LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., EEE , A-Sec

ACADEMIC YEAR : 2024-25

COURSE NAME & CODE : **Power Electronics** - 23EE10

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : **P.Deepak Reddy**

COURSE COORDINATOR : **P.Deepak Reddy**

PRE-REQUISITES: Electrical Circuit Analysis, Semiconductor Physics, Control Systems.

COURSE EDUCATIONAL OBJECTIVE: This course enables the student to study the characteristics of power semiconductor devices and to familiarize the principle of operation & performance of various power electronic converters.

COURSE OUTCOMES(COs)

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

CO1: Understand the static and dynamic characteristics of SCR, Power-MOSFET and Power-IGBT. (Understand-L2)

CO2: Analyse the operation of phase-controlled rectifiers. (Apply-L3)

CO3: Analyse the operation of three-phase full–wave converters, AC Voltage Controllers and Cyclo converters. (Apply-L3)

CO4: Examine the operation and design of different types of DC-DC converters. (Apply-L3)

CO5: Analyse the operation of square wave inverters and PWM inverters for voltage control. (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	PSO4
CO1	3											1	1	1	2	1
CO2	2	3										1	2	2	1	1
CO3	2	3										1	2	1	1	1
CO4	2	3	3									1	1	2	1	1
CO5	2	3										1	2	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).

Text Books:

1. Power Electronics: Converters, Applications and Design by Ned Mohan, Tore M Undeland, William P Robbins, John Wiley & Sons, 2002.
2. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 2017.
3. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009.

Reference Books:

1. Elements of Power Electronics–Philip T.Krein. Oxford University Press; Second edition, 2014.
2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics: by Daniel W.Hart, Mc Graw Hill, 2011.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I : POWER SEMI-CONDUCTOR DEVICES

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.	Silicon controlled rectifier (SCR)	1	30/6/25		**TLM1 TLM4**	CO1	1	
2.	Two transistor analogy	1	1/7/25		**TLM1**	CO1	1	
3.	Static and Dynamic characteristics	1	3/7/25		**TLM1**	CO1	1	
4.	Static and Dynamic characteristics	1	5/7/25		**TLM1**	CO1	1	
5.	Turn on Methods and Turn off Methods	1	7/7/25		**TLM1**	CO1	1	
6.	Triggering Methods (R and RC)	1	8/7/25		**TLM4**	CO1	1	
7.	TUTORIAL-1	1	10/7/25		**TLM3**	CO1	1	
8.	Triggering Methods (UJT)	1	12/7/25		**TLM4**	CO1	1	
9.	Snubber circuit design.	1	14/7/25		**TLM1**	CO1	1	
10.	Static and Dynamic Characteristics of Power MOSFET	1	15/7/25		**TLM4**	CO1	1	
11.	TUTORIAL-2	1	17/7/25		**TLM3**	CO1	1	
12.	Static and Dynamic Characteristics of Power IGBT	1	19/7/25		**TLM1**	CO1	1	
13.	Numerical problems	1	21/7/25		**TLM1**	CO1	1	

14.	Numerical problems	1	22/7/25		**TLM1**		1	
15.	TUTORIAL-3	1	24/7/25		**TLM3**		1	
No. of classes required to complete UNIT-I		15			No. of classes taken:			

UNIT-II : SINGLE-PHASE AC-DC CONVERTERS

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.	Single-phase half-wave controlled rectifiers - R and RL loads without freewheeling diode	1	28/7/25		**TLM4**	CO2	2	
17.	Single-phase half-wave controlled rectifiers - R and RL loads with freewheeling diode	1	29/7/25		**TLM4**	CO2	2	
18.	TUTORIAL-4	1	31/7/25		**TLM3**	CO2	2	
19.	Single-phase fully controlled mid-point converter with R load, RL load and RLE load(CCD, DCM)	1	2/8/25		**TLM4**	CO2	2	
20.	Single-phase fully controlled bridge converter with R load, RL load and RLE load(CCD, DCM)	1	4/8/25		**TLM4**	CO2	2	
21.	Effect of source inductance in Single-phase fully controlled bridge rectifier	1	5/8/25		**TLM1**	CO2	2	
22.	TUTORIAL-5	1	7/8/25		**TLM3**	CO2	2	
23.	Single-phase Semi-Converter with R load-RL load and RLE load(CCM, DCM)	1	9/8/25		**TLM4**	CO2	2	
24.	Single-phase Semi-Converter with R load-RL load and RLE load(CCM, DCM)	1	11/8/25		**TLM4**	CO2	2	
25.	Dual converter and its mode of operation	1	12/8/25		**TLM4**	CO2	2	
26.	TUTORIAL-6	1	14/8/25		**TLM3**	CO2	2	
27.	Numerical Problems	1	18/8/25		**TLM1**	CO2	2	
28.	Numerical Problems	1	19/8/25		**TLM1**	CO2	2	
29.	TUTORIAL-7	1	21/8/25		**TLM3**	CO2	2	
No. of classes required to complete UNIT-II		14			No. of classes taken:			
I MID EXAMIANTIONS 25-8-25 TO 30-08-25								

UNIT-III : THREE-PHASE AC-DC CONVERTERS & AC – AC CONVERTERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
30.	Three-phase half-wave Rectifier with R and RL load	1	23/8/25		**TLM1**	CO3	1	
31.	Three-phase fully controlled rectifier with R and RL load	1	1/9/25		**TLM4**	CO3	1	
32.	Three-phase semi converter with R and RL load	1	2/9/25		**TLM1**	CO3	1	
33.	TUTORIAL-8	1	4/9/25		**TLM3**	CO3	1	
34.	Numerical Problems	1	6/9/25		**TLM1**	CO3	1	
35.	Numerical Problems	1	8/9/25		**TLM1**	CO3	1	
36.	Single-phase AC-AC power control by phase control with R and RL loads	1	9/9/25		**TLM1**	CO3	1	
37.	TUTORIAL-9	1	11/9/25		**TLM3**	CO3	1	
38.	Single-phase AC-AC power control by phase control with R and RL loads	1	13/9/25		**TLM1**	CO3	1	
39.	Single-phase step down Cycloconverter	1	15/9/25		**TLM4**	CO3	1	
40.	Single-phase step up Cycloconverter	1	16/9/25		**TLM4**	CO3	1	
41.	TUTORIAL-10	1	18/9/25		**TLM3**	CO3	1	
42.	Numerical Problems	1	20/9/25		**TLM1**	CO3	1	
No. of classes required to complete UNIT-III		10			No. of classes taken:			

UNIT-IV : DC–DC CONVERTERS

(THIS UNIT WILL BE COVERED BY Dr.RAMESH BABU DARLA, ASST. GENERAL MANAGER, PANASONIC ELECTRIC WORKS PVT LTD, BENGALORE.)

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
43.	Operation of Basic Chopper	1	20/9/25		**TLM1**	CO4	2	
44.	control techniques	1	22/9/25		**TLM1**	CO4	2	
45.	Introduction to PWM control	1	23/9/25		**TLM1**	CO4	2	
46.	TUTORIAL-10	1	25/9/25		**TLM3**	CO4	2	
47.	Analysis of Buck converters(CCM, DCM)	1	27/9/25		**TLM4**	CO4	2	

48.	Analysis of Boost converters(CCM, DCM)	1	29/9/25		**TLM4**	CO4	2	
49.	Analysis of Buck-Boost converters(CCM, DCM)	1	4/10/25		**TLM4**	CO4	2	
50.	Numerical Problems	1	6/10/25		**TLM1**	CO4	2	
51.	Numerical Problems	1	7/10/25		**TLM1**	CO4	2	
52.	TUTORIAL-11	1	9/10/25		**TLM3**	CO4	2	
53.	REPITITION	1	11/10/25		**TLM2**	CO4	2	
54.	No. of classes required to complete UNIT-IV	11			No. of classes taken:			

UNIT-V : DC–AC Converters

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
55.	Introduction - Single-phase half-bridge, Phase Displacement Control	1	13/10/25		**TLM1**	CO5	2	
56.	full-bridge inverters with R and RL loads	1	14/10/25		**TLM4**	CO5	2	
57.	TUTORIAL-12	1	16/10/25		**TLM3**	CO5	2	
58.	PWM with bipolar voltage switching, PWM with unipolar voltage switching	1	18/10/25		**TLM1**	CO5	2	
59.	Three-phase square wave inverters - 120^0 conduction of operation	1	20/10/25		**TLM4**	CO5	2	
60.	TUTORIAL-13	1	23/10/25		**TLM3**	CO5	2	
61.	Three-phase square wave inverters - 180^0 conduction modes of operation	1	25/10/25		**TLM4**	CO5	2	
62.	Sinusoidal Pulse Width Modulation	1	27/10/25		**TLM1**	CO5	2	
63.	Current Source Inverter (CSI)	1	28/10/25		**TLM4**	CO5	2	
64.	TUTORIAL-14	1	30/10/25		**TLM3**	CO5	2	
65.	Numerical Problems.	1	1/11/25		**TLM1**	CO5	2	
No. of classes required to complete UNIT-V		11			No. of classes taken:			
II-MID EXAMINATIONS(03-11-2025 TO 08-11-2025)								

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
66.	Three-phase fully controlled rectifier with DC MOTOR using MATLAB simulation	1	14-8-25		**TLM2**	CO2	2	

67.	Multilevel Inverter	1	30-10-25		**TLM4**	CO5	2	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM2	PPT	**TLM6**	Assignment or Quiz
TLM3	Tutorial	**TLM7**	Group Discussion/Project
TLM4	Demonstration (Lab/Field Visit)		

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, III)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,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):

PEO1	Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.
PEO2	Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.
PEO3	Work effectively as individuals and as team members in multidisciplinary projects.
PEO4	Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

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 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)
PROGRAMME OUTCOMES (POs)
PSOs

P.Deepak Reddy	P.Deepak Reddy	P.Deepak Reddy	Dr.P.Sobha Rani
Course Instructor	Course Coordinator	Module Coordinator	HOD

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COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., EEE , B-Sec

ACADEMIC YEAR : 2024-25

COURSE NAME & CODE : **Power Electronics** - 23EE10

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : **P.Deepak Reddy**

COURSE COORDINATOR : **P.Deepak Reddy**

PRE-REQUISITES: Electrical Circuit Analysis, Semiconductor Physics, Control Systems.

COURSE EDUCATIONAL OBJECTIVE: This course enables the student to study the characteristics of power semiconductor devices and to familiarize the principle of operation & performance of various power electronic converters.

