LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC, NBA(TIER-I) & 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.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF CIVIL ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor :Dr C.Rajamallu
Course Name & Code : Prestressed concretes(20CE24)
L-T-P Structure : 3-1-0 Credits : 3
Program/Sem/Sec : B.Tech.,CE.,VII-Sem., Sections- A A.Y : 2025-2026

PRE-REQUISITE: DRCS -I

COURSE EDUCATIONAL OBJECTIVES (CEOs):

1. Understand the basic concepts of Prestressing
2. Understand principle in various methods of pre stressing systems
3. Evaluate the losses in pre tensioned and post tensioned members
4. Analyze and design members subjected to flexure
5. Analyze and design members subjected to Shear and Torsion

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

CO 1	Understand the general mechanical behavior of prestressed concrete
CO 2	Perform analysis and design of prestressed concrete members and connections.
CO 3	Identify and interpret the appropriate relevant industry design codes.
CO 4	Become familiar with professional and contemporary issues in the design and fabrication of prestressed concrete members.
CO 5	Perform an industry relevant design project in team setting etc .

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	1	-	-	3	-	-	-	-	-	-	-	-	3	1
CO2	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	1	-	-	-	3	-	-	2	-	-	-	-	1	2	-
CO4	-	-	1	-	-	-	2	-	-	-	-	-	-	-	1
CO5	-	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).

TEXT BOOKS:

T1 Krishnaraju N, "Prestressed Concrete", Tata McGraw Hill Publishing Co.,Ltd., New Delhi, 1995.

T2 Rajagopalan.N, "Prestressed Concrete",Narosa Publishing House, New Delhi, 2002.

T3 MC Sinha and SK Rai "Fundamentals of prestressed concretes " s chand and company Ltd.New Delhi, 2011

REFERENCE BOOKS:

R1 James R.Libby, "Modern Prestressed Concrete", Design principles and Construction methods - Van Standard Rainford Co., New York, 1977

R2 Lin.T.Y, & Ned.H.Burns, "Design of Prestressed Concrete Structures", John Wiley & Sons, New York, 1981.

R3 P.Dhayaratnam "Prestressed concrete structures" Oxford and IBH ,New, Delhi, 2007.

R4 Arthur H.Nilson "Design of Prestressed concretes" john wiley and sons,Newyark,1978

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Basic concepts of prestressing

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 prestreesed	1	30-06-2025		TLM2	
2.	Historic development of prestreesed	1	01-07-2025		TLM2	
3.	General principles of prestressing	1	02-07-2025		TLM2	
4.	Principles of pre tensioning and post tensioning	1	05-07-2025		TLM2	
5.	Advantages of prestreesed concrete	1	07-07-2025		TLM2	
6.	Limitations of prestreesed concrete	1	08-07-2025		TLM2	
7.	Materials of prestreesed concrete	1	09-07-2025		TLM2	
8.	High strength concrete and High tensile steel	1	12-07-2025		TLM2	
9.	Relaxation of stress, stress corrosion	1	14-07-2025		TLM2	
10.	Durability, fire resistance, cover requirement	1	15-07-2025		TLM2	
11.	**Tutorial-1**	1	15-07-2025		TLM3	
No. of classes required to complete UNIT-I:11				No. of classes taken:		

UNIT-II: Prestressing systems

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and Methods of prestressing	1	16-07-2025		TLM2	
2.	Pre-tensioning method and post tensioning methods	1	19-07-2025		TLM2	
3.	Post tensioning methods analysis	1	21-07-2025		TLM2	
4.	Different systems of prestressing	1	22-07-2025		TLM2	
5.	Hoyer's , Magnel analysis	1	23-07-2025		TLM2	
6.	Freyssinet and Gifford analysis	1	26-07-2025		TLM2	
7.	Basic assumptions in analysis Prestress and design	1	28-07-2025		TLM2	
8.	Resultant stress at a section	1	29-07-2025		TLM2	
9.	Pressure line, concept of load balancing	1	30-07-2025		TLM2	
10.	Stress in tendons,cracking moment	1	02-08-2025		TLM2	
11.	Tutorial -2	2	04-08-2025		TLM 3	
No. of classes required to complete UNIT-II:12				No. of classes taken:		

UNIT-III: Losses of prestressing

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 losses of prestress	1	05-08-2025		TLM2	
2.	Analysis of sections of flexure	1	06-08-2025		TLM2	
3.	Elastic analysis of concrete beams prestressed with tendons	1	11-08-2025		TLM2	
4.	Problems on various elastic tendons	1	12-08-2025		TLM2	
5.	Elastic shortage of concrete	1	13-08-2025		TLM2	
6.	Problems on elastic shortage concrete	1	18-08-2025		TLM2	
7.	Tutorial -3	1	19-08-2025		TLM2	
8.	Shrinkage of concrete ,Problems on shrinkage of concrete	1	20-08-2025		TLM2	

9.	Creep of concrete, Relaxation of steel	1	23-08-2025		TLM2	
10.	MID-1					
11.	Problems on both the cases	1	06-10-2025		TLM2	
12.	Frictional losses and problems	1	08-10-2025		TLM2	
13.	Tutorial -4	1	10-10-2025		TLM3	
14.	Problems on Anchorage slip	1	11-10-2025		TLM2	
15.	Total loss of pretensioning & Post tensioning	1	13-10-2025		TLM2	
16.			15-10-2025			
17.	Losses problems	1	17-10-2025		TLM2	
No. of classes required to complete UNIT-III:16				No. of classes taken:		

UNIT-IV :Design for flexural resistance

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Types of flexural failures	1	18-10-2025		TLM2	
2.	Problems on flexural failure	1	22-10-2025		TLM2	
3.	Flexural failure, Strain compatibility method	1	24-10-2025		TLM2	
4.	Tutorial -5	2	25-10-2025		TLM2	
5.	Problems on strain compatibility	1	27-10-2025		TLM2	
6.	Problems	1	29-10-2025		TLM2	
7.	Control of deflections, factors influencing	1	31-10-2025		TLM3	
8.	Prediction of short term deflection	1	03-11-2025		TLM2	
9.	Prediction of long term deflection	1	05-11-2025		TLM2	
10.	Tutorial-6	2	07-11-2025		TLM3	
No. of classes required to complete UNIT-IV:12				No. of classes taken:		

UNIT-V :Design for Shear and Torsion

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.	Shear and principles of stresses	1	08-11-2025		TLM2	
2.	Problems on flexibility matrix method	1	10-11-2025		TLM2	
3.	Principal of stresses	1	12-11-2025		TLM2	
4.	Problems in principal of stress and shear	1	14-11-2025		TLM2	
5.	Design of shear reinforcement	1	15-11-2025		TLM2	

6.	Design for torsion,	1	17-11-2025		TLM2	
7.	Design for combined bending,Shear and Torsion	1	19-11-2025		TLM2	
8.	Transfer of Prestress in pre tensioned members	1	19-11-2025		TLM2	
9.	Transmission length,bond stress,end zone reinforcement	1	21-11-2025		TLM2	
10.	Mugnel method, Problems, Anchorage zone stresses	1	21-11-2025		TLM2	
11.	Anchorage zone reinforcement problems, Analysis of stresses	1	22-11-2025		TLM2	
12.	Differential shrinkage and problems	1	22-11-2025		TLM2	
13.	MID-2	24-11-2025 to 29-11-2025				
No. of classes required to complete UNIT-V:16				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

	continuous learning.

