
16.	short term and long term deflection	1	26-07-24		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
17.	Limit State of collapse – shear and torsion	1	27-07-24		TLM-1	CO2	
18.	design of a rectangular section for shear	2	30-07-24 01-08-24		TLM-1	CO2	
19.	Tutorial	1	01-08-24		TLM-3	CO1	
20.	shear-torsion and bending-torsion	1	02-08-24		TLM-1	CO2	
21.	Design for development length	1	03-08-24		TLM-1	CO2	
22.	End anchorages	1	06-08-24		TLM-1	CO2	
23.	Reinforcement details in beam for flexure,	1	08-08-24		TLM-1	CO2	
24.	Tutorial	1	08-08-24		TLM-3	CO1	
25.	shear and torsion	1	09-08-24		TLM-1	CO2	
26.	Serviceability requirements.	1	13-08-24		TLM-1	CO2	
No. of classes required to complete UNIT-II: 11					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
27.	Design of slabs - one way SS	2	16-08-24 17-08-24		TLM-1	CO3	
28.	Design of slabs - Two way SS	2	20-08-24 22-08-24		TLM-1	CO3	
29.	Tutorial	1	22-08-24		TLM-3	CO1	
30.	Continuous Slabs	2	23-08-24 24-08-24		TLM-1	CO3	
31.	Restrained One Way Slabs	2	27-08-24 29-08-24		TLM-1	CO3	
32.	Tutorial	1	29-08-24		TLM-3	CO1	

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
33.	Restrained Two Way Slabs	2	30-08-24 31-08-24		TLM-1	CO3	
34.	Numerical Problems	2	10-09-24 12-09-24		TLM-1	CO3	
No. of classes required to complete UNIT-III : 14				No. of classes taken: 12			

UNIT-IV: DESIGN OFCOLUMNS

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
35.	Tutorial	1	12-09-24		TLM-3	CO1	
36.	Limit State of Collapse compression	2	13-09-24 17-09-24		TLM-1	CO4	
37.	design of columns for axial load	1	19-09-24		TLM-1	CO4	
38.	Tutorial	1	19-09-24		TLM-3	CO1	
39.	Numerical Problems	2	20-09-24 21-09-24		TLM-1	CO4	
40.	Reinforcement details for columns	2	24-09-24 26-09-24		TLM-1	CO4	
41.	Tutorial	1	26-09-24		TLM-3	CO1	
42.	Design of short and long columns for uni-axial.	2	27-09-24 28-09-24		TLM-1	CO4	
43.	Design of short and long columns for bi-axial	2	01-10-24 03-10-24		TLM-1	CO4	
44.	Tutorial	1	03-10-24		TLM-3	CO1	
45.	serviceability requirements	2	04-10-24 05-10-24		TLM-1	CO4	
No. of classes required to complete UNIT-IV:17				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
46.	Design of shallow foundation	2	08-10-24 10-10-24		TLM-1	CO5	
47.	Tutorial	1	10-10-24		TLM-3	CO1	
48.	Square Footings	2	15-10-24 17-10-24		TLM-1	CO5	

49.	Tutorial	1	17-10-24		TLM-3	CO1	
50.	Rectangular Footings	2	18-10-24 19-10-24		TLM-1	CO5	
51.	isolated footing of uniform thickness	2	22-10-24 24-10-24		TLM-1	CO5	
52.	Tutorial	1	24-10-24		TLM-3	CO1	
53.	sloped footing	2	25-10-24 26-10-24		TLM-1	CO5	
54.	Numerical Problems	2	29-10-24 1-11-24		TLM-1	CO5	
55.	Revision	1	02-11-24		TLM-1	CO5	

No. of classes required to complete UNIT-V:16	No. of classes taken:

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

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	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
(Dr. K.V.Ramana)	(Dr. K.V.Ramana)	(Dr. C. Rajamallu)	(Dr. JVR)

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

PROGRAM	:	B.Tech., V -Sem., CIVIL
ACADEMIC YEAR	:	2024-25
COURSE NAME & CODE	:	H & WRE (20CE13)
L-T-P STRUCTURE	:	3-0-0
COURSE CREDITS	:	3
COURSE INSTRUCTOR	:	J. Rangaiah
COURSE COORDINATOR	:	J. Rangaiah
PRE-REQUISITE	:	Applied Mechanics, Mechanics of Fluids, 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	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO3	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	3	-	-	-	-	-	-	-	-	-	-	-	2	-	1