COURSE OUTCOMES(COs)

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

CO1: Understand the static and dynamic characteristics of SCR, Power-MOSFET and Power-IGBT. (Understand-L2)

CO2: Analyse the operation of phase-controlled rectifiers. (Apply-L3)

CO3: Analyse the operation of three-phase full–wave converters, AC Voltage Controllers and Cyclo converters. (Apply-L3)

CO4: Examine the operation and design of different types of DC-DC converters. (Apply-L3)

CO5: Analyse the operation of square wave inverters and PWM inverters for voltage control. (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	PSO4
CO1	3											1	1	1	2	1
CO2	2	3										1	2	2	1	1
CO3	2	3										1	2	1	1	1
CO4	2	3	3									1	1	2	1	1
CO5	2	3										1	2	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).

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1. Power Electronics: Converters, Applications and Design by Ned Mohan, Tore M Undeland, William P Robbins, John Wiley & Sons, 2002.
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Reference Books:

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2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics: by Daniel W.Hart, Mc Graw Hill, 2011.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I : POWER SEMI-CONDUCTOR DEVICES

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.	Silicon controlled rectifier (SCR)	1	30/6/25		**TLM1 TLM4**	CO1	1	
2.	Two transistor analogy	1	1/7/25		**TLM1**	CO1	1	
3.	Static and Dynamic characteristics	1	2/7/25		**TLM1**	CO1	1	
4.	Static and Dynamic characteristics	1	5/7/25		**TLM1**	CO1	1	
5.	Turn on Methods and Turn off Methods	1	7/7/25		**TLM1**	CO1	1	
6.	Triggering Methods (R and RC)	1	8/7/25		**TLM4**	CO1	1	
7.	Triggering Methods (UJT)	1	9/7/25		**TLM3**	CO1	1	
8.	TUTORIAL-1	1	12/7/25		**TLM4**	CO1	1	
9.	Snubber circuit design.	1	14/7/25		**TLM1**	CO1	1	
10.	Static and Dynamic Characteristics of Power MOSFET	1	15/7/25		**TLM4**	CO1	1	
11.	Static and Dynamic Characteristics of Power IGBT	1	16/7/25		**TLM3**	CO1	1	
12.	TUTORIAL-2	1	19/7/25		**TLM1**	CO1	1	
13.	Numerical problems	1	21/7/25		**TLM1**	CO1	1	

14.	Numerical problems	1	22/7/25		**TLM1**		1	
15.	TUTORIAL-3	1	23/7/25		**TLM3**		1	
No. of classes required to complete UNIT-I		15			No. of classes taken:			

UNIT-II : SINGLE-PHASE AC-DC CONVERTERS

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.	Single-phase half-wave controlled rectifiers - R and RL loads without freewheeling diode	1	28/7/25		**TLM4**	CO2	2	
17.	Single-phase half-wave controlled rectifiers - R and RL loads with freewheeling diode	1	29/7/25		**TLM4**	CO2	2	
18.	Single-phase fully controlled mid-point converter with R load, RL load and RLE load(CCD, DCM)	1	30/7/25		**TLM3**	CO2	2	
19.	TUTORIAL-4	1	2/8/25		**TLM4**	CO2	2	
20.	Single-phase fully controlled bridge converter with R load, RL load and RLE load(CCD, DCM)	1	4/8/25		**TLM4**	CO2	2	
21.	Effect of source inductance in Single-phase fully controlled bridge rectifier	1	5/8/25		**TLM1**	CO2	2	
22.	Single-phase Semi-Converter with R load-RL load and RLE load(CCM, DCM)	1	6/8/25		**TLM3**	CO2	2	
23.	TUTORIAL-5	1	9/8/25		**TLM4**	CO2	2	
24.	Single-phase Semi-Converter with R load-RL load and RLE load(CCM, DCM)	1	11/8/25		**TLM4**	CO2	2	
25.	Dual converter and its mode of operation	1	12/8/25		**TLM4**	CO2	2	
26.	TUTORIAL-6	1	13/8/25		**TLM3**	CO2	2	
27.	Numerical Problems	1	18/8/25		**TLM1**	CO2	2	
28.	Numerical Problems	1	19/8/25		**TLM1**	CO2	2	
29.	TUTORIAL-7	1	20/8/25		**TLM3**	CO2	2	
No. of classes required to complete UNIT-II		14			No. of classes taken:			
I MID EXAMIANTIONS 25-8-25 TO 30-08-25								

UNIT-III : THREE-PHASE AC-DC CONVERTERS & AC – AC CONVERTERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
30.	Three-phase half-wave Rectifier with R and RL load	1	23/8/25		**TLM1**	CO3	1	
31.	Three-phase fully controlled rectifier with R and RL load	1	1/9/25		**TLM4**	CO3	1	
32.	Three-phase semi converter with R and RL load	1	2/9/25		**TLM1**	CO3	1	
33.	Numerical Problems	1	3/9/25		**TLM3**	CO3	1	
34.	TUTORIAL-8	1	6/9/25		**TLM1**	CO3	1	
35.	Numerical Problems	1	8/9/25		**TLM1**	CO3	1	
36.	Single-phase AC-AC power control by phase control with R and RL loads	1	9/9/25		**TLM1**	CO3	1	
37.	Single-phase AC-AC power control by phase control with R and RL loads	1	10/9/25		**TLM3**	CO3	1	
38.	TUTORIAL-9	1	13/9/25		**TLM1**	CO3	1	
39.	Single-phase step down Cycloconverter	1	15/9/25		**TLM4**	CO3	1	
40.	Single-phase step up Cycloconverter	1	16/9/25		**TLM4**	CO3	1	
41.	TUTORIAL-10	1	20/9/25		**TLM3**	CO3	1	
42.	Numerical Problems	1	17/9/25		**TLM1**	CO3	1	
No. of classes required to complete UNIT-III		10			No. of classes taken:			

UNIT-IV : DC–DC CONVERTERS

(THIS UNIT WILL BE COVERED BY Dr.RAMESH BABU DARLA, ASST. GENERAL MANAGER, PANASONIC ELECTRIC WORKS PVT LTD, BENGALORE.)

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
43.	Operation of Basic Chopper	1	22/9/25		**TLM1**	CO4	2	
44.	control techniques	1	22/9/25		**TLM1**	CO4	2	
45.	Introduction to PWM control	1	23/9/25		**TLM1**	CO4	2	
46.	TUTORIAL-10	1	27/9/25		**TLM3**	CO4	2	
47.	Analysis of Buck converters(CCM, DCM)	1	24/9/25		**TLM4**	CO4	2	

48.	Analysis of Boost converters(CCM, DCM)	1	29/9/25		**TLM4**	CO4	2	
49.	Analysis of Buck-Boost converters(CCM, DCM)	1	1/10/25		**TLM4**	CO4	2	
50.	Numerical Problems	1	6/10/25		**TLM1**	CO4	2	
51.	Numerical Problems	1	7/10/25		**TLM1**	CO4	2	
52.	TUTORIAL-11	1	11/10/25		**TLM3**	CO4	2	
53.	REPITITION	1	8/10/25		**TLM2**	CO4	2	
54.	No. of classes required to complete UNIT-IV	11			No. of classes taken:			

UNIT-V : DC–AC CONVERTERS

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
55.	Introduction - Single-phase half-bridge, Phase Displacement Control	1	13/10/25		**TLM1**	CO5	2	
56.	full-bridge inverters with R and RL loads	1	14/10/25		**TLM4**	CO5	2	
57.	TUTORIAL-12	1	18/10/25		**TLM3**	CO5	2	
58.	PWM with bipolar voltage switching, PWM with unipolar voltage switching	1	15/10/25		**TLM1**	CO5	2	
59.	Three-phase square wave inverters - 120^0 conduction of operation	1	20/10/25		**TLM4**	CO5	2	
60.	TUTORIAL-13	1	25/10/25		**TLM3**	CO5	2	
61.	Three-phase square wave inverters - 180^0 conduction modes of operation	1	22/10/25		**TLM4**	CO5	2	
62.	Sinusoidal Pulse Width Modulation	1	27/10/25		**TLM1**	CO5	2	
63.	Current Source Inverter (CSI)	1	28/10/25		**TLM4**	CO5	2	
64.	TUTORIAL-14	1	1/11/25		**TLM3**	CO5	2	
65.	Numerical Problems.	1	29/11/25		**TLM1**	CO5	2	
No. of classes required to complete UNIT-V		11			No. of classes taken:			
II-MID EXAMINATIONS(03-11-2025 TO 08-11-2025)								

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
66.	Three-phase fully controlled rectifier with DC MOTOR using MATLAB simulation	1	14-8-25		**TLM2**	CO2	2	

67.	Multilevel Inverter	1	30-10-25		**TLM4**	CO5	2	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM2	PPT	**TLM6**	Assignment or Quiz
TLM3	Tutorial	**TLM7**	Group Discussion/Project
TLM4	Demonstration (Lab/Field Visit)		

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, III)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,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):

PEO1	Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.
PEO2	Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.
PEO3	Work effectively as individuals and as team members in multidisciplinary projects.
PEO4	Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

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 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)
PROGRAMME OUTCOMES (POs)
PSOs

P.Deepak Reddy	P.Deepak Reddy	P.Deepak Reddy	Dr.P.Sobha Rani
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF EEE

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr. M.UmaVani
Course Name & Code : Digital Circuits (23EE11)
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech/V/A **A.Y.: 2025-26**

PREREQUISITE: Knowledge of electronic components and semiconductor devices, number systems, binary arithmetic, Boolean or switching algebra and logic gates.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To know the simplification methods of Boolean functions
- To understand the realization of arithmetic, data routing and memory logic circuits.
- To know the operation and design of various counters and registers.
- To understand the analysis and design of synchronous sequential circuits.
- To understand the basic concepts of digital integrated circuits.

COURSE OUTCOMES (COs) and COURSE ARTICULATION MATRIX

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

23EE11	Digital Circuits	PO1	PO2	PO3	PO4 To PO11 not mapped	PO12	PSO1 PSO2 not mapped	PSO3	PSO4
CO1	Analyze different types of combinational circuits. (Apply-L3)	2	3	-		-		1	1
CO2	Apply knowledge of flip-flops in designing of registers and counters. (Apply-L3)	2	3	3		-		1	1
CO3	Design synchronous sequential circuits. (Apply-L3)	2	3	3		1		1	1
CO4	Understand the logic families in the form of digital integrated circuits. (Understand-L2)	3	-	-		1		1	1

Textbooks:

1. Switching and finite automata theory Zvi. Kohavi, 3rd edition, Cambridge University Press, 2010.
2. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education,2006.

Reference Books:

1. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition, 1992.
2. Switching Theory and Logic Design by A. Anand Kumar,Prentice Hall India Pvt., Limited, Third Edition, 2016.