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Dr. C. Rajamallu)	(Mr. P. M. Ganga Raju)	(Dr. C. Rajamallu)	(Dr. K. V. Ramana)

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DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.J.Venkateswara Rao
Course Name & Code : GREEN BUILDINGS & 20CE29
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., CE., VII-Sem., A.Y : 2025-26
PRE-REQUISITE : Environmental science, Environmental Engineering

COURSE EDUCATIONAL OBJECTIVES (CEOs): This Course aims to provide study of appropriate materials for constructing a green building and planning for energy and resource conservation in green buildings. The course also provides the practices of optimum use of renewable energy resources, the principle of the designing of the building using climatic factors and planning for effective green building rating system.

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

CO 1	Explain the basic terminology used, different types, benefits of a green building and its rating concept
CO 2	Assess the impact of climate on a building and identify the appropriate materials for constructing a cost-effective green building (Understand – L2)
CO 3	Plan the various options for energy and resource conservation in a green building. (Understand – L2)
CO 4	Identify the ways for optimal use of renewable energy resources in the green building. (Understand – L2)

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

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

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

TEXT BOOKS:

1. K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao, "Alternative building materials and technologies", New Age International, 2014.
2. N. Kumara Swamy and A. Kameswara Rao, "Building Planning and Drawing", Charotar Publications, 2013.

REFERENCES

1. Abe Kruger and Carl Seville, "Green Building: Principles and Practices in Residential Construction", Demar Cengage Learning, 2012.
2. G.D. Rai, "Non-Conventional Energy Resources", Khanna Publishers; 18th edition, 2017.
3. Koenigsberger O H, "Manual of Tropical Housing and Building", 1st edition, Orient Longman Publishers, Chennai, 2003.
4. Odom P. Eugene, "Ecology and Environment", 2nd edition, Oxford and IBH Publishers, New Dehi, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: GREEN BUILDINGS CONCEPT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Review on environment science basics	1	30-06-25		TLM 1	
2.	Introduction to CO's, PO's & Overview	1	02-07-25		TLM 1	
3.	Concept of Green Buildings	1	03-07-25		TLM 1	
4.	Features of green building	1	04-07-25		TLM 1	
5.	Miscellaneous features of GB	1	07-07-25		TLM 1,2	
6.	Benefits and environmental impacts of green building	1	09-07-25		TLM 1,2	
7.	Green and Brown field development	1	10-07-25		TLM 1,2	
8.	Sustainable site selection	1	11-07-25		TLM 1,2	
9.	Planning of buildings to maximize comfort	1	14-07-25		TLM 1,2	
10.	Day light requirements-Planning	1	16-07-25		TLM 1,2	
11.	Natural Ventilation	1	17-07-25		TLM 1,2	
12.	Review on Unit-1	1	18-07-25		TLM 1,2	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: CLIMATE DESIGN

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction about Climatic conditions	1	21-07-25		TLM 1,2	
2.	Local climatic conditions	1	23-07-25		TLM 1,2	
3.	Effect of Solar radiation	1	24-07-25		TLM 1,2	
4.	Wind, Humidity and temperature	1	25-07-25		TLM 1,2	
5.	Impact of deforestation	1	28-07-25		TLM 1,2	
6.	Climate change on built environment	1	30-07-25		TLM 1,2	

7.	Climate change desirable conditions	1	01-08-25		TLM 1,2	
8.	Fresh air requirements & Sick building syndrome	1	04-08-25		TLM 1,2	
9.	Fresh air Standards & Air pollutants	1	06-08-25		TLM 1,2	
10.	Review on Unit-1	1	07-08-25		TLM 1,2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: GREEN MATERIALS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction about recycling building materials	1	08-08-25		TLM 1	
2.	Advantages in usage of natural materials &	1	11-08-25		TLM 1,2	
3.	Usage of bamboo and properties, uses	1	13-08-25		TLM 1,2	
4.	Timber properties, uses	1	14-08-25		TLM 1,2	
5.	Rammed earth and its advantages	1	20-08-25		TLM 1	
6.	Usage of stabilized mud blocks, hollow blocks	1	21-08-25		TLM 1,2	
7.	Review on Unit-3	1	22-08-25		TLM 1,2	
8.	I Mid Examinations	1	22-09-25		-	
9.	I Mid Examinations	1	24-09-25		-	
10.	I Mid Examinations	1	25-09-25		-	
11.	I Mid Examinations	1	26-09-25		-	
12.	Usage of lime and lime-pozzolana	1	06-10-25		TLM 1,2	
13.	Materials from agro and industrial waste	1	08-10-25		TLM 1,2	
14.	Usage of ferro- cement and free-concrete	1	09-10-25		TLM1,2	
15.	Alternative roofing systems	1	10-10-25		TLM 1,2	
16.	Alternative roofing systems	1	13-10-25		TLM 1,2	
17.	Paints reducing the heat gain of the building	1	15-10-25		TLM 1,2	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: ENERGY AND RESOURCE CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction about building envelope	1	16-10-25		TLM 1,2	
2.	Active and passive energy systems	1	22-10-25		TLM 1,2	