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

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

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 Publishinf   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	02-07-24		TLM-1	CO1	T1	
2.	Hydrology & its applications Hydrologic cycle	1	04-07-24		TLM-1	CO1	T1	
3.	Precipitation – Types & Forms	1	05-07-24		TLM-1	CO1	T1	
4.	Types of Rain gauges Rain gauge Network	1	06-07-24		TLM-1	CO1	T1	
5.	Problems	1	09-07-24		TLM-1	CO1	T1	
6.	Estimation of missing rainfall data	1	11-07-24		TLM-1	CO2	T1	
7.	Problems	1	12-07-24		TLM-1	CO1	T1	
8.	Average rainfall over a basin	1	16-07-24		TLM-1	CO2	T1	
9.	Problems	1	18-07-24		TLM-1	CO1	T1	
10.	Problems	1	19-07-24		TLM-1	CO2	T1	
11.	Evaporation – factors affecting.	1	20-07-24		TLM-1	CO1	T1	
12.	Evapotranspiration – factors affecting.	1	23-07-24		TLM-1	CO1	T1	
13.	Infiltration – factors affecting.	1	25-07-24		TLM-1	CO1	T1	
14.	Quiz	1	26-07-24		TLM-1	CO1	T1	

	No. of classes required to complete UNIT-I	14			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
15.	Runoff – factors - Components	1	27-07-24		TLM-1	CO1	R2	
16.	Runoff estimation by Infiltration Indices	1	30-07-24		TLM-1	CO1	R2	
17.	Problems	1	01-08-24		TLM-1	CO2	R2	
18.	Ground water - Occurence	1	02-08-24		TLM-1	CO1	R2	
19.	Types of aquifers- properties	1	03-08-24		TLM-1	CO1	R2	
20.	Darcy's law Dupuits equation - Assumptions	1	06-08-24		TLM-1	CO1	R2	
21.	Steady radial flow to wells in Confined aquifer	1	08-08-24		TLM-1	CO1	R2	
22.	Problems	1	09-08-24		TLM-1	CO3	R2	
23.	Steady radial flow to wells in Unconfined aquifer	1	13-08-24		TLM-1	CO2	R2	
24.	Problems	1	16-08-24		TLM-1	CO3	R2	
25.	Yield of an open well – Recuperation test.	1	17-08-24		TLM-1	CO1	R2	
26.	Problems	1	20-08-24		TLM-1	CO3	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
27.	Hydrograph &its components	1	22-08-24		TLM-1	CO1	R2	
28.	Separation of Baseflow	1	23-08-24		TLM-1	CO1	R2	

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
29.	ERH & DRH	1	24-08-24		TLM-1	CO1	R2	
30.	Problems	1	27-08-24		TLM-1	CO3	R2	
31.	Problems	1	29-08-24		TLM-1	CO3	R2	
32.	Assumptions Limitations & applications of UH	1	30-08-24		TLM-6	CO1	R2	
33.	Derivation of UH	1	31-08-24		TLM-1	CO1	R2	
34.	Unit hydrograph of different duration- Method of super position	1	10-09-24		TLM-1	CO1	R2	
35.	Problems	1	12-09-24		TLM-1	CO3	R2	
36.	S-curve method	1	13-09-24		TLM-1	CO1	R2	
37.	Problems	1	17-09-24		TLM-1	CO3	R2	
38.	Problems	1	19-09-24		TLM-1	CO3	R2	
No. of classes required to complete UNIT-III		12			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
39.	Necessity & importance of irrigation	1	20-09-24		TLM-2	CO4	T1	
40.	Advantages & ill effects of irrigation	1	21-09-24		TLM-2	CO4	T1	
41.	Types & Methods of irrigation	1	24-09-24		TLM-1	CO4	T1	
42.	Soil-water-plant relationship	1	26-09-24		TLM-2	CO4	T1	
43.	Problems	1	27-09-24		TLM-1	CO5	T1	
44.	Estimation of consumptive use-problems	1	28-09-24		TLM-2	CO4	T1	
45.	Problems	1	01-10-24		TLM-1	CO5	T1	
46.	Duty & delta – factors affecting.	1	03-10-24		TLM-1	CO4	T1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
47.	Depth & frequency of irrigation	1	04-10-24		TLM-2	CO4	T1	
48.	Irrigation efficiencies	1	05-10-24		TLM-2	CO4	T1	
No. of classes required to complete UNIT-IV		10			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
49.	Classification of canals	1	15-10-24		TLM-2	CO4	T1	
50.	Cross-section of an irrigation channel – Balancing depth	1	17-10-24		TLM-2	CO4	T1	
51.	Kennedy's theory- Design of channels	1	18-10-24		TLM-2	CO4	T1	
52.	Problems	1	19-10-24		TLM-2	CO4	T1	
53.	Lacey's regime theory – Design of channels	1	22-10-24		TLM-2	CO4	T1	
54.	Drawbacks, Comparision of Kennedy's theory & Lacey's theory	1	24-10-24		TLM-1	CO4	T1	
55.	Lining of irrigation channel- necessity, Advantages,& disadvantages	1	25-10-24		TLM-2	CO4	T1	
56.	Types of lining-	1	26-10-24		TLM-2	CO4	T1	
57.	Design of lined canal- problems	1	29-10-24		TLM-2	CO4	T1	
58.	Problems	1	01-11-24		TLM-3	CO5	T1	
No. of classes required to complete UNIT-V		10			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
59.								
60.								