Online Learning Resources:

1. https://nptel.ac.in/courses/117106086.
2. https://nptel.ac.in/courses/108105113.

1. Comer, "Digital Logic and State Machine Design", Oxford Higher Education, 3rd edition 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN-A/Sec)

(Commencement of Classwork: 30-06-2025)

UNIT – I: Combinational Logic Circuits – I

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.	OBE / COs / POs Awareness, Introduction to DC course	1	30-6-2025		TLM1/2	
2.	Canonical forms and switching equations from truth tables	2	2-7-2025, 4-7-2025		TLM1/2	
3.	Boolean simplification and NAND/NOR implementations	2	5-7-2025, 7-7-2025		TLM1/2	
4.	Karnaugh maps (3,4,5 variables)	2	9-7-2025, 11-7-2025		TLM1/2	
5.	Don't care terms and simplification of maxterm expressions	1	14-7-2025		TLM1/2	
6.	Quine-McCluskey minimization	1	16-7-2025		TLM1/2	
7.	Combinational design approach and Look-ahead carry adder	2	18-7-2025, 19-7-2025		TLM1/2	
8.	4-bit adder-subtractor and BCD adder	1	21-7-2025		TLM1/2	
9.	Excess-3 adder and binary comparators	1	23-7-2025		TLM1/2	
10.	**Quiz**	1	25-7-2025		TLM3	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT – II: Combinational Logic Circuits – II

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Decoders, BCD decoders, and 7-segment decoders	2	26-7-2025, 28-7-2025		TLM1/2	
12.	Multiplexers and higher-order multiplexing	2	30-7-2025, 1-8-2025		TLM1/2	
13.	De-multiplexers and realization using decoders/MUX	1	2-8-2025		TLM1/2	
14.	Encoders and priority encoders	2	4-8-2025, 6-8-2025		TLM1/2	
15.	Read-only and Read/Write memories	1	8-8-2025		TLM1/2	
16.	PROM, PAL, PLA structures and programming tables	2	11-8-2025, 13-8-2025		TLM1/2	
17.	Realization using PROM, PAL, PLA	2	16-8-2025, 18-8-2025		TLM1/2	

18.	**Practical demonstration of combinational circuit design using 'Logisim' software**	1	20-8-2025		TLM4	
No. of classes required to complete UNIT-II:13				**No. of classes taken:**		

Unit – III: Sequential Logic Circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Flip-flops and timing considerations	2	22-8-2025 23-8-2025,		TLM1/2	
20.	Characteristic equations and excitation tables	2	1-9-2025, 3-9-2025		TLM1/2	
21.	Flip-flop conversions	2	5-9-2025, 6-9-2025		TLM1/2	
22.	Asynchronous and synchronous counters	2	8-9-2025, 10-9-2025		TLM1/2	
23.	Design of modulus-N counters	1	12-9-2025		TLM1/2	
24.	Johnson and ring counters	1	15-9-2025		TLM1/2	
25.	Design of registers and types	2	17-9-2025, 19-9-2025		TLM1/2	
26.	Universal shift register	1	20-9-2025		TLM1/2	
27.	**Practical demonstration of 'Digital Works' software for visual digital circuit simulation, including timing diagrams**	1	22-9-2025		TLM4	
No. of classes required to complete UNIT-III:14				**No. of classes taken:**		

UNIT – IV: Sequential Circuit 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
28.	Mealy and Moore models	1	24-9-2025		TLM1/2	
29.	Synchronous sequential circuit analysis	1	3-10-2025		TLM1/2	
30.	State diagrams and analysis of clocked circuits	2	4-10-2025, 6-10-2025		TLM1/2	
31.	Sequence detector design	1	8-10-2025		TLM1/2	
32.	State reduction and assignment	1	10-10-2025		TLM1/2	
33.	Design procedure for synchronous circuits	2	13-10-2025, 15-10-2025		TLM1/2	
34.	**Practical demonstration of sequential circuit design using 'Multisim' software**	1	17-10-2025		TLM4	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken:**		

UNIT – V: Digital Integrated Circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Logic levels and propagation delay	1	18-10-2025		TLM1/2	
36.	Power dissipation and fan-out/fan-in	0.5	22-10-2025		TLM1/2	
37.	Noise margin and RTL/DTL circuits	0.5	24-10-2025		TLM1/2	
38.	TTL and ECL families	1	25-10-2025		TLM1/2	
39.	MOS and CMOS logic	2	27-10-2025, 29-10-2025		TLM1/2	
40.	Transmission Gate Circuits	1	31-10-2025		TLM1/2	
No. of classes required to complete UNIT-V: 6				**No. of classes taken:**		
Mid-I from 25-8-2025 to 30-8-2025 Mid-II from 3-11-2025 to 8-11-2025						

Content Beyond the Syllabus (one or two topics may be covered here)

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 hardware description languages (VHDL/Verilog)**	1	1-11-2025		TLM4	

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)]	D1=15
I- Short Answer Examination [Units-I, II & UNIT-III (Half of the Syllabus)]	SA1=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-Short Answer Examination [UNIT-III (Remaining Half of the Syllabus), IV & V]	SA2=10
Mid Marks = 80% of Max ((M1+SA1+A1), (M2+SA2+A2)) + 20% of Min ((M1+SA1+A1), (M2+SA2+A2))	M=30
Cumulative Internal Examination (CIE): D+SA+A	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	Specify, design, and analyze systems that efficiently generate, transmit and distribute electrical power.
PSO 2	Design and analyze electrical machines, modern drive and lighting systems.
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems.
PSO 4	Design controllers for electrical and electronic systems to improve their performance.

Title	Course Instructor	Course Coordinator	Module Coordinator	HoD
Name of the Faculty	Dr.M.UmaVani	Dr.M.UmaVani	Dr. A V G A Marthanda	Dr.P.Sobha Rani
Signature				

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DEPARTMENT OF EEE

COURSE HANDOUT
PART-A

Name of Course Instructor: Mr. R.ANJANEYULU NAIK
Course Name & Code : Digital Circuits (23EE11)
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech/V/B **A.Y.: 2025-26**

PREREQUISITE: Knowledge of electronic components and semiconductor devices, number systems, binary arithmetic, Boolean or switching algebra and logic gates.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To know the simplification methods of Boolean functions
- To understand the realization of arithmetic, data routing and memory logic circuits.
- To know the operation and design of various counters and registers.
- To understand the analysis and design of synchronous sequential circuits.
- To understand the basic concepts of digital integrated circuits.

COURSE OUTCOMES (COs) and COURSE ARTICULATION MATRIX

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

23EE11	Digital Circuits	PO1	PO2	PO3	PO4 To PO11 not mapped	PO12	PSO1 PSO2 not mapped	PSO3	PSO4
CO1	Analyze different types of combinational circuits. (Apply-L3)	2	3					1	1
CO2	Apply knowledge of flip-flops in designing of registers and counters. (Apply-L3)	2	3	3				1	1
CO3	Design synchronous sequential circuits. (Apply-L3)	2	3	3		1		1	1
CO4	Understand the logic families in the form of digital integrated circuits. (Understand-L2)	3				1		1	1

Textbooks:

1. Switching and finite automata theory Zvi. Kohavi, 3rd edition, Cambridge University Press, 2010.
2. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education,2006.

Reference Books:

1. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition, 1992.
2. Switching Theory and Logic Design by A. Anand Kumar,Prentice Hall India Pvt., Limited, Third Edition, 2016.

Online Learning Resources:

1. https://nptel.ac.in/courses/117106086.
2. https://nptel.ac.in/courses/108105113.

1. Comer, "Digital Logic and State Machine Design", Oxford Higher Education, 3rd edition 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN-A/Sec)

(Commencement of Classwork: 30-06-2025)

UNIT – I: Combinational logic circuits – I

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.	OBE / COs / POs Awareness, Introduction to DC course	1	01-07-2025		TLM1/2	
2.	Canonical forms and switching equations from truth tables	2	02-07-2025		TLM1/2	
3.	Boolean simplification and NAND/NOR implementations	2	05-07-2025		TLM1/2	
4.	Karnaugh maps (3,4,5 variables)	2	08-07-2025		TLM1/2	
5.	Don't care terms and simplification of maxterm expressions	1	09-07-2025		TLM1/2	
6.	Quine-McCluskey minimization	1	15-07-2025		TLM1/2	
7.	Combinational design approach and Look-ahead carry adder	2	16-07-2025		TLM1/2	
8.	4-bit adder-subtractor and BCD adder	1	19-07-2025		TLM1/2	
9.	Excess-3 adder and binary comparators	1	22-07-2025		TLM1/2	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT – II: Combinational logic circuits – II

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Decoders, BCD decoders, and 7-segment decoders	2	23-07-2025 26-07-2025		TLM1/2	
11.	Multiplexers and higher-order multiplexing	2	29-07-2025 30-07-2025		TLM1/2	
12.	De-multiplexers and realization using decoders/MUX	1	02-08-2025 05-08-2025		TLM1/2	
13.	Encoders and priority encoders	2	8-8-2025, 9-8-2025		TLM1/2	
14.	Read-only and Read/Write memories	1	12-08-2025 13-08-2025		TLM1/2	
15.	PROM, PAL, PLA structures and programming tables	2	16-08-2025 19-08-2025		TLM1/2	
16.	Realization using PROM, PAL, PLA	2	20-08-2025		TLM1/2	

17.	Practical demonstration of combinational circuit design using 'Logisim' software	1	23-08-2025		TLM4	
No. of classes required to complete UNIT-II:13				**No. of classes taken:**		

Unit – III: Sequential logic circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Flip-flops and timing considerations	2	02-09-2025		TLM1/2	
19.	Characteristic equations and excitation tables	2	03-09-2025		TLM1/2	
20.	Flip-flop conversions	2	06-09-2025		TLM1/2	
21.	Asynchronous and synchronous counters	2	09-09-2025		TLM1/2	
22.	Design of modulus-N counters	1	10-09-2025		TLM1/2	
23.	Johnson and ring counters	1	16-09-2025		TLM1/2	
24.	Design of registers and types	2	17-09-2025		TLM1/2	
25.	Universal shift register	1	20-09-2025		TLM1/2	
26.	Practical demonstration of 'Digital Works' software for visual digital circuit simulation, including timing diagrams	1	23-9-2025		TLM4	
No. of classes required to complete UNIT-III:14				**No. of classes taken:**		