3.	Need for energy conservation, Various forms of energy used in buildings	1	23-10-25		TLM 1,2	
4.	Building automation and building, management	1	24-10-25		TLM 1,2	
5.	Principle of thermal and design lighting	1	25-10-25		TLM 1,2	
6.	Energy efficient lighting	1	27-10-25		TLM 1,2	
7.	Water conservation systems in buildings, Planning for storm	1	29-10-25		TLM 1,2	
8.	Water harvesting in buildings	1	30-10-25		TLM 1,2	
9.	Recycling of sewage	1	31-10-25		TLM 1,2	
10.	Waste to energy management in complexes or gated communities	1	03-11-25		TLM 1,2	
11.	Modular wastewater treatment systems for built environment	1	05-11-25		TLM 1,2	
12.	Review on Unit-4	1	06-11-25		TLM 1,2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: RENEWABLE ENERGY AND GREEN BUILDING RATING SYSTEMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction about Solar Energy	1	07-11-25		TLM 1,2	
2.	Introduction about wind Energy	1	10-11-25		TLM 1,2	
3.	Harvesting Potential of solar energy in India and world	1	12-11-25		TLM 1,2	
4.	Construction and operation of various solar based appliances	1	13-11-25		TLM 1,2	
5.	Geothermal energy usage in buildings . Geothermal building	1	15-11-25		TLM 1,2	
6.	Introduction to LEED and LEED certification	1	17-11-25		TLM 1,2	
7.	Green rating system for Integrated Habitat Assessment	1	19-11-25		TLM 1,2	
8.	Salient features of Green Buildings Constructed in India	1	20-11-25		TLM 1,2	
9.	Case studies on green buildings	1	21-11-25		TLM 4	
No. of classes required to complete UNIT-V: 9				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

	receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. J.Venkateswara Rao**	**Dr. C. Rajamallu**	**Dr. K.V.Ramana**
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF CIVIL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: K. HARISH KUMAR
Course Name & Code : Repair and Rehabilitation of Structures & 20CE30
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech, VII SEM, CE **A.Y.:** 2025-26

PREREQUISITE: CONCRETE TECHNOLOGY

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course deals with concepts of various distress and damages to concrete, masonry structures - importance of maintenance of structures - various types and properties of repair materials - damage assessment to the structures using various NDT tests - various repair techniques of damaged structures, corroded structures. The course also consists of Retrofitting components in addition to adapting new techniques in construction practices

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

CO1	Illustrate the causes for distress and deterioration of structures (Understand – L2)
CO2	Describe the various Non Destructive Tests for condition assessment of structures (Understand – L2)
CO3	Select appropriate repair material and rehabilitation strategy (Understand – L2)
CO4	Conduct survey and apply suitable repair methods for cracks (Understand – L2)

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

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

TEXTBOOKS:

T1 Concrete Structures-Repair, Rehabilitation and Retrofitting, B. Bhattacharjee, CRS Publishers and Distributors, 2017.

T2 P. C. Varghese, Maintenance, Repair & Rehabilitation and Minor Works of Buildings", PHI Learning Pvt. Ltd., 2014

REFERENCE BOOKS:

R1 Concrete Structures-Protection, Repair and Rehabilitation, R.Dodge Woodson, Elsevier, 2009

R2 B.L. Gupta and Amit Gupta, „Maintenance & Repair of Civil Structures", Standard Publication, Edition 2009

R3 CPWD Handbook on Repair and Rehabilitation of RCC buildings, Govt. of India Press, New Delhi, 2014.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: DISTRESS IN CONCRETE AND CONDITION SURVEY

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 CO's ,PO's & Basics of Concrete technology	01	30-06-2025		**TLM2**	
2.	Present repair practices	01	02-07-2025		**TLM2**	
3.	Distress identification and repair management	01	03-07-2025		**TLM2**	
4.	Causes of distress in concrete structures	01	04-07-2025		**TLM2**	
5.	Holistic Models for deterioration of concrete	01	07-07-2025		**TLM2**	
6.	Permeability of concrete	01	09-07-2025		**TLM2**	
7.	Aggressive chemical agents, durability aspects	01	10-07-2025		**TLM2**	
8.	Condition Survey: Objectives, different stages	01	11-07-2025		**TLM2**	
9.	Preliminary inspection, planning stage, visual inspection	01	14-07-2025		**TLM2**	
10.	Consideration for repair strategy, need for rehabilitation of structures.	01	16-07-2025		**TLM2**	
11.	Revision	01	17-07-2025		**TLM2**	
12.	**TUTORIAL-I**	01	18-07-2025		**TLM3**	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: DETERIORATION OF CONCRETE STRUCTURES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to détérioration of concrète structures	01	21-07-2025			
14.	Physical processes of deterioration like Freezing and Thawing	01	23-07-2025		**TLM2**	
15.	Wetting and Drying, Abrasion, Erosion, Pitting	01	24-07-2025		**TLM2**	
16.	Corrosion – Mechanism	01	25-07-2025		**TLM2**	
17.	Corrosion – Effect - preventive measures.	01	28-07-2025		**TLM2**	
18.	Chemical processes like Carbonation	01	30-07-2025		**TLM2**	
19.	Chloride ingress, Sulphate attack	01	31-07-2025		**TLM2**	
20.	Alkali aggregate reaction, Acid attack	01	01-08-2025		**TLM2**	
21.	Cracks in concrete	01	04-08-2025		**TLM2**	
22.	Type, pattern	01	06-08-2025		**TLM2**	
23.	Quantification, measurement	01	07-08-2025		**TLM2**	
24.	Preventive measures	01	08-08-2025		**TLM2**	
25.	Revision	01	11-08-2025		**TLM2**	
26.	**TUTORIAL-II**	01	13-08-2025		**TLM3**	
No. of classes required to complete UNIT-II: 14				**No. of classes taken:**		

UNIT-III: NON-DESTRUCTIVE EVALUATION TESTS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Introduction – NDT tests	01	14-08-2025		TLM2	
28.	Rebound hammer test	01	18-08-2025		TLM2	
29.	Ultrasonic pulse velocity tests	01	20-08-2025		TLM2	
30.	Penetration resistance, pull out tests	01	21-08-2025		TLM2	
31.	Carbonation tests	01	22-08-2025		TLM2	
Technical Training		**25.08.2025 – 20.09.2025**				
MID – I Examination		**22.09.2025 – 27.09.2025**				
32.	Chloride content	01	29.09.2025		TLM2	
33.	Corrosion potential assessment cover mete	02	01.10.2025 03.10.2025		TLM2	
34.	Half-cell potentiometer test,	01	06.10.2025		TLM2	
35.	Resistivity measurement	01	08.10.2025		TLM2	
36.	Revision	01	09.10.2025		TLM2	
37.	**TUTORIAL-III**	01	10.10.2025		TLM3	
No. of classes required to complete UNIT-III:12				**No. of classes taken:**		

UNIT-IV: SELECTION OF REPAIR MATERIALS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38.	Introduction – Repair materials	01	13.10.2025		TLM2	
39.	Various repair materials	01	15.10.2025		TLM2	
40.	Criteria for material selection, Methodology of selection	02	16.10.2025 17.10.2025		TLM2	
41.	Health and safety precautions for handling	01	20.10.2025		TLM2	
42.	Applications of repair materials	01	22.10.2025		TLM2	
43.	Polymer modified mortars and concrete	01	23.10.2025		TLM2	
44.	Gas forming grouts	01	24.10.2025		TLM2	
45.	Epoxy bonding agents	01	27.10.2025		TLM2	
46.	Protective coatings for Concrete and Steel	01	29.10.2025		TLM2	
47.	FRP Sheets	01	30.10.2025		TLM2	
48.	**TUTORIAL-IV**	01	31.10.2025		TLM3	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: REPAIR AND REHABILITATION STRATEGIES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
49.	Introduction - Repair strategies	01	03.11.2025		TLM2	
50.	Various methods of crack repair	01	05.11.2025		TLM2	
51.	Grouting, Routing and sealing	01	06.11.2025		TLM2	
52.	Stitching, Autogenous healing,	02	07.11.2025		TLM2	