Teaching Learning Methods

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

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	01-07-2024	31-08-2024	9 W
I Mid Examinations	02-09-2024	07-09-2024	1 W
II Phase of Instructions	09-09-2024	02-11-2024	8 W
II Mid Examinations	04-11-2024	09-11-2024	1 W
Preparation and Practicals	11-11-2024	16-11-2024	1 W
Semester End Examinations	18-11-2024	30-11-2024	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 & III)	M1=15
I-Quiz Examination (Units-I, II & III)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =80% of Max(M1,M2)+20% of Min(M1,M2)	M=15
Quiz Marks =80% of Max(Q1,Q2)+20% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course
Instructor   Course Coordinator   Module Coordinator   HOD

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr V. Ramakrishna**
Course Name & Code : 20CE14: Environmental Engineering
L-T-P Structure : 2-1-0   Credits : 3
Program/Sem/Sec : B.Tech., CE., V-Sem., Sections- A   A.Y   : 2024-25

PRE-REQUISITE: Applied Chemistry, Environmental Studies, Mechanics of Fluids.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course deals with concepts of water demand, water and wastewater quality parameters, design of -water treatment units, -wastewater treatment units, -sludge handling in wastewater/sewage treatment

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

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 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, 1996, 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, 36th Revised edition, New Delhi, 2017.

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.	Introduction	1	1.7.24		1	
2.	Need for protected water supply, Water demand	1	2.7.24		2	
3.	Factors affecting water demand, fluctuations in demand	1	3.7.24		2	
4.	Population forecasting	1	6.7.24		2	
5.	Population forecasting	1	8.7.24		1	
6.	Sources of water, Physical parameters	1	9.7.24		2	
7.	Chemical parameters	1	10.7.24		2	
8.	Chemical parameters	1	13.7.24		2	
9.	Problems	1	15.7.24		1	
10.	Bacteriological parameters	1	16.7.24		2	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Water Treatment - Sedimentation

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.	Treatment objectives, Screening, Aeration	1	20.7.24		2	
2.	Stokes law	1	22.7.24		1	
3.	Theory of sedimentation	1	23.7.24		1	
4.	Problems	1	24.7.24		1	
5.	Coagulation concept	1	27.7.24		2	
6.	Problems	1	29.7.24		1	
7.	Jar test	1	30.7.24		1	
8.	Flash Mixer	1	31.7.24		2	
9.	Flocculator	1	3.8.24		2	
10.	Clariflocculator	1	5.8.24		2	
11.	Problems	1	6.8.24		1	
12.	Problems	1	7.8.24		1	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

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
1.	Filtration Mechanism	1	10.8.24		2	
2.	Rapid sand filter	1	12.8.24		2	
3.	Slow sand filter	1	13.8.24		2	
4.	Problems	1	13.8.24		1	
5.	Comparison of SSF and RSF	1	14.8.24		2	
6.	Forms of disinfection	1	17.8.24		2	
7.	Types of Chlorination	1	19.8.24		2	
8.	Kinetics of chlorination	1	20.8.24		2	
9.	Problems	1	21.8.24		1	
10.	Problems	1	24.8.24		1	

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

Mid1 exams: 2.9.24 to 7.9.24

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
1.	Systems of sanitation, Decomposition cycles	1	26.8.24		2	
2.	Physical parameters	1	27.8.24		2	
3.	Physical parameters	1	31.8.24		2	
4.	Physical parameters	1	9.9.24		1	
5.	Chemical parameters	1	10.9.24		2	
6.	BOD rate equation	1	11.9.24		1	
7.	Problems	1	14.9.24		1	
8.	Preliminary Treatment	1	16.9.24		2	
9.	Preliminary Treatment	1	17.9.24		1	
10.	Primary sedimentation tank design	1	18.9.24		2	
11.	Problems	1	21.9.24		1	
12.	Problems	1	23.9.24		1	
13.	Problems	1	24.9.24		1	
No. of classes required to complete UNIT-IV: 13				No. of classes taken:		

UNIT-V: Secondary Treatment & Sludge Handling 9-15

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.	Biological growth & Processes	1	25.9.24		2	
2.	Activated sludge process	1	28.9.24		2	
3.	Simple calculations	1	30.9.24		1	
4.	Complete mix process – design	1	1.10.24		1	
5.	Diffused aeration process-design	1	5.10.24		1	
6.	Trickling filter construction	1	7.10.24		2	
7.	Low rate filter, High rate filter	1	8.10.24		2	
8.	Problems	1	19.10.24		1	
9.	Sludge properties	1	21.10.24		1	
10.	Sludge digestion	1	22.10.24		2	
11.	Design of digester	1	23.10.24		2	
12.	Sludge dry beds	1	26.10.24		2	
13.	Problems	1	28.10.24		1	
14.	Septic tank – Concept and Design	1	29.10.24		2	
15.	Soak pit	1	30.10.24		2	
No. of classes required to complete UNIT-V: 15				No. of classes taken:		