UNIT – IV: Sequential Circuit 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
27.	Mealy and Moore models	1	24-09-2025		TLM1/2	
28.	Synchronous sequential circuit analysis	1	27-09-2025		TLM1/2	
29.	State diagrams and analysis of clocked circuits	2	30-09-2025		TLM1/2	
30.	Sequence detector design	1	01-10-2025		TLM1/2	
31.	State reduction and assignment	1	04-10-2025		TLM1/2	
32.	Design procedure for synchronous circuits	2	07-10-2025		TLM1/2	
33.	Practical demonstration of sequential circuit design using 'Multisim' software	1	08-10-2025		TLM4	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken:**		

UNIT – V: Digital integrated circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Logic levels and propagation delay	1	14-10-2025		TLM1/2	
35.	Power dissipation and fan-out/fan-in	0.5	15-10-2025		TLM1/2	
36.	Noise margin and RTL/DTL circuits	0.5	18-10-2025		TLM1/2	
37.	TTL and ECL families	1	21-10-2025		TLM1/2	
38.	MOS and CMOS logic	2	22-10-2025		TLM1/2	
39.	Transmission Gate Circuits	1	25-10-2025		TLM1/2	
No. of classes required to complete UNIT-V: 6				**No. of classes taken:**		
Mid-I from 25-8-2025 to 30-8-2025 **Mid-II from 3-11-2025 to 8-11-2025**						

Content Beyond the Syllabus (one or two topics may be covered here)

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 hardware description languages (VHDL/Verilog)	1	1-11-2025		TLM4	

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)]	D1=15
I- Short Answer Examination [Units-I, II & UNIT-III (Half of the Syllabus)]	SA1=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-Short Answer Examination [UNIT-III (Remaining Half of the Syllabus), IV & V]	SA2=10
Mid Marks = 80% of Max ((M1+SA1+A1), (M2+SA2+A2)) + 20% of Min ((M1+SA1+A1), (M2+SA2+A2))	M=30
Cumulative Internal Examination (CIE): D+SA+A	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	Specify, design, and analyze systems that efficiently generate, transmit and distribute electrical power.
PSO 2	Design and analyze electrical machines, modern drive and lighting systems.
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems.
PSO 4	Design controllers for electrical and electronic systems to improve their performance.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HoD**
Name of the Faculty	Mr.R.A.NAIK	Dr.M.UmaVani	Dr. A V G A Marthanda	Dr.P.Sobha Rani
Signature				

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., EEE , A-Sec

ACADEMIC YEAR : 2025-26

COURSE NAME & CODE : Power Systems-II - 23EE12

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : Dr.P.Sobha Rani

COURSE COORDINATOR : Dr.P.Sobha Rani

PRE-REQUISITES: Power systems-I, Electrical circuit Analysis

COURSE EDUCATIONAL OBJECTIVE: This course enables the student to learn performance of transmission lines, the concept of corona, the factors effecting corona and effects of transmission lines. It also covers the design the sag and tension of transmission lines as well as to learn the performance of line insulators.

COURSE OUTCOMES(COs)

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

CO1: Calculate parameters of transmission lines for different circuit configurations. **(Apply-L3)**

CO2: Analyze the performance of short, medium and long transmission lines. **(Apply-L3)**

CO3: Analyze the effect of travelling waves on transmission lines. **(Apply-L3)**

CO4: Estimate the effects of corona in transmission lines. **(Apply-L3)**

CO5: Analyze sag, tension of transmission lines and Performance of overhead line insulators. **(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	PSO4
CO1	2	3	3										1			
CO2	2	3											1			
CO3	2	3											1			
CO4	2	3	3										1			
CO5	2	3											1			

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

Text Books:

1. Electrical Power Systems – by C.L.Wadhwa, New Age International (P) Limited, 1998.
2. Power System Engineering by I.J.Nagarath and D.P.Kothari, Tata McGraw Hill, 3rd Edition, 2019.

Reference Books:

1. Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar A.Chakrabarthy, DhanpatRai Co Pvt. Ltd.2016.
4. Electrical Power Systems by P.S.R. Murthy, B.S. Publications, 2017.

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/108/105/108105104
2. https://archive.nptel.ac.in/courses/108/102/108102047

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Transmission Line Parameters Calculations

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, Cos, POs	1	30.6.25		**TLM1**	CO1	1	
2.	Types of conductors, Calculation of resistance for solid conductors	1	1.7.25		TLM2	CO1	1	
3.	Calculation of inductance for Single-phase circuit lines	1	2.7.25		TLM1	CO1	1	
4.	Calculation of inductance for Three-phase single and double circuit lines	1	5.7.25		TLM1	CO1	1	
5.	Concept of GMR and GMD	1	7.7.25		TLM1	CO1	1	
6.	Tutorial-1	1	8.7.25		TLM3	CO1	1	
7.	Symmetrical and asymmetrical conductor configuration with and without transposition	1	9.7.25		TLM1	CO1	1	
8.	Bundled conductors, Skin and Proximity effects	1	14.7.25		TLM1	CO1	1	
9.	Tutorial-2	1	15.7.25		TLM3	CO1	1	
10.	Calculation of capacitance for 2 wire and 3 wire systems	1	16.7.25		TLM1	CO1	1	
11.	Effect of ground on capacitance	1	19.7.25		TLM1	CO1	1	
12.	Capacitance calculations for symmetrical single phase single and double circuit lines without Bundled conductors	1	21.7.25		TLM1	CO1	1	

13.	Capacitance calculations for symmetrical single phase single and double circuit lines with Bundled conductors	1	22.7.25		TLM1	CO1	1	
14.	Capacitance calculations for symmetrical three phase single and double circuit lines without Bundled conductors	1	23.7.25		TLM1	CO1	1	
15.	Capacitance calculations for symmetrical and asymmetrical three phase single and double circuit lines with Bundled conductors	1	28.7.25		TLM1	CO1	1	
No. of classes required to complete UNIT-I		15			No. of classes taken:			

UNIT-II: Performance Analysis of Transmission Lines

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.	Classification of Transmission Lines	1	2.8.25		TLM2	CO2	2	
17.	Short lines and their model representation	1	4.8.25		TLM1	CO2	2	
18.	Medium lines and their model representation–Nominal-T, Nominal-π	1	5.8.25		TLM1	CO2	2	
19.	Long lines and their model representation–Nominal-T, Nominal-π	1	6.8.25		TLM1	CO2	2	
20.	A, B, C, D Constants for symmetrical Networks.	1	11.8.25		TLM1	CO2	2	
21.	Tutorial-1	1	12.8.25		TLM3	CO2	2	
22.	Rigorous Solution for long line equations, Equivalent T network models	1	13.8.25		TLM1	CO2	2	
23.	Representation of Long lines – Equivalent π network models	1	18.8.25		TLM1	CO2	2	
24.	Tutorial-2	1	19.8.25		TLM3	CO2	2	
25.	Surge Impedance and Surge Impedance Loading of Long Lines	1	20.9.25		TLM1	CO2	2	
26.	Regulation and efficiency for all types of lines, Ferranti effect	1	23.8.25		TLM1	CO2	2	
No. of classes required to complete UNIT-II		11			No. of classes taken:			
I MID EXAMIANTIONS 25-8-25 TO 30-08-25								

UNIT-III: Power System Transients

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.	Types of System Transients	2	1.9.25		TLM2	CO3	1	

			2.9.25					
28.	Propagation of Surges	2	3.9.25 6.9.25		TLM2	CO3	1	
29.	Attenuation–Distortion	1	8.9.25		TLM1	CO3	1	
30.	Tutorial-1	1	9.9.25		TLM3	CO3	1	
31.	Reflection and Refraction Coefficients	1	15.9.25		TLM1	CO3	1	
32.	Termination of lines with different types of conditions: Open Circuited Line, Short Circuited Line	1	16/9/25		TLM1	CO3	1	
33.	Line terminated through a resistance and line connected to a cable	1	17.9.25		TLM1	CO3	1	
34.	Reflection and Refraction at a T-Junction	1	20.9.25		TLM1	CO3	1	
35.	Reflection and Refraction Coefficients	1	22.9.25		TLM1	CO3	1	
36.	Tutorial-2	1	23.9.25		TLM3	CO3	1	
No. of classes required to complete UNIT-III		12			No. of classes taken:			

UNIT-IV: Corona& Effects of transmission lines

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
37.	Description of the phenomenon	2	24.9.25 27.9.25		TLM1	CO4	2	
38.	Types of Corona	2	29.9.25 1.10.25		TLM2	CO4	2	
39.	Critical voltages and power loss	1	6.10.25		TLM1	CO4	2	
40.	Tutorial-1	1	7.10.25		TLM3	CO4	2	
41.	Advantages and Disadvantages of Corona	1	13.10.25		TLM1	CO4	2	
42.	Factors affecting corona	1	14.10.25		TLM1	CO4	2	
43.	Radio Interference.	1	15.10.25		TLM1	CO4		
44.	No. of classes required to complete UNIT-IV	9			No. of classes taken:			

UNIT-V: Sag and Tension Calculations and Overhead Line Insulators

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
45.	Sag and Tension calculations with equal and unequal heights of towers	1	18.10.25		TLM1	CO5	2	

46.	Effect of Wind and Ice weight on conductor	1	20.10.25		TLM2	CO5	2	
47.	Stringing chart, sag template and its applications	1	22.10.25		TLM2	CO5	2	
48.	Types of Insulators	1	25.10.25		TLM1	CO5	2	
49.	Voltage distribution in suspension insulators	1	27.10.25		TLM4	CO5	2	
50.	Tutorial-1	1	28.10.25		TLM3	CO5	2	
51.	Calculation of string efficiency, Methods for String efficiency improvement	1	29.10.25		TLM2	CO5	2	
52.	Capacitance grading and Static Shielding	1	1.11.25		TLM1	CO5	2	
No. of classes required to complete UNIT-V		11			No. of classes taken:			
II-MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

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
53.	HVDC Transmission	1	15.10.25		TLM2	CO2	2	
54.	Insulators -Types	1	28.10.25		TLM4	CO5	2	

Teaching Learning Methods			
TLM1	Chalk and talk	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM2	PPT	**TLM6**	Assignment or Quiz
TLM3	Tutorial	**TLM7**	Group Discussion/Project
TLM4	Demonstration (Lab/Field Visit)		

PART-C

EVALUATION PROCESS (R23 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)]	D1=15
I-Short Answer Examination [Units-I, II & UNIT-III (Half of the Syllabus)]	SA1=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]	D2=15
II- Short Answer Examination [UNIT-III (Remaining Half of the Syllabus), IV & V]	SA2=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): D+SA+A	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1	Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.
PEO2	Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.
PEO3	Work effectively as individuals and as team members in multidisciplinary projects.
PEO4	Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

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 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

Dr.P.Sobha Rani	Dr.P.Sobha Rani	Dr.M.S.Giridhar	Dr.P.Sobha Rani
Course Instructor	Course Coordinator	Module Coordinator	HOD

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
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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.M.S.Giridhar
Course Name : Power System- II
Code : 23EE12 **Credits:** 3 **L-T-P Structure:** 3-0-0
Program/Sem/Sec : B.Tech/V Semester – EEE Section-B **A.Y.** : 2025-26

PREREQUISITE: Power systems-I, Electrical circuit Analysis.