	Overlays					
53.	Repair to active crack & dormant cracks	01	10.11.2025		**TLM2**	
54.	RCC jacketing	01	12.11.2025		**TLM2**	
55.	Ferro cement jacketing	01	13.11.2025		**TLM2**	
56.	Fiber wrap technique	01	14.11.2025		**TLM2**	
57.	Strengthening of columns and beams	01	17.11.2025		**TLM2**	
58.	Case studies of RCC buildings	01	19.11.2025		**TLM2**	
59.	Case studies of RCC buildings	01	20.11.2025		**TLM2**	
60.	Case studies of RCC buildings	01	21.11.2025		**TLM2**	
	MID – II Examination	**24.11.2025 – 29.11.2025**				
No. of classes required to complete UNIT-V: 13				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**KHK**	**KHK**	**Dr. CR**	**Dr. KV.RAMANA**
Signature				

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT

Part-A

PROGRAM : B.Tech., VII-Sem., CIVIL Department

ACADEMIC YEAR : 2025-26

COURSE NAME & CODE : UTILIZATION OF ELECTRICAL ENERGY- 23EE83

L-T-P STRUCTURE : 3-0-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **D VENKATA LAKSHMI**

PRE-REQUISITES: BASIC ELECTRICAL ENGINEERING

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the student to acquire knowledge on methods of Electric Heating and welding, different lighting schemes. It also introduces the concepts of Electric Drives for Industrial and traction system, and also different tariff methods.

COURSE OUTCOMES (COs): At the end of the course, the student will be able to
CO1: Understand mechanism of electric heating and electric welding. **(Understand-L2)**
CO2: Analyze performance of various lighting schemes. **(Understand-L2)**
CO3: Analyze the performance of electric drive systems. **(Understand-L2)**
CO4: Illustrate the different schemes of traction and its main components **(Understand-L2)**
CO5: Understand various tariff methods and power factor improvement techniques. **(Understand-L2)**

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	2												
CO2	2	2	2								2				
CO3	2	2	2												
CO4	2	2	2								2				
CO5	2	2	2								2				

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

BOS APPROVED TEXT BOOKS:

T1 C.L. Wadhwa "Generation, Distribution and Utilization of Electrical energy, New Age International Publishers,3rd Edition,2015.

T2 N.V.Suryanarayana "Utilization of electric power including electric drives and electric traction, New age international publishers New Delhi,2nd edition 2014.

BOS APPROVED REFERENCE BOOKS

R1 V K Mehta & Rohit Mehta, "Principles of Power System", Revised Edition, S.Chand Publications, 2022.

R2 A.Chakrabarthi, M.L.Soni, P.V.Gupta and U.S.Bhatnagar, "A Textbook on Power system Engineering", Dhanpat Rai Publishing Company (P) Ltd., 2008.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I : ELECTRIC HEATING &WELDING

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.	Course Outcomes & Blooms Taxonomy Levels	1	30-06-2025		TLM1/ TLM2	CO1	T1	
2.	Advantages &applications of Electric heating	1	01-07-2025		TLM1/ TLM2	CO1	T1	
3.	Classification of electric heating	1	02-07-2025		TLM1/ TLM2	CO1	T1	
4.	Resistance heating	1	03-07-2025		TLM1/ TLM2	CO1	T1	
5.	Arc heating	1	07-07-2025		TLM1/ TLM2	CO1	T1	
6.	Induction heating	1	08-07-2025		TLM1/ TLM2	CO1	T1	
7.	Dielectric heating	1	08-07-2025		TLM1/ TLM2	CO1	T1	
8.	Causes of failures of heating elements	1	09-07-2025		TLM1/ TLM2	CO1	T1	
9.	Materials for heating elements	1	10-07-2025		TLM1/ TLM2	CO1	T1	
10.	Requirement of good heating material	1	14-07-2025		TLM1/ TLM2	CO1	T1	
11.	ARC Furnace	1	15-07-2025		TLM1/ TLM2	CO1	T1	
12.	Resistance welding	1	16-07-2025		TLM1/ TLM2	CO1	T1	
13.	Spot welding, seam welding	1	17-07-2025		TLM1/ TLM2	CO1	T1	
14.	Arc welding	1	21-07-2025		TLM1/ TLM2	CO1	T1	
15.	Comparison between AC and DC welding	1	22-07-2025		TLM1/ TLM2	CO1	T1	
No. of classes required to complete UNIT-I :15					No. of classes taken:			

UNIT-II : ILLUMINATION ENGINEERING

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
16	Introduction to Nature of light	1	23-07-2025		**TLM1/ TLM2**	CO2	T1	
17	Laws of illumination	1	24-07-2025		**TLM1/ TLM2**	CO2	T1	
18	Laws of illumination	1	28-07-2025		**TLM1/ TLM2**	CO2	T1	
19	Lighting schemes, sources of light	1	28-07-2025		**TLM1/ TLM2**	CO2	T1	
20	Fluorescent Lamp, CFL and LED	**1**	29-07-2025		**TLM1/ TLM2**	CO2	T1	
21	Sodium Vapor	1	30-07-2025		**TLM1/ TLM2**	CO2	T1	
22	Neon Lamp	1	31-07-2025		**TLM1/ TLM2**	CO2	T1	
23	Mercury vapor lamps	1	04-08-2025		**TLM1/ TLM2**	CO2	T1	
24	Comparison between tungsten &fluorescent tubes	1	05-08-2025		**TLM1/ TLM2**	CO2	T1	
25	Requirements of good lighting	1	06-08-2025		**TLM1/ TLM2**	CO2	T1	
26	Street lighting	1	07-08-2025		**TLM1/ TLM2**	CO2	T1	
27	Assignment/Quiz	1	11-08-2025		**TLM1/ TLM2**	CO2	T1	
No. of classes required to complete UNIT-II: 12					No. of classes taken:			