Mid2 exams: 4.11.24 to 9.11.24

Teaching Learning Methods

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

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I, II, III (Half of the syllabus))	A1=5
I-Mid Examination (Units-I, II, III (Half of the syllabus))	M1=15
I-Quiz Examination (Units-I, II, III (Half of the syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the syllabus), IV, V)	A2 = 5
II-Mid Examination (Units-III (Remaining Half of the syllabus), IV & V)	M2 =15
II-Quiz Examination (Units-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)	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.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Dr V. Ramakrishna)	(Dr V. Ramakrishna)	(J. Rangaiah)	(Dr J.V. Rao)

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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 : Remote sensing & GIS, 20CE15
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech, V SEM, Civil **A.Y.:** 2023-24

PREREQUISITE: NILL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The course is designed to understand the techniques of Remote Sensing and GIS Technology for civil engineering applications.

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

CO1	Interpret the concepts of Photogrammetric and its applications such as determination of heights of objects on terrain. (Understand-L2)
CO2	Illustrate the Electromagnetic spectrum and utilize the energy interactions of EMR with atmosphere and earth surface features for GIS data generation (Understand-L2)
CO3	Analyze the methods of map projections and understand coordinate systems on GIS Software packages to produce high resolution thematic maps (Understand-L2)
CO4	Apply the concepts of vector and raster data model for representation of topological earth features and its importance. (Understand-L2)
CO5	Apply the RS & GIS techniques for solving civil engineering applications (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	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO4	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
CO5	2	-	-	-	-	-	-	-	-	-	-	-	2	-	1
	1 - Low				**2 –**Medium					**3 -** High					

TEXTBOOKS:

T1 Kang – Tsung Chang, "Introduction to geographic information system", Tata McGraw- Hill Education Private Limited, 2007

T2 Srivastava G.S- "An Introduction to Geoinformatics" McGraw Hill Education (India) Private Limited 2014

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, "An 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 Remote sensing & Geographical Information Technology, NPTEL video lectures & web notes

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

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	HOD Sign Weekly
1.	Introduction to Photogrammetry	1	01.07.2024		**TLM2**	
2.	Principle and types of aerial photograph	1	02.07.2024		**TLM2**	
3.	Geometry of aerial photograph	1	04.07.2024		**TLM2**	
4.	Image displacements	1	06.07.2024		**TLM2**	
5.	Comparison of aerial photograph and map	1	08.07.2024		**TLM2**	
6.	Relief displacement in aerial photography	1	09.07.2024		**TLM2**	
7.	Introduction Stereoscopic, Type of stereoscope	1	11.07.2024		**TLM2**	
8.	Measurement of height from photographs	1	15.07.2024		**TLM2**	
9.	Aerial mosaics, Planning for mosaics	1	16.07.2024		**TLM2**	
10.	Mosaic compilation, Annotation and reproduction	1	18.07.2024		**TLM2**	
11.	Tutorial– 1/ Quick revision	1	20.07.2024		**TLM3**	
12.	Revision	1	22.07.2024		**TLM3**	
No. of classes required to complete UNIT-I: 12				**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	HOD Sign Weekly
13.	Basic concept of remote sensing	1	23.07.2024		**TLM2**	
14.	Remote sensing advantages and limitations	1	25.07.2024		**TLM2**	
15.	Remote sensing process	1	27.07.2024		**TLM2**	
16.	Electromagnetic spectrum	1	29.07.2024		**TLM2**	
17.	Energy interaction with atmosphere	1	30.07.2024		**TLM2**	
18.	Energy interaction with earth surface	1	01.08.2024		**TLM2**	
19.	Satellite orbits	1	03.08.2024		**TLM2**	
20.	Sensor resolution	1	05.08.2024		**TLM2**	
21.	India Satellite and sensor characteristics	1	06.08.2024		**TLM2**	
22.	Introduction to digital data	1	08.08.2024		**TLM2**	
23.	Elements of visual interpretation techniques	1	12.08.2024		**TLM2**	
24.	Tutorial– 2/ Quick revision	1	13.08.2024		**TLM3**	
25.	Revision	1	17.08.2024		**TLM3**	
No. of classes required to complete UNIT-II: 13				**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	HOD Sign Weekly
26.	Introduction to GIS	1	19.08.2024		**TLM2**	
27.	Components of a GIS	1	20.08.2024		**TLM2**	
28.	Application areas of GIS	1	22.08.2024		**TLM2**	
29.	Data types- Attribute data	1	24.08.2024		**TLM2**	

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Spatial data representation	1	27.08.2024		**TLM2**	
31.	Relationships of Spatial Objects	1	29.08.2024		**TLM2**	
32.	GIS Function	1	31.08.2024		**TLM2**	
	MID – I Examination		**02.09.2024 – 07.09.2024**			
33.	Geographic coordinate system	1	09.09.2024		**TLM2**	
34.	Types of map, uses of maps, characteristics of maps	1	10.09.2024			
35.	Map projections ,types of projections	1	12.09.2024		**TLM2**	
36.	Tutorial– 3/ Quick revision	1	17.09.2024		**TLM3**	
37.	Revision	1	19.09.2024		**TLM3**	