COURSE EDUCATIONAL OBJECTIVES (CEOs): To understand the concepts of GMD&GMR to compute inductance & capacitance of transmission lines and distinguish the models of short, medium and long length transmission lines and analyze their performance. Also to learn the effect of travelling waves on transmission lines with different terminal conditions and to learn the concepts of corona, the factors effecting corona and effects of transmission lines, finally to design the sag and tension of transmission lines as well as to learn the performance of line insulators.

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

CO1:	Calculate parameters of transmission lines for different circuit configurations.
CO2:	Analyze the performance of short, medium and long transmission lines.
CO3:	Analyze the effect of travelling waves on transmission lines.
CO4:	Estimate the effects of corona in transmission lines.
CO5:	Calculate sag and tension of transmission lines and design the line insulators.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3										1		
CO2	2	3											1		
CO3	2	3											1		
CO4	2	3	3										1		
CO5	2	3											1		

TEXTBOOKS:

T1	Electrical Power Systems – by C.L.Wadhwa, New Age International (P) Limited, 1998.
T2	Power System Engineering by I.J.Nagarath and D.P.Kothari, Tata McGraw Hill, 3rd Edition, 2019.

REFERENCE BOOKS:

R1	Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4th edition.
R2	Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
R3	A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar A.Chakrabarthy, DhanpatRai Co Pvt. Ltd.2016.
R4	Electrical Power Systems by P.S.R. Murthy, B.S. Publications, 2017.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Transmission Line Parameters Calculations

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.	Conductor materials	1	30-06-2025		TLM1	
2.	Types of conductors – Calculation of resistance for solid conductors	2	01-07-2025 02-07-2025		TLM.2	
3.	Calculation of inductance for Single-phase and Three-phase single and double circuit lines	1	04-07-2025		TLM1	
4.	Tutorial-2-Problems	1	07-07-2025		TLM3	
5.	Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition	2	08-07-2025 09-07-2025		TLM1	
6.	Bundled conductors, Skin and Proximity effects.	1	11-07-2025		TLM1	
7.	Calculation of capacitance for 2 wire and 3 wire systems	1	15-07-2025		TLM2	
8.	Tutorial-3-Problems	1	14-07-2025		TLM3	
9.	Effect of ground on capacitance	1	16-07-2025		TLM1	
10.	Capacitance calculations for symmetrical and asymmetrical single phase without and with Bundled conductors.	1	18-07-2025		TLM2	
11.	Tutorial-4-Problems	1	21-07-2025		TLM3	
12.	Capacitance calculations for symmetrical and asymmetrical Three-phase single and double circuit lines without and with Bundled conductors.	2	22-07-2025 23-07-2025		TLM1	
13.	Capacitance calculations for symmetrical and asymmetrical double circuit lines without and with Bundled conductors.	1	25-07-2025		TLM1	
14.	Tutorial-5-Problems	1	28-07-2025		TLM3	
No. of classes required to complete UNIT-I: 17				**No. of classes taken:**		

UNIT-II: Performance Analysis of Transmission Lines

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Classification of Transmission Lines – Short, medium, long lines and their model representation – Nominal-T, Nominal-π.	1	29-07-2025		TLM1	
16.	A, B, C, D Constants for symmetrical Networks.	2	30-07-2025 01-08-2025		TLM1	
17.	Tutorial-6-Problems	1	04-08-2025		TLM3	
18.	Rigorous Solution for long line equations – Representation of Long lines - Equivalent T and Equivalent π network models	1	05-08-2025		TLM1	
19.	Surge Impedance and Surge Impedance Loading of Long Lines	1	06-08-2025 08-08-2025		TLM1	
20.	Tutorial-7-Problems	1	11-08-2025		TLM3	
21.	Regulation and efficiency for a short & medium length lines	1	12-08-2025		TLM1	
22.	Regulation and efficiency for long length lines	1	13-08-2025		TLM1	
23.	Tutorial-8-Problems	1	18-08-2025		TLM3	
24.	Ferranti effect.	1	19-08-2025		TLM2	
25.	Problems & Objective questions Quiz	1	20-08-2025		TLM1	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT III: Power System Transients

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.	Types of System Transients.	1	22-08-2025		TLM2	
27.	Tutorial-9-Problems	1	01-09-2025		TLM3	
28.	Propagation of Surges–Attenuation–Distortion.	1	02-09-2025		TLM2	
29.	Reflection and Refraction Coefficients.	2	03-09-2025 05-09-2025		TLM1	
30.	Tutorial-10-Problems	1	08-09-2025		TLM3	
31.	Termination of lines with different types of conditions: Open Circuited Line.	1	09-09-2025		TLM1	
32.	Termination of lines with different types of conditions: Short Circuited Line.	2	10-09-2025 12-09-2025		TLM1	
33.	Tutorial-11-Problems	1	15-09-2025		TLM3	
34.	Termination of lines with different types of conditions: Line terminated through a resistance and line connected to a cable.	1	16-09-2025		TLM1	
35.	Reflection and Refraction at a T-Junction.	2	17-09-2025 19-09-2025		TLM2	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Corona& Effects of transmission lines

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Tutorial-12-Problems	1	22-09-2025		TLM3	
37.	Description of the phenomenon – Types of Corona	1	23-09-2025		TLM2	
38.	critical voltages and power loss	1	24-09-2025		TLM1	
39.	Advantages and Disadvantages of Corona.	1	26-09-2025		TLM2	
40.	Factors affecting corona.	1	29-09-2025		TLM3	
41.	Radio Interference.	1	01-10-2025		TLM2	
No. of classes required to complete UNIT-IV: 06				**No. of classes taken:**		

UNIT-V: Sag and Tension Calculations and Overhead Line Insulators

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Sag and Tension calculations with equal and unequal heights of tower.	1	03-10-2025		TLM1	
43.	Tutorial-13-Problems	1	06-10-2025		TLM3	
44.	Effect of Wind and Ice weight on conductor.	2	07-10-2025 08-10-2025		TLM1	
45.	Stringing chart and sag template and its applications.	1	10-10-2025		TLM1	
46.	Tutorial-14-Problems	1	13-10-2025		TLM3	
47.	Types of Insulators – Voltage distribution in suspension insulator.	2	14-10-2025 15-10-2025		TLM2	
48.	Calculation of string efficiency and Methods for String efficiency improvement.	1	17-10-2025		TLM1	
49.	Tutorial-15-Problems	1	20-10-2025		TLM3	
50.	Capacitance grading.	2	22-10-2025 24-10-2025		TLM1	
51.	Tutorial-16-Problems	1	27-10-2025		TLM3	
52.	Static Shielding.	1	28-10-2025		TLM2	
53.	Revision for SEE	2	29-10-2025 31-10-2025		TLM2	
No. of classes required to complete UNIT-V: 15				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (UNIT-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO 4	Design controllers for electrical and electronic systems to improve their performance

Signature				
Name of the Faculty	Dr.M.S.Giridhar	Dr.P.Sobha Rani	Dr.M.S.Giridhar	Dr.P.Sobha Rani
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

Department of Electrical and Electronics Engineering
Course Handout

Program : B.Tech. V-Sem., EEE., Section–B
Academic Year : 2025-26
Course Name & Code :**Communications Systems**– 23EC27
L-T-P-Cr : 3-0-0-3
Course Instructure : B. Lakshmi Thirupathamma

Course Objectives:

This course covers fundamental concepts of analog and digital communication systems which are essential for the understanding of advanced courses in digital or wireless communication systems.

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

CO 1	Understand the fundamental concepts of various analog and digital modulation schemes. **(Understand)**	L2
CO 2	Differentiate various analog and digital transmission schemes for transmission and reception.(Understand)	L2
CO 3	Interpret different types of AM and FM transmitters & Receivers in communication system.(Understand)	L2
CO 4	Apply the concepts of analog and digital modulation techniques for signal transmission (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
CO 1	2	2	1	-	-	-	-	-	-	-	-	1	2	-	-
CO 2	2	2	1	-	-	-	-	-	-	-	-	1	2	-	-
CO 3	3	1	1	-	-	-	-	-	-	-	-	1	2	-	-
CO 4	3	2	2	-	-	-	-	-	-	-	-	1	2	-	-

Textbooks (T) and References (R):

1. Simon Haykin, “Communication Systems”, John Wiley & Sons, 2nd Edition, 1983.
2. Taub and Schilling, “Principles of Communication Systems”, TMH Publications, 3rd Edition.

REFERENCE BOOKS:

1. George Kennedy,Davis, “Electronic Communication Systems”, Tata McGraw Hill Education, 4th edition, 1999
2. Sanjay Sharma, “Analog and Digital Communication Systems”,S.K.Katariya& Sons,2nd Edition, 2007

Part B

UNIT-I: Introduction of Communication 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 to Course Objectives and Outcomes, and POS Unit-I Introduction	1	2-07-2025			
2.	Introduction to Communication systems	1	03-07-2025			
3.	Elements of Communication System ,Need for Modulation	1	04-07-2025			
4.	Classification of Modulation	1	05-07-2025			
5.	Amplitude Modulation: Time and Frequency Domain Representation of AM	2	09-07-2025 10-07-2025			
6.	Switching Modulator, and Envelope detector	1	11-07-2025			
7.	Double Side band Suppressed Carrier Modulation	1	12-7-2025			
8.	Time and Frequency domain representation, Ring Modulator	2	16-07-2025 17-07-2025			
9.	Coherent Detection of DSBSC wave.	1	18-07-2025			
10.	Single Side band Modulation	1	19-07-2025			
11.	Generation of SSBSC: Filter Method & Phase-shift Method	2	23-07-2025			
12.	Coherent detection of SSB wave.	1	24-07-2025			
No. of classes required to complete UNIT-I : 15			**No. of classes taken :**			

UNIT-II: Angle Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Definition, Types of Angle Modulation	1	25-07-2025			
2.	Frequency modulation, Phase modulation, Narrow Band and Wide band FM.	2	30-07-2025 31-07-2025			
3.	Generation of FM waves: Indirect FM, Direct FM	1	01-08-2025			
4.	Demodulation of FM wave: Simple slope detector	1	02-08-2025			
5.	Balanced Slope detector	1	06-08-2025			
6.	Foster Seeley Discriminator	1	06-08-2025			
No. of classes required to complete UNIT-II : 07			**No. of classes taken :**			