UNIT-III: ELECTRIC DRIVES

S.No	Topics to be covered	No. of Classess Required	Tentative Date of Completion	Actual Date of Completion	Teachingg Learningg Method	Learning Outcome COs	Text Book followed	HOD Sign Weekly
28	Introduction	1	12-08-2025		**TLM1/ TLM2**	CO3	T1	
29	Elements of drive, advantages	1	13-08-2025		**TLM1/ TLM2**	CO3	T1	
30	Factors affecting selection of motor	1	14-08-2025		**TLM1/ TLM2**	CO3	T1	
31	Types of loads	1	18-08-2025		**TLM1/ TLM2**	CO3	T1	
32	Industrial applications	1	19-08-2025		**TLM1/ TLM2**	CO3	T1	
33	Transient Characteristics of drives	1	20-08-2025		**TLM1/ TLM2**	CO3	T1	
34	Steady state characteristics of drives	1	21-08-2025		**TLM1/ TLM2**	CO3	T1	
35	Size of motor	1	29-09-2025		**TLM1/ TLM2**	CO3	T1	
36	Load Equalization	1	30-09-2025		**TLM1/ TLM2**	CO3	T1	
37	Assignment/Quiz	1	01-10-2025		**TLM3**	CO3	T1	
No. of classes required to complete UNIT-II:10					No. of classes taken:			

UNIT-IV : ELECTRIC TRACTION

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
38	Introduction	1	02-10-2025		**TLM1**	CO4	T1	
39	Requirement of an ideal traction system	1	06-10-2025		**TLM1**	CO4	T1	
40	Supply system for electric traction	1	07-10-2025		**TLM1**	CO4	T1	
41	Train movement	1	08-10-2025		**TLM1**	CO4	T1	
42	Mechanism of train movement	1	09-10-2025		**TLM1**	CO4	T1	
43	Traction motors	1	13-10-2025		**TLM1**	CO4	T1	
44	Modern trends in electric traction	1	14-10-2025		**TLM1**	CO4	T1	
45	Automation in traction	1	15-10-2025		**TLM1**	CO4	T1	
46	Speed time curves for different services	1	16-10-2025		**TLM1**	CO4	T1	
47	Trapezoidal and quadrilateral speed time curves	1	20-10-2025		**TLM1**	CO4	T1	
48	Problems on train movement	1	21-10-2025		**TLM1**	CO4	T1	
49	Assignment/quiz	1	**22-10-2025**		**TLM3**	CO4	T1	
No. of classes requiredto complete UNIT-IV:12					No. of classes taken:			

UNIT-V : TARIFF AND POWER FACTOR IMPROVEMENT

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
50	Desirable characteristics	1	23-10-2025		**TLM1/ TLM2**	CO5	T1	
51	Types of Tariff	1	27-10-2025					
52	Flat rate & Block rate	1	28-10-2025		**TLM1/ TLM2**	CO5	T1	
53	KVA maximum demand & Time of Day tariff	1	29-10-2025					
54	KVA maximum demand & Time of Day tariff	1	30-10-2025		**TLM1/ TLM2**	CO5	T1	
55	Adv & Dis adv of low power factor	1	03-11-2025		**TLM1/ TLM2**	CO5	T1	
56	P.F improvement using static capacitor	1	04-11-2025		**TLM1/ TLM2**	CO5	T1	
57	Most economical power factor	1	05-11-2025		**TLM1/ TLM2**	CO5	T1	
58	PF impr. devices from consumer	1	06-11-2025		**TLM1/ TLM2**	CO5	T1	
59	Assignment/Quiz	1	10-11-2025		**TLM3**	CO5	T1	
60	REVISION	2	11-11-2025		**TLM2**	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	HOD Sign Weekly
61	Economic aspects in utilization of electrical energy	2	12-11-2025 13-11-2025		**TLM1/ TLM2**	

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 PROCES (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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8 W
Technical Training	25-08-2025	06-09-2025	2 W
I Mid Examinations	08-09-2025	13-09-2025	1 W
II Phase of Instructions	15-09-2025	15-11-2025	9 W
II Mid Examinations	17-11-2025	22-11-2025	1 W
Preparation and Practicals	24-11-2025	29-11-2025	1 W
Semester End Examinations	01-12-2025	13-12-2025	2 W

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1.	Pursue a successful career in the area of Information Technology or its allied fields..
PEO2.	Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.
PEO3.	Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.
PEO4.	Able to understand the professional code of ethics and demonstrate ethical behaviour, effective communication, team work and leadership skills in their job.

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Ms.D.Venkata Lakshmi	Dr.AV.G.A.Martanda	Dr.M.S.Giridhar	Dr.P.Sobha Rani
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT
Part-A

PROGRAM : B.Tech, VII Sem., Civil Engineering
ACADEMIC YEAR : 2025-26
COURSE NAME & CODE : **Elements of Automobile Engineering-20ME84**
L-T-P STRUCTURE : 3 (L) – 0 (T) – 0 (P)
COURSE CREDITS : 3
COURSE INSTRUCTOR : **Mr. K Lakshmi Prasad**
COURSE COORDINATOR : **Mr. K Lakshmi Prasad**
RE-REQUISITES : **Nil**

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of the course is to familiarize the concepts like lubricating systems, cooling systems, transmission systems, steering system, braking system, suspension system, ignition system, charging system, wheels and tyres, air conditioning and lighting system in automobiles.

COURSE OUTCOMES (COs)

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

CO1 : Label the various components of engine systems and sub-systems of an automobile. (Remembering-L1)
CO2 : Comprehend the ignition, charging and starting systems of automobile. (Understanding-L2)
CO3 : Outline the features and functions of steering and braking system. (Understanding-L2)
CO4 : Describe the transmission system in automobile.(Understanding-L2)
CO5 : Identify the safety measures and pollution issues of automobile. (Remembering-L1)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	-	2	-	-	-	-	-	-	-	-	-	2	1	-	2
CO4	1	1	-	-	-	-	-	-	-	-	-	2	2	-	2
CO5	-	-	-	-	-	3	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 Dr. Kirpal Singh, Automobile Engineering-Vol I& II, 13thEdition, Standard Publishers Distributors, 2014.
T2 R.B.Gupta, Automobile Engineering, 8th edition, Tech India publication series, 2013.

BOS APPROVED REFERENCE BOOKS:

R1 Srinivasan.S, Automotive Mechanics, 2nd Edition, Tata McGraw-Hill, 2003.

R2 Crouse and Anglin, Automotive Mechanism, 9th Edition. Tata McGraw-Hill, 2003.