No. of classes required to complete UNIT-III: 12   **No. of classes taken:**

UNIT-IV: SPATIAL DATA

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38.	Introduction to Vector Data Model	1	21.09.2024		**TLM2**	
39.	Representation of simple feature	1	23.09.2024		**TLM2**	
40.	Advantages and disadvantages	1	24.09.2024		**TLM2**	
41.	Introduction to raster data model	1	26.09.2024		**TLM2**	
42.	Elements of the raster Data model	1	28.09.2024		**TLM2**	
43.	Advantages and disadvantages	1	30.09.2024		**TLM2**	
44.	Spatial data analysis	1	01.10.2024		**TLM2**	
45.	Introduction overlay function	1	03.10.2024		**TLM2**	
46.	Vector overlay function	1	05.10.2024		**TLM2**	
47.	Raster overlay function	1	07.10.2024		**TLM2**	
48.	Network analysis, tracing & allocation	2	08.10.2024 10.10.2024		**TLM2**	
49.	Tutorial– 4/ Quick revision	1	14.10.2024		**TLM3**	

No. of classes required to complete UNIT-IV: 13   **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	HOD Sign Weekly
50.	Land cover and land use	1	15.10.2024		**TLM2**	
51.	Agricultural, forestry	1	17.10.2024		**TLM2**	
52.	Geology, geomorphology	1	19.10.2024		**TLM2**	
53.	Urban application	1	21.10.2024		**TLM2**	
54.	Transportation engineering	1	22.10.2024		**TLM2**	
55.	Hydrology	1	24.10.2024		**TLM2**	
56.	Flood zone declination and mapping	1	26.10.2024		**TLM2**	
57.	Ground water prospects and recharge	1	28.10.2024		**TLM2**	
58.	Reservoir storage estimation	1	29.10.2024		**TLM2**	
59.	Tutorial– 5/ Quick revision	1	01.11.2024		**TLM3**	
60.	Revision	1	02.11.2024		**TLM3**	
	MID – II Examination		**04.11.2024 – 09.11.2024**			

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 (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.
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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
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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.
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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	Module Coordinator	Head of the Department
Name of the Faculty	K. Harish Kumar	Mr. J. Rangaiah	Dr. J.V.Rao
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms.G.DIVYA
Course Name & Code : INTRODUCTION TO ARTIFICIAL INTELLIGENCE – 20AD81
L-T-P Structure : 3-0-0   **Credits:**3
Program/Branch/Sem : B.Tech/CE/V   **A.Y.: 2024-25**

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.
     T2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011