UNIT-III: Radio Transmitters

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Classification of Transmitters	1	07-08-2025			
2.	AM Transmitter: Low level and high level	1	08-08-2025			
3.	FM transmitters: Reactance tube and Armstrong Method	2	12-08-2025 13-08-2025			
4.	Radio Receivers: Tuned Radio Frequency receiver Need for heterodyning,	3	13-08-2025 14-08-2025 20-08-2025			
5.	AM Super Heterodyne Receiver, Frequency Changing and Tracking,	1	20-08-2025 21-08-2025			
6.	Concept of Intermediate Frequency	1	21-08-2025			
7.	FM receiver: Noise: Definition	1	22-08-2025			
8.	Classification of Noise: internal noise and external noise	2	23-08-2025 03-09-2025			
No. of classes required to complete UNIT-III : 12			No. of classes taken :			

UNIT-IV : Pulse Analog Modulation

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.	Sampling theorem	1	04-09-2025			
2.	Pulse Amplitude Modulation Generation of and demodulation of PAM wave,	3	05-09-2025 06-09-2025 10-09-2025			
3.	Width Modulation	1	11-09-2025 12-09-2025			
4.	Generation and demodulation of PWM waves	2	13-09-2025 17-09-2025			
5.	Pulse Position Modulation: Generation and demodulation of PPM.	2	18-09-2025 19-09-2025 20-09-2025			
No. of classes required to complete UNIT-IV : 10			No. of classes taken :			

Program Outcomes (POs):

UNIT- V: Digital Modulation Technique

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 Digital Modulation		1	22-09-2025 01-10-2025			
2.	Delta Modulation Adaptive Delta Modulation		3	03-10-2025 04-10-2025 08-10-2025			
3.	Amplitude Shift Keying Frequency Shift Keying		3	09-10-2025 10-10-2025 11-10-2025			
4.	Phase Shift Keying Binary Phase Shift Keying		3	15-10-2025 16-10-2025 17-10-2025			
5.	Comparison of various digital modulation techniques.		**2**	18-10-2025 22-10-2025 23-10-2025			
	No. of classes required to complete UNIT-V : 11			**No. of classes taken :**			

Teaching Learning Methods

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

Program Outcomes (POs):

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.
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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
B.Lakshmi Thirupathamma	P.James Vijay	Dr. M.Venkata Sudhakar	Dr. G. Srinivasulu

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

Department of Electrical and Electronics Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : P. James Vijay
Course Name & Code : COMMUNICATION SYSTEMS - 23EC27
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., EEE., V-Sem-A A. Y: 2025-26
PRE-REQUISITE : Concept of signals and modulation theory.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course covers fundamental concepts of analog and digital communication systems which are essential for the understanding of advanced courses in digital or wireless communication systems.

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

CO 1	Understand the fundamental concepts of various analog and digital modulation schemes.(Understand-L2)
CO 2	Differentiate various analog and digital transmission schemes for transmission and reception.(Understand-L2)
CO 3	Interpret different types of AM and FM transmitters & receivers in communication system(Understand-L2)
CO 4	Apply the concepts of analog and digital modulation techniques for signal transmission.(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
CO 1	2	2	1									1	2		
CO 2	2	2	1									1	2		
CO 3	3	1	1									1	2		
CO 4	3	2	2									1	2		

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

Textbooks (T) and References (R):

1. Simon Haykin, "Communication Systems", John Wiley & Sons, 2nd Edition, 1983.
2. Taub and Schilling, "Principles of Communication Systems", TMH Publications, 3rd Edition.

REFERENCE BOOKS:

1. George Kennedy,Davis, “Electronic Communication Systems”, Tata McGraw Hill Education, 4th edition, 1999
2. Sanjay Sharma, “Analog and Digital Communication Systems”,S.K.Katariya& Sons,2nd Edition, 2007

Part B

UNIT-I: Introduction of Communication 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 to Course Objectives and Outcomes, and POS Unit-I Introduction	1	01-07-2025			
2.	Introduction to Communication systems	1	03-07-2025			
3.	Elements of Communication System ,Need for Modulation	1	03-07-2025			
4.	Classification of Modulation	1	04-07-2025			
5.	Amplitude Modulation: Time and Frequency Domain Representation of AM	2	08-07-2025 10-07-2025			
6.	Switching Modulator, and Envelope detector	1	10-07-2025			
7.	Double Side band Suppressed Carrier Modulation	1	11-07-2025			
8.	Time and Frequency domain representation, Ring Modulator	2	15-07-2025 17-07-2025			
9.	Coherent Detection of DSBSC wave.	1	17-07-2025			
10.	Single Side band Modulation	1	18-07-2025			
11.	Generation of SSBSC: Filter Method & Phase-shift Method	2	22-07-2025			
12.	Coherent detection of SSB wave.	1	24-07-2025			
No. of classes required to complete UNIT-I : 15			**No. of classes taken :**			

UNIT-II: Angle Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Definition, Types of Angle Modulation	1	24-07-2025			
2.	Frequency modulation, Phase modulation, Narrow Band and Wide band FM.	2	25-07-2025 29-07-2025			
3.	Generation of FM waves: Indirect FM, Direct FM	1	31-07-2025			
4.	Demodulation of FM wave: Simple slope detector	1	31-07-2025			
5.	Balanced Slope detector	1	01-08-2025			
6.	Foster Seeley Discriminator	1	05-08-2025			
No. of classes required to complete UNIT-II : 07			**No. of classes taken :**			

UNIT-III: Radio Transmitters

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Classification of Transmitters	1	07-08-2025			
2.	AM Transmitter: Low level and high level	1	07-08-2025			
3.	FM transmitters: Reactance tube and Armstrong Method	2	08-08-2025 12-08-2025			
4.	Radio Receivers: Tuned Radio Frequency receiver Need for heterodyning,	3	14-08-2025 14-08-2025 19-08-2025			
5.	AM Super Heterodyne Receiver, Frequency Changing and Tracking,	1	21-08-2025 21-08-2025			
6.	Concept of Intermediate Frequency	1	02-09-2025			
7.	FM receiver: Noise: Definition	1	04-09-2025			
8.	Classification of Noise: internal noise and external noise	2	04-09-2025 05-09-2025			
No. of classes required to complete UNIT-III : 12			No. of classes taken :			

UNIT-IV : Pulse Analog Modulation

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.	Sampling theorem	1	09-09-2025			
2.	Pulse Amplitude Modulation Generation of and demodulation of PAM wave,	3	12-09-2025			
3.	Width Modulation	1	16-09-2025			
4.	Generation and demodulation of PWM waves	2	18-09-2025			
5.	Pulse Position Modulation: Generation and demodulation of PPM.	2	23-09-2025			
No. of classes required to complete UNIT-IV : 09			No. of classes taken :			

UNIT- V: Digital Modulation Technique

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 Digital Modulation		1	25-09-2025			
2.	Delta Modulation Adaptive Delta Modulation		3	07-10-2025			
3.	Amplitude Shift Keying Frequency Shift Keying		3	10-10-2025			
4.	Phase Shift Keying Binary Phase Shift Keying		3	16-10-2025			
5.	Comparison of various digital modulation techniques.		**2**	23-10-2025			
	No. of classes required to complete UNIT-V : 12			**No. of classes taken :**			

Content 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
1.		1				
2.		1				
3		1				

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

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 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.

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. P. James Vijay	Mr. P.James Vijay	Dr. M.Venkata Sudhakar	Dr. G. Srinivasulu

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hodads@lbrce.ac.in , ads@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms.P. MADHAVI
Course Name & Code : INTRODUCTION TO DATA SCIENCE – 20AD82
L-T-P Structure : 3-0-0 **Credits:**3
Program/Branch/Sem : B.Tech/EEE- A /V **A.Y.: 2025-26**

PRE-REQUISITE: Programming knowledge

Course Educational Objectives:
1.To provide students with a strong foundation in Python programming so they can effectively utilize its basic constructs and syntax to solve a variety of mathematical and computational problems.
2.To develop a clear understanding of essential data science concepts, preparing students to engage in further study or professional work involving data-centric problem solving.
3.To equip students with the fundamental knowledge of NumPy, enabling them to perform efficient numerical computations and array manipulations for data-driven applications.
4.To enable students to demonstrate proficiency in using the Pandas library, facilitating data manipulation, cleaning, and transformation tasks for real-world datasets.
5.To prepare students to perform end-to-end data analysis, including data preprocessing, exploration, and visualization using Python libraries such as Matplotlib and Seaborn, supporting decision-making and insights extraction.

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

CO1	Identify basic building blocks of python to solve mathematical problems. (**Understand L-2**)
CO2	Describe the key concepts in data science. (**Remember L-1**)
CO3	Enumerate the fundamentals of NumPy**. (Understand L-2)**
CO4	Demonstrate the fundamentals of Pandas. (**Understand L-2)**
CO5	Demonstrate data analysis, manipulation and visualization of data using Python libraries. (**Apply L-3)**

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	2	2	-	1	-	-	-	-	-	-	-	-	3	-
CO2	-	3	-	-	1	-	-	-	-	-	-	-	3	3	-
CO3	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-	-	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:
1.Wes McKinney, "Python for Data Analysis", O'REILLY, ISBN:978-1-449- 31979-3, 1st edition, October 2012.
2. Rachel Schutt & O'neil, "Doing Data Science", O'REILLY, ISBN:978-1- 449-35865-5, 1st edition, October 2013.