R3 Jack Erjavec, A Systems Approach to Automotive Technology, Cengage Learning Pub., 2009.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: INTRODUCTION, ENGINE AND LUBRICATING SYSTEM AND COOLING SYSTEMS:

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 CO's and PO's	1	30.06.25		TLM1/ TLM2	CO1	T1,T2	
2.	**ENGINE:** Basic terminology and working principle of engines	2	01.07.25 02.07.25		TLM1/ TLM2	CO1	T1,T2	
3.	Essential engine components	2	04.07.25 07.07.25		TLM1/ TLM2	CO1	T1,T2	
4.	Firing Order, Turbo charging.	2	08.07.25 09.07.25		TLM1/ TLM2	CO1	T1,T2	
5.	**LUBRICATING SYSTEM AND COOLING SYSTEMS:** Functions and need of lubrication and cooling system	1	11.07.25		TLM1/ TLM2	CO1	T1,T2	
6.	methods of lubrication- pressure type, mist lubrication	2	14.07.25 15.07.25		TLM1/ TLM2	CO1	T1,T2	
7.	Characteristics of effective cooling system, types of cooling system	1	16.07.25		TLM1/ TLM2	CO1	T1,T2	
8.	thermostat cooling system	1	18.07.25		TLM1/ TLM2	CO1	T1,T2	
No. of classes required to complete UNIT-I: 12					No. of classes taken:			

UNIT-II: IGNITION SYSTEM, CHARGING SYSTEM & STARTING SYTEMS

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.	**IGNITION SYSTEM:** Introduction, Need of ignition systems	1	21.07.25		TLM1/ TLM2	CO2	T1,T2	
2.	ignition systems and types Battery Ignition system, Magneto Ignition system	2	22.07.25 23.07.25		TLM1/ TLM2	CO2	T1,T2	
3.	Electronic Ignition system-Capacitive discharge Ignition system.	2	25.07.25 28.07.25		TLM1/ TLM2	CO2	T1,T2	
4.	**CHARGING SYSTEM & STARTING SYTEMS:** Introduction, need of Charging and starting system	1	29.07.25		TLM1/ TLM2	CO2	T1,T2	
5.	Starting Motor, Starting drives	2	30.07.25 01.08.25		TLM1/ TLM2	CO2	T1,T2	
6.	Bendix drive mechanism, and Solenoid switch.	2	04.08.25 05.08.25		TLM1/ TLM2	CO2	T1,T2	
No. of classes required to complete UNIT-II: 10					No. of classes taken:			

UNIT-III STEERING SYSTEM AND BRAKING 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
1.	**STEERING SYSTEM:** Introduction, Functions of steering mechanism,	1	06.08.25		TLM1/ TLM2	CO3	T1,T2	
2.	steering gear box types,	3	08.08.25 11.08.25 12.08.25		TLM1/ TLM2	CO3	T1,T2	
3.	wheel geometry and power steering systems	3	13.08.25 18.08.25 19.08.25		TLM1/ TLM2	CO3	T1,T2	
4.	**BRAKING SYSTEM:** Introduction, functions of braking system	1	20.08.25		TLM1/ TLM2	CO3	T1,T2	
5.	classification of braking system- Hydraulic braking system-Pneumatic braking system	3	29.09.25 30.09.25 01.10.25		TLM1/ TLM2	CO3	T1,T2	
6.	constructional and operation of Antilock braking system	3	03.10.25 06.10.25 07.10.25		TLM1/ TLM2	CO3	T1,T2	
No. of classes required to complete UNIT-I: 14					No. of classes taken:			

UNIT-IV: TRANSMISSION 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
1.	**TRANSMISSION SYSTEM:** Introduction, Types of gear Boxes	2	08.10.25 10.10.25		TLM1/ TLM2	CO4	T1,T2	
2.	functions and types of front and rear axles	3	13.10.25 14.10.25 15.10.25		TLM1/ TLM2	CO4	T1,T2	
3.	types and functions, components of the clutches	3	17.10.25 20.10.25 21.10.25		TLM1/ TLM2	CO4	T1,T2	
4.	fluid couplings, design considerations of Hotchkiss drive torque tube drive	3	22.10.25 24.10.25 27.10.25		TLM1/ TLM2	CO4	T1,T2	
5.	function and parts of differential and traction control.	2	28.10.25 29.10.25		TLM1/ TLM2	CO4	T1,T2	
No. of classes required to complete UNIT-I:-15					No. of classes taken:			

UNIT-V: FRONT AXLE AND STEERING, SUSPENSION SYSTEM, BRAKING SYSTEM SAFTEY MEASURES OFAN AUTOMOBILE

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.	**SAFTEY MEASURES OF AN AUTOMOBILE:** Introduction -Safety belt,	1	31.10.25		TLM1/ TLM2	CO5	T1,T2	
2.	Airbags, wind screen wipers,	2	03.11.25 04.11.25		TLM1/ TLM2	CO5	T1,T2	
3.	rear vehicle cameras, bumper design safety.	2	05.11.25 07.11.25		TLM1/ TLM2	CO5	T1,T2	
4.	**AUTOMOBILE POLLUTION:** Emissions from Automobiles	2	10.11.25 11.11.25		TLM1/ TLM2	CO5	T1,T2	
5.	Nitrogen oxides, Soot,	1	12.11.25		TLM1/ TLM2	CO5	T1,T2	
6.	Carbon monoxide, Hydrocarbons, Particulates,	2	14.11.25 17.11.25		TLM1/ TLM2	CO5	T1,T2	
7.	Emission Regulations	1	18.11.25		TLM1/ TLM2	CO5	T1,T2	
No. of classes required to complete UNIT-I: 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
1.	Advanced Topics in all Units	2	19.11.25 21.11.25		TLM1/ TLM2	CO1 - CO5	T1, T2, R1 to R5	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work: 30.06.2025			
I Phase of Instructions	30.06.2025	23.08.2025	8
Technical Training	25.08.2025	06.09.2025	2
I Mid Examinations	08.09.2025	13.09.2025	1
II Phase of Instructions	15.09.2025	15.11.2025	9
II Mid Examinations	17.11.2025	22.112025	1
Preparation and Practical	24.11.2025	29.11.2025	1
Semester End Examinations	01.12.2025	13.12.2025	2

Part - C

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment-1	1,2,3	A1=05
I-Mid Examination	1,2,3	B1=15
Quiz-1	1,2,3	Q1=10
Assignment -2	3,4,5	A3=05
II-Mid Examination	3,4,5	B2=15
Quiz-2	3,4,5	Q2=10
Evaluation of Assignment/Quiz Marks: A=(A1+A2)/5	1,2,3,4,5	**A=05**
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	**B=15**
Evaluation of Online Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C	1,2,3,4,5	**Q=10**
Cumulative Internal Examination: A+B+Q	**1,2,3,4,5**	**A+B+Q=30**
Semester End Examinations: E	**1,2,3,4,5**	**E=70**
Total Marks: CIE+SEE	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1: To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.

PEO2: To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.

PEO3: To develop inquisitiveness towards good communication and lifelong learning.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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.

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.

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.

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.

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.

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.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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.

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.

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):

PSO1: Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering.

PSO2: Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands.