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
1.	Discussion of CEO's and CO's, Introduction	1	01-07-2024		-	CO1	-	
2.	Introduction: What Is AI?,	1	02-07-2024		TLM1	CO1	T1,T2	
3.	The Foundations of Artificial Intelligence	1	04-07-2024		TLM1	CO1	T1,T2	
4.	The History of Artificial Intelligence,	1	05-07-2024		TLM1	CO1	T1,T2	
5.	The State of the Art.	1	08-07-2024		TLM1	CO1	T1,T2	
6.	Agents and Environments	1	09-07-2024		TLM1	CO1	T1,T2	
7.	Types of agents	1	11-07-2024		TLM2	CO1	T1,T2	
8.	Types of agents	1	12-07-2024		TLM2	CO1	T1,T2	
9.	Types of agents	1	15-07-2024		TLM2	CO1	T1,T2	
10.	Good Behavior: The Concept of Rationality	1	16-07-2024		TLM1	CO1	T1,T2	
11.	Omniscience vs Rational agent	1	18-07-2024		TLM1	CO1	T1,T2	
12.	The Nature of Environments	1	19-07-2024		TLM1	CO1	T1,T2	
13.	The Structure of Agents	1	22-07-2024		TLM1	CO1	T1,T2	
14.	Assignment/Quiz-2	1	23-07-2024		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
15.	Problem-Solving Agents, Example Problems	2	25-07-2024 26-07-2024		TLM1	CO2	T1,T2	
16.	searching for Solutions, Uninformed Search Strategies	2	29-07-2024 30-07-2024		TLM1	CO2	T1,T2	
17.	Search algorithms terminologies	1	01-08-2024		TLM1	CO2	T1,T2	
18.	Properties of search algorithms	1	02-08-2024		TLM1	CO2	T1,T2	
19.	Types of search algorithms.	1	05-08-2024		TLM1	CO2	T1,T2	
20.	Best first search algorithm	1	06-08-2024		TLM2	CO2	T1,T2	
21.	A* Algorithm	1	08-08-2024		TLM2	CO2	T1,T2	
22.	AO* Algorithm	1	09-08-2024		TLM2	CO2	T1,T2	
23.	Local Search Algorithms	1	12-08-2024		TLM2	CO2	T1,T2	
24.	Local Search Algorithms	1	13-08-2024		TLM2	CO2	T1,T2	
25.	Searching with Nondeterministic Actions.	1	16-08-2024		TLM2	CO2	T1,T2	
26.	Assignment/Quiz-2	1	19-08-2024		TLM1	CO2	T1,R1	
No. of classes required to complete UNIT-II: 15				**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
27.	Introduction	1	20-08-2024		TLM1	CO3	T1,T2	
28.	Uniformed/Blind Search Algorithms:	1	22-08-2024		TLM1	CO3	T1,T2	
29.	Breadth-first Search	1	23-08-2024		TLM2	CO3	T1,T2	
30.	Depth-first Search,	1	27-08-2024		TLM2	CO3	T1,T2	
31.	Depth limited search	1	29-08-2024		TLM2	CO3	T1,T2	
32.	Iterative deepening depth-first search	1	30-08-2024		TLM2	CO3	T1,T2	
33.	Uniform cost search	1	09-09-2024		TLM2	CO3	T1,T2	
34.	Bidirectional Search.	1	10-09-2024		TLM2	CO3	T1,T2	
35.	Assignment/Quiz-3	1	12-09-2024		TLM1	CO3	-	
No. of classes required to complete UNIT-III: 10				**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
36.	Introduction	1	13-09-2024		TLM1	CO4	T1,T2	
37.	Minimax algorithm	1	17-09-2024		TLM2	CO4	T1,T2	
38.	Alpha-Beta pruning	2	20-09-2024 19-09-2024		TLM2	CO4	T1,T2	
39.	Knowledge Based Agent, Architecture	1	23-09-2024		TLM1	CO4	T1,T2	
40.	Knowledge base Levels and types	1	24-09-2024		TLM1	CO4	T1,T2	
41.	Representation mappings	1	27-09-2024		TLM1	CO4	T1,T2	
42.	Inference Engine:Forward chaining/reasoning	1	30-09-2024		TLM1	CO4	T1,T2	
43.	Backward chaining/reasoning	1	01-10-2024		TLM1	CO4	T1,T2	
44.	Approaches of knowledge representation,	1	03-10-2024		TLM1	CO4	T1,T2	
45.	issues in knowledge representation	1	07-10-2024		TLM1	CO4	T1,T2	
46.	Assignment/Quiz-4	1	08-10-2024		TLM1	CO4	-	
No. of classes required to complete UNIT-IV: 16					**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
47.	Introduction	1	10-10-2024		TLM1	CO5	T1,T2	
48.	Logic, Propositional Logic:	1	14-10-2024		TLM1	CO5	T1,T2	
49.	A Very Simple Logic,	1	15-10-2024		TLM1	CO4	T1,T2	
50.	Ontological Engineering	1	17-10-2024		TLM2	CO4	T1,T2	
51.	Categories, Objects and Events	1	18-10-2024		TLM2	CO5	T1,T2	
52.	Mental Events and Mental Objects	1	21-10-2024		TLM1	CO5	T1,T2	
53.	What is reasoning and Types	1	22-10-2024		TLM1	CO4	T1,T2	
54.	Types of reasoning	1	24-10-2024		TLM1	CO4	T1,T2	
55.	Reasoning Systems for Categories	1	25-10-2024		TLM2	CO5	T1,T2	
56.	The Internet Shopping World	1	28-10-2024		TLM1	CO5	T1,T2	
57.	Assignment/Quiz-5	1	29-10-2024		TLM1	CO5	-	
No. of classes required to complete UNIT-V:15					**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
58.	Turing test, Interview Questions	1	08-11-2024		**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	**G.Divya**			**Dr. O. Rama Devi**
Signature				

COURSE HANDOUT

PROGRAM	:	B.Tech., V-Sem., CIVIL
ACADEMIC YEAR	:	2024-25
COURSE NAME & CODE	:	ENVIRONMENTAL ENGINEERING LAB (20CE60)
L-T-P STRUCTURE	:	0-0-3
COURSE CREDITS	:	1.5
COURSE INSTRUCTOR	:	
COURSE COORDINATOR	:	
PRE-REQUISITE	:	Applied Chemistry Lab

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

CO1: Understand the underlying principles of operation, perform the different laboratory techniques for examining the water quality parameters and comment on the results obtained (Apply-L3)

CO2: Understand the underlying principles of operation and perform the different laboratory techniques for examining the wastewater quality parameters and comment on the results obtained.(Apply-L3)

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	1	-	2	-	1	-	-	-	-	2	-	-	-	1	-
CO2	1	-	2	-	1	-	-	-	-	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).

20CE60 – ENVIRONMENTAL ENGINEERING LAB

Course Instructor: Dr. V. RAMAKRISHNA   B.Tech (V Sem)

                                                        A.Y: 2024-25

CYCLE-1

C-1-1. Determination of pH value and Conductivity in water sample.