3. Python For Data Analysis (O Reilly, Wes Mckinney)

BOS APPROVED REFERENCE BOOKS:

1.Python: The Complete Reference, Martin C. Brown, McGraw HillEducation

2. Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly Media, 2015

3. Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization, O'Reilly, 2016.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I : INTRODUCTION TO PYTHON

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 Python	1	30-06-2025		TLM1	CO1	T1,T2	
2.	Features of Python	1	03-07-2025		TLM1	CO1	T1,T2	
3.	Data types	2	04-07-2025 07- 07-2025		TLM1	CO1	T1,T2	
4.	Operators	1	10-07-2025		TLM1	CO1	T1,T2	
5.	Input and output	1	11-07-2025		TLM1	CO1	T1,T2	
6.	Control Statements	1	14-07-2025		TLM1	CO1	T1,T2	
7.	Strings: Creating strings	1	17-07-2025		TLM1	CO1	T1,T2	
8.	Basic operations on strings	1	18-07-2025		TLM2	CO1	T1,T2	
9.	String testing methods	1	21-07-2025		TLM2	CO1	T1,T2	
10.	Lists	1	24-07-2025		TLM1	CO1	T1,T2	
11.	Dictionaries	1	25-07-2025		TLM1	CO1	T1,T2	
12.	Tuples	1	28-07-2025		TLM1	CO1	T1,T2	
13.	Assignment/Quiz-2	1	31-07-2025		TLM1	CO1	-	
No. of classes required to complete UNIT-I: 14					**No. of classes taken:**			

UNIT-II : 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
14.	Introduction to Data Science	2	01-08-2025 04-08-2025		TLM1	CO2	T1,T2	
15.	Data Science life cycle	1	07-08-2025		TLM1	CO2	T1,T2	
16.	Datafication	1	08-08-2025		TLM1	CO2	T1,T2	
17.	Exploratory Data Analysis	1	11-08-2025		TLM1	CO2	T1,T2	
18.	The Data science process	1	14-08-2025		TLM1	CO2	T1,T2	
19.	A data scientist role in this process	2	18-08-2025 21-08-2025		TLM2	CO2	T1,T2	
20.	Assignment/Quiz-2	1	22-08-2025		TLM1	CO2	T1,R1	
No. of classes required to complete UNIT-II: 09					**No. of classes taken:**			

UNIT-III: NumPy Basics

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
21.	The NumPy ndarray: A Multidimensional array object	1	01-09-2025		TLM1	CO3	T1,T2	
22.	Creating ndarrays, and its data types	1	04-09-2025		TLM1	CO3	T1,T2	
23.	Operations between Arrays and Scalars	1	05-09-2025		TLM2	CO3	T1,T2	
24.	Basic Indexing and Slicing, Boolean and Fancy Indexing	1	08-09-2025		TLM2	CO3	T1,T2	
25.	Expressing Conditional Logic as Array Operations	1	11-09-2025		TLM2	CO3	T1,T2	
26.	Methods for Boolean Arrays	1	12-09-2025		TLM2	CO3	T1,T2	
27.	Sorting and Unique in NumPy	1	15-09-2025		TLM2	CO3	T1,T2	
28.	Assignment/Quiz-3	1	18-09-2025		TLM2	CO3	T1,T2	
No. of classes required to complete UNIT-III: 08					**No. of classes taken:**			

UNIT-IV: GETTING STARTED WITH PANDAS

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.	Introduction to pandas: Library Architecture	1	19-09-2025		TLM1	CO4	T1,T2	
30.	Features, Applications	1	22-09-2025		TLM2	CO4	T1,T2	

31.	Data Structures	1	25-09-2025		TLM2	CO4	T1,T2	
32.	Series, Data Frame	1	26-09-2025		TLM1	CO4	T1,T2	
33.	Index Objects, Essential Functionality Re indexing	1	29-09-2025		TLM1	CO4	T1,T2	
34.	Dropping entries from an axis	1	03-10-2025		TLM1	CO4	T1,T2	
35.	Indexing, Selection, Filtering	1	06-10-2025		TLM1	CO4	T1,T2	
36.	Assigment/Quiz-4	1	09-10-2025		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV: 08					**No. of classes taken:**			

UNIT-V: DATA PREPROCESSING

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
37.	Data Preprocessing, Loading	1	10-10-2025		TLM1	CO5	T1,T2	
38.	Storing, File Formats	1	13-10-2025		TLM1	CO5	T1,T2	
39.	Reading and Writing data in text format, and Binary formats	1	16-10-2025		TLM1	CO4	T1,T2	
40.	interacting with html and web apis	1	17-10-2025		TLM2	CO4	T1,T2	
41.	interacting with databases	1	20-10-2025		TLM2	CO5	T1,T2	
42.	Data Wrangling: Clean, Transform, Merge, Reshape	1	23-10-2025		TLM1	CO5	T1,T2	
43.	Combining and Merging Data Sets	1	24-10-2025		TLM1	CO4	T1,T2	
44.	Reshaping and Pivoting, String Manipulation	1	27-10-2025		TLM2	CO5	T1,T2	
45.	Data Transformation, Aggregation	1	30-10-2025		TLM1	CO5	T1,T2	
46.	Assignment/Quiz-5	1	31-10-2025					
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
47.	creating meaningful input variables from raw data, going beyond basic preprocessing.	1	31-102025		**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 (R23 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,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	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real timeproblems.
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	**P. Madhavi**	**P. Madhavi**	**Dr.V.Suryanarayana**	**Dr. P.Bhagath**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms.P. MADHAVI
Course Name & Code : INTRODUCTION TO DATA SCIENCE – 20AD82
L-T-P Structure : 3-0-0 **Credits:**3
Program/Branch/Sem : B.Tech/EEE- B /V **A.Y.: 2025-26**

PRE-REQUISITE: Programming knowledge

Course Educational Objectives:
1.To provide students with a strong foundation in Python programming so they can effectively utilize its basic constructs and syntax to solve a variety of mathematical and computational problems.
2.To develop a clear understanding of essential data science concepts, preparing students to engage in further study or professional work involving data-centric problem solving.
3.To equip students with the fundamental knowledge of NumPy, enabling them to perform efficient numerical computations and array manipulations for data-driven applications.
4.To enable students to demonstrate proficiency in using the Pandas library, facilitating data manipulation, cleaning, and transformation tasks for real-world datasets.
5.To prepare students to perform end-to-end data analysis, including data preprocessing, exploration, and visualization using Python libraries such as Matplotlib and Seaborn, supporting decision-making and insights extraction.

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

CO1	Identify basic building blocks of python to solve mathematical problems. (**Understand L-2**)
CO2	Describe the key concepts in data science. (**Remember L-1**)
CO3	Enumerate the fundamentals of NumPy**. (Understand L-2)**
CO4	Demonstrate the fundamentals of Pandas. (**Understand L-2)**
CO5	Demonstrate data analysis, manipulation and visualization of data using Python libraries.(**Apply L-3)**

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	2	2	-	1	-	-	-	-	-	-	-	-	3	-
CO2	-	3	-	-	1	-	-	-	-	-	-	-	3	3	-
CO3	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-	-	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:
1.Wes McKinney, "Python for Data Analysis", O'REILLY, ISBN:978-1-449- 31979-3, 1st edition, October 2012.
2. Rachel Schutt & O'neil, "Doing Data Science", O'REILLY, ISBN:978-1- 449-35865-5, 1st edition, October 2013.

3. Python For Data Analysis (O Reilly, Wes Mckinney)

BOS APPROVED REFERENCE BOOKS:

1.Python: The Complete Reference, Martin C. Brown, McGraw HillEducation

2. Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly Media, 2015

3. Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization, O'Reilly, 2016.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I : INTRODUCTION TO PYTHON

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 Python	1	30-06-2025		TLM1	CO1	T1,T2	
2.	Features of Python	1	02-07-2025		TLM1	CO1	T1,T2	
3.	Data types	2	04-07-2025 07-07-2025		TLM1	CO1	T1,T2	
4.	Operators	1	09-07-2025		TLM1	CO1	T1,T2	
5.	Input and output	1	11-07-2025		TLM1	CO1	T1,T2	
6.	Control Statements	1	14-07-2025		TLM1	CO1	T1,T2	
7.	Strings: Creating strings	1	16-07-2025		TLM1	CO1	T1,T2	
8.	Basic operations on strings	1	18-07-2025		TLM2	CO1	T1,T2	
9.	String testing methods	1	21-07-2025		TLM2	CO1	T1,T2	
10.	Lists	1	23-07-2025		TLM1	CO1	T1,T2	
11.	Dictionaries	1	25-07-2025		TLM1	CO1	T1,T2	
12.	Tuples	1	28-07-2025		TLM1	CO1	T1,T2	
13.	Assignment/Quiz-2	1	30-07-2025		TLM1	CO1	-	
No. of classes required to complete UNIT-I: 14					**No. of classes taken:**			

UNIT-II : 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
14.	Introduction to Data Science	2	01-08-2025 04-08-2025		TLM1	CO2	T1,T2	
15.	Data Science life cycle	1	06-08-2025		TLM1	CO2	T1,T2	
16.	Datafication	1	08-08-2025		TLM1	CO2	T1,T2	
17.	Exploratory Data Analysis	1	11-08-2025		TLM1	CO2	T1,T2	
18.	The Data science process	1	13-08-2025		TLM1	CO2	T1,T2	
19.	A data scientist role in this process	2	18-08-2025 20-08-2025		TLM2	CO2	T1,T2	
20.	Assignment/Quiz-2	1	22-08-2025		TLM1	CO2	T1,R1	
No. of classes required to complete UNIT-II: 09					**No. of classes taken:**			

UNIT-III: NumPy Basics

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
21.	The NumPy ndarray: A Multidimensional array object	1	01-09-2025		TLM1	CO3	T1,T2	
22.	Creating ndarrays, and its data types	1	03-09-2025		TLM1	CO3	T1,T2	
23.	Operations between Arrays and Scalars	1	05-09-2025		TLM2	CO3	T1,T2	
24.	Basic Indexing and Slicing, Boolean and Fancy Indexing	1	08-09-2025		TLM2	CO3	T1,T2	
25.	Expressing Conditional Logic as Array Operations	1	10-09-2025		TLM2	CO3	T1,T2	
26.	Methods for Boolean Arrays	1	12-09-2025		TLM2	CO3	T1,T2	
27.	Sorting and Unique in NumPy	1	15-09-2025		TLM2	CO3	T1,T2	
28.	Assignment/Quiz-3	1	17-09-2025		TLM2	CO3	T1,T2	
No. of classes required to complete UNIT-III: 08					**No. of classes taken:**			

UNIT-IV: GETTING STARTED WITH PANDAS

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.	Introduction to pandas: Library Architecture	1	19-09-2025		TLM1	CO4	T1,T2	

30.	Features, Applications	1	22-09-2025		TLM2	CO4	T1,T2	
31.	Data Structures	1	24-09-2025		TLM2	CO4	T1,T2	
32.	Series, Data Frame	1	26-09-2025		TLM1	CO4	T1,T2	
33.	Index Objects, Essential Functionality Re indexing	1	29-09-2025		TLM1	CO4	T1,T2	
34.	Dropping entries from an axis	1	01-10-2025		TLM1	CO4	T1,T2	
35.	Indexing, Selection, Filtering	1	03-10-2025		TLM1	CO4	T1,T2	
36.	Assigment/Quiz-4	1	06-10-2025		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV: 08					**No. of classes taken:**			

UNIT-V: DATA PREPROCESSING

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
37.	Data Preprocessing, Loading	1	08-10-2025		TLM1	CO5	T1,T2	
38.	Storing, File Formats	1	10-10-2025		TLM1	CO5	T1,T2	
39.	Reading and Writing data in text format, and Binary formats	1	13-10-2025		TLM1	CO4	T1,T2	
40.	interacting with html and web apis	1	15-10-2025		TLM2	CO4	T1,T2	
41.	interacting with databases	1	17-10-2025		TLM2	CO5	T1,T2	
42.	Data Wrangling: Clean, Transform, Merge, Reshape	1	20-10-2025		TLM1	CO5	T1,T2	
43.	Combining and Merging Data Sets	1	22-10-2025		TLM1	CO4	T1,T2	
44.	Reshaping and Pivoting, String Manipulation	1	24-10-2025		TLM2	CO5	T1,T2	
45.	Data Transformation, Aggregation	1	27-10-2025		TLM1	CO5	T1,T2	
46.	Assignment/Quiz-5	1	29-10-2025					
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
47.	creating meaningful input variables from raw data, going beyond basic preprocessing.	1	31-10-2025		**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 (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,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	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real timeproblems.
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	**P. Madhavi**	**P. Madhavi**	**Dr.V.Suryanarayana**	**Dr. P. Bhagath**
Signature				

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.Imran Abdul
Course Name & Code : Advanced Electrical Machines-23PEH1
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/V Sem(Honor) **A.Y.:** 2025-26

Prerequisite: DC Machines & Transformers, Induction and Synchronous Machines
Course Objective: The basic objective of this course is to introduce the theory, construction, design, control electronics, and in-depth analysis of several non-traditional machines such as single-phase special motors, servo motors, stepper motors, reluctance motors and linear motors.