PSO3: Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

Position	***Course Instructor***	***Course Coordinator***	***Module Coordinator***	***HOD***
Name	Mr. K. Lakshmi Prasad	Mr. K. Lakshmi Prasad	Dr. P.Vijay Kumar	Dr. M B S Sreekara Reddy
Signature				

DEPARTMENT OF CIVIL ENGINEERING
COURSE HANDOUT
PART - A

PROGRAM : B.Tech. - VII-Sem.
ACADEMIC YEAR : 2025-26
COURSE NAME & CODE : Management Science for Engineers – 20HS02
L-T-P STRUCTURE : 4-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. M.S. CHAKRAVARTHY Assistant. Professor
COURSE COORDINATOR : Dr. A. Nageswara Rao, Sr. Assistant Professor
PER-REQUISITE : NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To make students understand management, its principles, contribution to management, organization, and its basic issues and types.
2. To make students understand the concept of plant location and its factors and plant layout and types, method of production and work study importance.
3. To understand the purpose and function of statistical quality control. And understand the material management techniques.

COURSE OUTCOMES:

After completion of the course student will be able to:
CO1: Understand management principles to practical situations based on the organization structures. **(L2)**
CO2: Design Effective plant Layouts by using work study methods. **(L2)**
CO3: Apply quality control techniques for improvement of quality and materials management. **(L3)**
CO4: Develop best practices of HRM in corporate Business to raise employee productivity. **(L2)**
CO5: Identify critical path and project completion time by using CPM and PERT techniques. **(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	3	3	3	2	3				3			3		3	
CO2	3	3	1	2	1				3			3		3	
CO3	3	3	3	2	1				3			3		3	
CO4	3	2	3	2	3				1			3		3	
CO5	2	3	3	2	1				1			3		3	

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

BOS APPROVED TEXT BOOKS:

1. Dr. A.R.Aryasri, Management Science, TMH, 10th edition, 2012

References:

1. Koontz & weihrich – Essentials of management, TMH, 10th edition, 2015
2. Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
3. O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT & CPM

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.	Introduction To Management	1	01.07.25		TLM1	CO1	T1	
2.	Definition, Nature, Importance of management	1	02.07.25		TLM1	CO1	T1	
3.	Functions of Management	1	03.07.25		TLM1	CO1	T1	
4.	Taylor's scientific management theory	1	05.07.25		TLM1	CO1	T1	
5.	Fayal's principles of management	1	08.07.25		TLM3	CO1	T1	
6.	Contribution of Elton mayo, Maslow	1	09.07.25		TLM1	CO1	T1	
7.	Herzberg, Douglas MC Gregor principles of management	1	10.07.25		TLM1	CO1	T1	
8.	Basic Concepts of Organization, Authority, Responsibility	1	12.07.25		TLM1	CO1	T1	
9.	Delegation of Authority, Span of control	1	15.07.25		TLM1	CO1	T1, R1	
10.	Departmentation and Decentralization	1	16.07.25		TLM1	CO1	T1, R1	
11.	Organization structures (Line organization)	1	17.07.25		TLM1	CO1	T1, R1	
12.	Line and Functional staff organization,	1	19.07.25		TLM1	CO1	T1	
13.	Committee and Matrix organization	1	22.07.25		TLM3	CO1	T1	
No. of classes required to complete UNIT-I		**13**			**No. of classes taken:**			

UNIT-II: OPERATIONS MANAGEMENT

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
14.	Introduction, Plant location	1	23.07.25		TLM1	CO2	T1, R3	
15.	Factors influencing location	1	24.07.25		TLM1	CO2	T1, R3	
16.	Principles of plant layouts	1	26.07.25		TLM1	CO2	T1, R3	
17.	Types of plant layouts	1	29.07.25		TLM1	CO2	T1, R3	
18.	Methods of production	1	30.07.25		TLM1	CO2	T1, R3	
19.		1	31.07.25		TLM3	CO2	T1, R3	
20.	Work study	1	02.08.25		TLM1	CO2	T1	

21.		1	05.08.25		TLM1	CO2	T1	
22.	Basic procedure involved in method study	1	06.08.25		TLM1	CO2	T1	
23.	Work measurement	1	07.08.25		TLM3	CO2	T1	
24.	Work measurement	1	09.08.25		TLM1	CO2	T1	
25.		1	12.08.25		TLM1	CO2	T1	
No. of classes required to complete UNIT-II		**12**			**No. of classes taken:**			

UNIT-III: STATISTICAL QUALITY CONTROL & MATERIALS MANAGEMENT

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.	Introduction, Concept of Quality, Quality Control functions	1	13.08.25		TLM1	CO3	T1	
27.	Meaning of SQC, Variables and attributes	1	14.08.25		TLM1	CO3	T1, R1	
28.	X chart, R Chart	1	16.08.25		TLM1	CO3	T1, R1	
29.	C Chart, P Chart	1	19.08.25		TLM1	CO3	T1	
30.	Simple problems	1	20.08.25		TLM3	CO3	T1, R1	
31.	Acceptance sampling, Sampling plans	1	21.08.25		TLM1	CO3	T1, R1	
25.08.25 to 20.09.25 Technical Training 1st MID EXAMINATIONS 22/09/25 to 27 /09/25								
32.	Deming's contribution to quality	1	30.09.25		TLM1	CO3	T1	
33.	Materials management Meaning and objectives	1	01.10.25		TLM1	CO3	T1, R1	
34.	Inventory control & Need for inventory control	1	04.10.25		TLM1	CO3	T1, R1	
35.	Purchase procedure, Store records	1	07.10.25		TLM1	CO3	T1	
36.	EOQ, ABC analysis	1	08.10.25		TLM3	CO3	T1	
37.	Stock levels	1	09.10.25		TLM1	CO3	T2	
No. of classes required to complete UNIT-III		**12**			**No. of classes taken:**			

UNIT-IV: HUMAN RESOURCE MANAGEMENT (HRM)

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
38.	Introduction	1	11.10.25		TLM1	CO4	T1	
39.	Concepts of HRM	1	14.10.25		TLM1	CO4	T1	
40.	Basic functions of HR manager	1	15.10.25		TLM1	CO4	T1, R2	
41.	Man power planning	1	16.10.25		TLM3	CO4	T1, R2	
42.	Recruitment	1	18.10.25		TLM1	CO4	T1, R2	
43.	Selection,	1	21.10.25		TLM1	CO4	T1, R1	
44.	Training & developmemt	1	22.10.25		TLM1	CO4	T1, R1	
45.	Placement	1	23.10.25		TLM1	CO4	T1	
46.	Wage and salary administration	1	25.10.25		TLM3	CO4	T1, R1	
47.	Promotion, Transfers Separation	1	28.10.25		TLM1	CO4	T1, R1	
48.	Performance appraisal	1	29.10.25		TLM1	CO4	T1	
49.	Job evaluation and merit rating	1	30.10.25		TLM3	CO4	T1	
No. of classes required to complete UNIT-IV		**12**			**No. of classes taken:**			