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

C-1-3. Determination of Total, temporary and permanent hardness of water sample.

C-1-4. Determination of Calcium hardness of water sample.

C-1-5. Determination of Chloride concentration of water sample.

C-1-6. Determination of Alkalinity of water sample.

CYCLE-2

C-2-1. Determination of Acidity of water sample

C-2-2. Determination of Dissolved Oxygen of water sample (Analytical Method).

C-2-3. Determination of Total solids and Settleable solids in sewage sample.

CYCLE-3

C-3-1. Determination of Total Suspended solids in sewage sample.

C-3-2. Determination of Optimum dose of coagulant using Jar test.

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

C-3-4. Determination of Fluorides in water sample

INCHARGE   **HOD**

20CE60 – ENVIRONMENTAL ENGINEERING LAB

Course Instructor: Dr. V. RAMAKRISHNA

B.Tech (V Sem)

A.Y : 2024-25

Batch-A (Friday)

Date/Batch	A1	A2	A3	A4	A5	A6
05/07/2024	Introduction	Introduction	Introduction	Introduction	Introduction	Introduction
12/07/2024	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5	C-1-6
19/07/2024	C-1-2	C-1-3	C-1-4	C-1-5	C-1-6	C-1-1
26/07/2024	C-1-3	C-1-4	C-1-5	C-1-6	C-1-1	C-1-2
02/08/2024	C-1-4	C-1-5	C-1-6	C-1-1	C-1-2	C-1-3
09/08/2024	C-1-5	C-1-6	C-1-1	C-1-2	C-1-3	C-1-4
16/08/2024	C-1-6	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
23/08/2024	C-2-1	C-2-1	C-2-2	C-2-2	C-2-3	C-2-3
30/08/2024	C-2-2	C-2-2	C-2-3	C-2-3	C-2-1	C-2-1
13/09/2024	C-2-3	C-2-3	C-2-1	C-2-1	C-2-2	C-2-2
20/09/2024	C-3-1	C-3-1	C-3-1	C-3-2	C-3-2	C-3-2
27/09/2024	C-3-2	C-3-2	C-3-2	C-3-1	C-3-1	C-3-1
04/10/2024	REPEATATION LAB					
18/10/2024	REPEATATION LAB					
25/10/2024	REPEATATION LAB					
01/11/2024	REVISION					

20CE60 – ENVIRONMENTAL ENGINEERING LAB

Course Instructor: Dr. V. RAMAKRISHNA   B.Tech (V Sem)

A.Y: 2024-25

Batch-B (Monday)

Tentative Date/Batch	B1	B2	B3	B4	B5	B6
01/07/2024	Introduction	Introduction	Introduction	Introduction	Introduction	Introduction
08/07/2024	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5	C-1-6
15/07/2024	C-1-2	C-1-3	C-1-4	C-1-5	C-1-6	C-1-1
22/07/2024	C-1-3	C-1-4	C-1-5	C-1-6	C-1-1	C-1-2
29/07/2024	C-1-4	C-1-5	C-1-6	C-1-1	C-1-2	C-1-3
05/08/2024	C-1-5	C-1-6	C-1-1	C-1-2	C-1-3	C-1-4
12/08/2024	C-1-6	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
19/08/2024	C-2-1	C-2-1	C-2-2	C-2-2	C-2-3	C-2-3
09/09/2024	C-2-2	C-2-2	C-2-3	C-2-3	C-2-1	C-2-1
23-09-2024	C-2-3	C-2-3	C-2-1	C-2-1	C-2-2	C-2-2
30-09-2024	C-3-1	C-3-1	C-3-1	C-3-2	C-3-2	C-3-2
07-10-2024	C-3-2	C-3-2	C-3-2	C-3-1	C-3-1	C-3-1
14-10-2024	REPEATATION LAB					
21-10-2024	REPEATATION LAB					
28-10-2024	REVISION					

Batch A: 22761A0101 to 22761A0131 **(Fr**i**day)**
Batch B: 22761A0132 to 23765A0123 **(Monday)**

INCHARGE   **HOD**

ENVIRONMENTAL ENGINEERING LAB

COURSE : B.Tech (V SEM)   **A.Y** : 2024-25

LAB TIME TABLE

DAY	FN	AN
Monday	V Semister Batch-B	
Tuesday		
Wednesday		
Thursday		
Friday		V Semister Batch-A
Saturday		

Batch-A : 22761A0101 to 22761A0131

Batch-B : 22761A0132 to 23765A0123

Lab Incharge

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**

COURSE HANDOUT

PROGRAM	:	B.Tech., V-Sem., CIVIL
ACADEMIC YEAR	:	2024-25
COURSE NAME & CODE	:	GIS and Computer Applications Lab (20CE61)
L-T-P STRUCTURE	:	0-0-3
COURSE CREDITS	:	1
COURSE INSTRUCTOR	:	J.Rangaiah
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	-	1	-	1	1
CO2	-	-	-	-	2	-	-	-	-	2	-	1	-	1	1
CO3	-	-	-	2	2	-	-	-	-	2	-	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).