UNIT-V: PROJECT MANAGEMENT

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
50.	Introduction	1	01.11.25		TLM1	CO5	T1,R2	
51.	Early techniques in project management	1	04.11.25		TLM1	CO5	T1, R2	
52.	Network analysis	1	05.11.25		TLM1	CO5	T1,R2	
53.	Programme Evaluation and Review Technique (PERT)	1	06.11.25		TLM1	CO5	T1,R2	
54.	Problems	1	08.11.25		TLM1	CO5	T1,R2	
55.	Critical path method (CPM)	1	11.11.25		TLM1	CO5	T1, R2	
56.	Identifying critical path	1	12.11.25		TLM1	CO5	T1,R2	
57.	Problems	1	13.11.25		TLM1	CO5	T1,R2	
58.	Probability of completing project within given time	1	15.11.25		TLM1	CO5	T1,R2	

59.	Project cost analysis	1	18.11.25		TLM1	CO5	T1, R2	
60.	Problems	1	19.11.25		TLM1	CO5	T1,R2	
61.	project crashing	1	20.11.25		TLM1	CO5	T1,R2	
62.	Simple problems	1	22.11.25		TLM1	CO5	T1,R2	
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**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

Part – C

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Assignment 1	1	A1=5
Assignment 2	2	A2=5
I-Mid Examination	1,2,3	B1=15
Quiz – 1	1,2,3	Q1=10
Assignment 3	3	A3=5
Assignment 4	4	A4=5
Assignment 5	5	A5=5
II-Mid Examination	3,4,5	B2=15
Quiz – 2	3,4,5	Q2=10
Evaluation of Assignment: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=15
Evaluation of Quiz Marks: Q=75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	1,2,3,4,5	Q=10
Cumulative Internal Examination: A+B+Q	**1,2,3,4,5**	**CIE=30**
Semester End Examinations	**1,2,3,4,5**	**SEE=70**
Total Marks: CIE+SEE	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Pursue higher education, entrepreneurship and research to compete at global level.

PEO2: Design and develop products innovatively in the area of computer science and engineering and in Other allied fields.

PEO3: Function effectively as individuals and as members of a team in the conduct of interdisciplinary Projects and even at all the levels with ethics and necessary attitude.

PEO4: Serve ever-changing needs of the society with a pragmatic perception.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

PO1 - Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design / Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 - Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 - Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - Project Management and Finance: Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOS):

PSO1: The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.

PSO2: The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.

PSO3: To inculcate an ability to analyze, design and implement database applications.

Mr.M.S.CHAKRAVARTHY	Dr. A. Nageswara Rao	Mr. J. Subba Reddy	Dr.K.DEEPIKA
Course Instructor	Course Coordinator	Module Coordinator	HoD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)
NAAC Accredited with CGPA of 3.20 on 4-point scale at 'A' Grade NIRF-2022
(Positioned in the Band of 251-300 in the Engineering Category) NIRF-2023
(Positioned in the Band of 101-150 in the Innovation Category)
NBA Accredited under Tier-I (ECE, EEE, CSE, IT, ME, CIV, ASE) Recognized as Scientific Industrial Research Organization(SIRO) by DSIR Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program : B.Tech. VII Sem. Civil Engineering
Academic Year : 2025-26
Course Name & Code : **IOT APPLICATIONS IN CIVIL ENGINEERING**-20CS53
L-T-P-Cr : 1-0-2-2
Course Instructure : Mr. K.V. Ashok

Course Objectives: In this course, student will be exposed to implement interfacing of various sensors with Arduino/Raspberry Pi to transmit data wirelessly between different devices.

Course Outcomes (COs): At the end of the course, students will be able to

CO 1	Understand the basics of Microcontroller, Arduino-Uno, Raspberry Pi and Internet of Things (Understand)	L2
CO 2	Apply the steps of the design methodology in developing IoT Applications using Arduino Uno, Raspberry Pi (Understand)	L2
CO 3	Design the interfacing of various sensors with Arduino and Raspberry Pi (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
CO 1	1	2	2	2	2	-	-	-	-	-	-	1	-	-	-
CO 2	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-
CO 3	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

Textbooks (T) and References (R):

T1: Raj Kamal, Internet of Things - Architecture and Design Principles, McGraw Hill Publication, 2017
T2: Zach Shelby, Carsten Bormann: "The Wireless Embedded Internet", Wiley, 1st Edition.

R1: Arshdeep Bahga and Vijay Madisetti, Internet of Things – A Hands-on Approach, University Press, 2015
R2: Reema Thareja, "Python Programming using Problem Solving Approach", Oxford Press.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to 8051 Microcontroller, AT mega 328P - Arduino Uno and Raspberry Pi	**6**	08-07-2025		TLM4	
2.	Programming the Microcontroller, Arduino and Raspberry Pi	6	22-07-2025		TLM4	
3.	Stepper Motor Control with 8051 Microcontroller	3	29-07-2025		TLM4	
4.	Interfacing of LED, DHT11-humiditysensor and PIR sensor with Arduino and RaspberryPi using Python Program	3	05-08-2025		TLM4	
5.	Traffic Light Simulator using Arduino and RaspberryPi.	3	12-08-2025		TLM4	
6.	Water flow sensor with an Arduino board.	3	19-08-2025		TLM4	
7.	Ultrasonic sensor using Arduino board	3	30-09-2025		TLM4	
8.	RaspberryPi Motion Sensor Alarm using PIR Sensor	3	06-10-2025		TLM4	
9.	RaspberryPi based Smart Phone Controlled Home Automation	3	13-10-2025		TLM4	
10.	DC Motor Control with RaspberryPi	6	27-10-2025		TLM4	
11.	Stepper Motor Control with RaspberryPi	3	03-11-0025		TLM4	
12.	Interfacing DS 18B20 Temperature Sensor with RaspberryPi	3	10-11-2025		TLM4	
13.	Project Report writing & Verification	3	17-11-2025		TLM6	
No. of classes required: 48				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Semester End Examination (SEE)	**100**
Total Marks = SEE	**100**

PART-D

Program Educational Objectives (PEOs):

PEO 1:	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
PEO 2:	To Function professionally in the rapidly changing world with advances in technology.
PEO 3:	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
PEO 4:	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner.

Program Outcomes (POs):

PO 1:	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3:	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4:	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5:	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	**Individual and teamwork**: 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.

Program Specific Outcomes (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools.
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Mr. K. V. Ashok	Mr. K. Sasi Bhushan	Dr. P. Lachi Reddy	Dr. G. Srinivasulu