GIS AND COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

LIST OF EXPERIMENTS

COURSE: VII SEMESTER   **A.Y: 2024-25**

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

Lab-In charge

GIS AND COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

COURSE: VII SEMESTER   **A.Y: 2024-25**

LAB SCHEDULE

Sl.No	Name of the Experiment	Tentative Date	Actual Date
1	Demo	03-07-2024	
2	Determination of Permeability of Soil	10-7-2024	
3	Design of Irrigation Channel by Kennedy's Theory	24-7-2024	
4	Design of Singly Reinforced Rectangular Beam for Flexure.	31-7-2024	
5	Determination of Discharge over a Rectangular, Triangular or Trapezoidal Notch.	07-8-2024	
6	Design of Sedimentation Tank	14-8-2024	
7	Design of Compression Member	21-8-2024	
8	Digitization of Map / Toposheet	28-8-2024	
9	Estimation of Features and Interpretation	11-10-2024	
10	Creation of Thematic Maps	18-10-2024	
11	Developing Digital Elevation model	25-10-2024	
12	Revision	16-11-2024	
13	Internal Test	30-11-2024	

ACADEMIC CALENDAR

Description	From	To	Weeks
I Phase of Instructions	01-07-2024	31-08-2024	9 W
I Mid Examinations	02-09-2024	07-09-2024	1 W
II Phase of Instructions	09-09-2024	02-11-2024	8 W
II Mid Examinations	04-11-2024	09-11-2024	1 W
Preparation and Practical's	11-11-2024	16-11-2024	1 W
Semester End Examinations	18-11-2024	30-11-2024	2 W

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PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and researchmethods 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 modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor   Course Coordinator   Module Coordinator   HOD
   (J.RANGAIAH)   (J.RANGAIAH)   (J.RANGAIAH)   (Dr.J.V.R)

COURSE HANDOUT

PROGRAM	:	B. Tech., V-Sem., CIVIL
ACADEMIC YEAR	:	2024-25
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 /Sri B. Ramakrishna**
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 '-'**
   1- Slight (Low),   **2 –** Moderate (Medium),   **3 -** Substantial (High).

COMPUTER AIDED BUILDING DRAWING LAB

Faculty Name: Dr. K.V.Ramana /B. Ramakrishna   subject code: 20CES2

B.Tech (V SEM)   A.Y 2024-2025

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

DEPERTMENT OF CIVIL ENGINEERING
NOTIFICATION OF CYCLES
COMPUTER AIDED BUILDING DRAWING LAB
I–CYCLE SCHEDULE: BATCH-A (MONDAY)

Date / Batch	A	A	A	A	A	A
01/07/2024	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
08/07/2024	1	1	1	1	1	1
15/07/2024	2	2	2	2	2	2
22/07/2024	3	3	3	3	3	3
29/07/2024	4	4	4	4	4	4
05/08/2024	5	5	5	5	5	5
12/08/2024	6	6	6	6	6	6
19/08/2024	Repet.	Repet.	Repet.	Repet.	Repet.	Repet.

I–CYCLE SCHEDULE: BATCH-B (FRIDAY)

Date / Batch	B	B	B	B	B	B
05/07/2024	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
12/07/2024	1	1	1	1	1	1
19/07/2024	2	2	2	2	2	2
26/07/2024	3	3	3	3	3	3
02/08/2024	4	4	4	4	4	4
09/08/2024	5	5	5	5	5	5
16/08/2024	6	6	6	6	6	6
23/08/2024	Repet.	Repet.	Repet.	Repet.	Repet.	Repet.

II–CYCLE SCHEDULE: BATCH-A (MONDAY)

Date / Batch	A	A	A	A	A	A
09/09/2024	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
23-09-2024	7	7	7	7	7	7
30-09-2024	8	8	8	8	8	8
07-10-2024	9	9	9	9	9	9
14-10-2024	10	10	10	10	10	10
21-10-2024	11	11	11	11	11	11
28-10-2024	12	12	12	12	12	12

II–CYCLE SCHEDULE: BATCH-B (FRIDAY)

Date / Batch	B	B	B	B	B	B
30/08/2024	DEMO	DEMO	DEMO	DEMO	DEMO	DEMO
13/09/2024	1	1	1	1	1	1
20/09/2024	2	2	2	2	2	2
27/09/2024	3	3	3	3	3	3
04/10/2024	4	4	4	4	4	4
18/10/2024	5	5	5	5	5	5
25/10/2024	6	6	6	6	6	6
01/11/2024	Repet.	Repet.	Repet.	Repet.	Repet.	Repet.

Batch A (22761A0101 to 22761A0131), **Monday**
Batch B (22761A0132 to 23765A0123), Fri**day**

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(Dr. K.V.Ramana)	**(Dr. K.V.Ramana)**	**(Dr. CR)**	**(Dr. JVR)**