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

CO1: Understand the construction and operation of servomotors and stepper motors. (**Understand-L2)**

CO2: Analyse the construction and operation of single-phase electrical motors. **(Apply-L3)**

CO3: Understand the construction and operation of reluctance motors and linear motors (**Understand-L2)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3	PSO4
CO1	3	2											2	3		
CO2	3	2											2	3		
CO3	3	2											2	3		
CO4	3	2											2	3		

TEXT BOOKS:

1. Miller, T. J. E., Brushless Permanent Magnet and Reluctance Motor Drives, Oxford Science Publications, 1989.

2. Kenjo, T., and Sugawara, A., Stepping Motors and their Microprocessor Controls, Oxford Science Publications, 1984.

3. Venkataratnam K., Special Electrical Machines, CRC Press, 2009.

REFERENCE:

1. Krishnan, R., “Permanent Magnet and BLDC Motor Drives”, CRC Press, 2009.

2. Chang-liang, X., "Permanent Magnet Brushless DC Motor Drives and Controls", Jun 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Servo Motors

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 Subject & Course Outcomes	1	02-07-25		TLM1	
2.	Construction Servo Motors.	1	03-07-25		TLM2,TLM4	
3.	Principle of operation of AC servo motor		03-07-25		TLM1	
4.	Damped AC Servo Motor	1	09-07-25		TLM1	
5.	Drag Cup Servo servo motors	1	10-07-25		TLM2	
6.	DC Servo Motor Field control	1	10-07-25		TLM1	
7.	DC Servo Motor armature control	1	16-07-25		TLM1	
8.	Permanent magnet armature controlled – servomotor	1	17-07-25		TLM1	
9.	series split field DC servomotor	1	17-07-25		TLM1	
10.	Applications of servo motor	1	23-07-25		TLM1	
11.	Comparison of AC and DC Servo motors	1	24-07-25		TLM6	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Stepper Motors

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Introduction and basic principle of stepper motor	1	24-07-25		TLM1	
13.	Variable reluctance motor operation	1	30-07-25		TLM1	
14.	Permanent magnet stepper motor operation	1	31-07-25		TLM1	
15.	Hybrid Stepper motor-operation	1	31-07-25		TLM1	
16.	Monofilar and bifilar winding stepper	1	06-08-25			

	motor					
17.	Modes of Excitation of stepper motor	1	07-08-25		TLM1	
18.	Drive circuits for stepper motors	1	07-08-25			
19.	Static and dynamic characteristics of stepper motor.	1	13-08-25			
20.	Applications of stepper motor	1	14-08-25		TLM1	
21.	Comparison of stepper motors	1	14-08-25			
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Single Phase Special Electrical Machines

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Introduction to f AC series motor	1	20-08-25		TLM1	
23.	Construction details of AC series motor	1	21-08-25		TLM2	
24.	Working of AC series motor	1	21-08-25		TLM1	
25.	Phasor diagram of AC series motor	1	28-08-25		TLM3	
26.	Types and construction details of Universal motors	1	28-08-25		TLM1	
27.	Construction details of Hysteresis motor	1	03-09-25			
28.	Working of Hysteresis motor	1	04-09-25			
29.	Torque-speed characteristics	1	04-09-25			
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Reluctance Motors

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.	Reluctance motors	1	10-09-25		TLM1	
31.	Principle of operation of reluctance motors	1	11-09-25		TLM2	
32.	Torque equation and torque slip characteristics	1	11-09-25		TLM1	
33.	Switched reluctance motor	1	17-09-25		TLM1	
34.	Principle of operation of SRM	1	18-09-25		TLM1	
35.	Power converter circuits of SRM	1	18-09-25			
36.	Power converter	1	24-09-25		TLM1	

	circuits of SRM					
37.	Torque equation		25-09-25		TLM1	
38.	Types of reluctance motors	1	25-09-25		TLM1	
39.	Comparison and applications of reluctance motors	1	01-10-25		TLM6	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Linear Motors

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	Introduction to linear motors	1	08-10-25		TLM1	
41.	Linear reluctance motor construction	1	09-10-25		TLM2	
42.	Linear reluctance motor working	1	09-10-25		TLM1	
43.	Linear synchronous motor construction	1	15-10-25		TLM2	
44.	Linear synchronous motor working	1	16-10-25		TLM1	
45.	Linear induction motor construction	1	16-10-25		TLM2	
46.	Linear induction motor working	1	22-10-25		TLM1	
47.	Thrust equation of Linear induction motor	1	23-10-25		TLM1	
48.	Equivalent circuit of linear induction motor	1	2310-25		TLM1	
49.	Application of linear motors	1	29-10-25		TLM6	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Content 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
	BLDC motors		30-10-25& 31-10-25		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 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 a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Mr.Jmran Abdul	**Mr.Imran Abdul**	**Mr. P. Deepak Reddy**	**Dr.P.Sobharani**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr Shaik Salma Asiya Begum
Course Name & Code : Principles of Artificial Intelligence & 23AMM1
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B.Tech./EEE/V/A&B **A.Y.:** 2025-26

Pre-requisites: Computer Programming, Mathematical Foundations of Computer Science, linear algebra, data structures and algorithms

Course Objectives: The main objectives of the course is to

- The student should be made to study the concepts of Artificial Intelligence.
- The student should be made to learn the methods of solving problems using Artificial Intelligence.
- The student should be made to introduce the concepts of Expert Systems.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.
- To learn different knowledge representation techniques

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

CO1: Enumerate the history & foundation of AI. **(Understand- L2)**
CO2: Apply the searching algorithms for AI in problem solving. **(Apply- L3)**
CO3: Choose the appropriate representation of knowledge. **(Apply- L2)**
CO4: Choose the appropriate logic concepts**. (Apply- L2)**
CO5: understand Expert systems techniques in AI **(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
CO1	2	3	2	-	-	-	-	-	-	-	-	2	2	2
CO2	2	3	2	-	-	-	-	-	-	-	-	2	2	2
CO3	2	3	2	-	-	-	-	-	-	-	-	2	2	3
CO4	2	3	2	-	-	-	-	-	-	-	-	2	2	3
CO5	3	2	2	-	-	-	-	-	-	-	-	2	2	3
1-Low						2 –Medium					3-High			

Textbooks:
1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", SecondEdition, Pearson Education.
2. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill

Reference Books:
1. David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: a logical

approach", Oxford University Press.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.
4. Artificial Intelligence, SarojKaushik, CENGAGE Learning.

Online Learning Resources:
1. https://ai.google/
2. https://swayam.gov.in/nd1_noc19_me71/preview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction:

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.	What Is AI?, Definition of AI	1	2-07-2025		TLM2	
2.	The Foundations of Artificial Intelligence	1	03-07-2025		TLM2	
3.	The Foundations of Artificial Intelligence	1	03-07-2025		TLM2	
4.	The History of Artificial Intelligence	1	09-07-2025		TLM2	
5.	The History of Artificial Intelligence	1	10-07-2025		TLM2	
6.	The State of the Art	1	10-07-2025		TLM2	
7.	Agents and Environments	1	16-07-2025		TLM2	
8.	Agents and Environments	1	17-07-2025		TLM2	
9.	Good Behavior: The Concept of Rationality	1	17-07-2025		TLM2	
10.	The Nature of Environments	1	23-07-2025		TLM2	
11.	The Structure of Agents.	1	24-07-2025		TLM2	
12.	The Structure of Agents.	1	24-07-2025		TLM2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Searching.

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.	Problem Solving: Problem-Solving Agents	1	30-07-2025		TLM1	
14.	Example Problems	1	31-07-2025			
15.	Searching for solutions	1	31-07-2025		TLM1	
16.	uniformed search strategies Breadth first search	1	6-08-2025		TLM1	
17.	Depth first Search.	1	7-08-2025		TLM1	
18.	Search with partial information (Heuristic search) Hill climbing	1	7-08-2025		TLM1	
19.	A* Algorithms	1	13-08-2025		TLM1	
20.	AO* Algorithms	1	14-08-2025		TLM1	

21.	CSP	1	14-08-2025		TLM1	
22.	Applications of Artificial Intelligence to real world.	1	20-08-2025		TLM1	
I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)						
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Representation of Knowledge

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Game Playing-Adversial search	1	21-08-2025		TLM2	
24.	Games, mini-max algorithm,	1	21-08-2025		TLM2	
25.	optimal decisions in multiplayer games	1	3-09-2025		TLM2	
26.	Problem in Game playing	1	4-09-2025		TLM2	
27.	Alpha-Beta pruning	1	4-09-2025		TLM2	
28.	Evaluation functions	1	10-09-2025		TLM2	
29.	Decision Trees	1	11-09-2025		TLM2	
30.	Bayes' Probabilistic Interferences.	1	11-09-2025		TLM2	
31.	Tutorial	1	17-09-2025		TLM2	
No. of classes required to complete UNIT-III: 9				**No. of classes taken:**		

UNIT-IV: Logic concepts

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Knowledge Representation: Knowledge-Based Agents	1	18-09-2025		TLM2	
33.	Logic	1	18-09-2025		TLM2	
34.	Propositional Logic: A Very Simple Logic	1	24-09-2025		TLM2	
35.	Introduction to Predicate Logic	1	25-09-2025		TLM2	
36.	First Order Logic	1	25-09-2025		TLM2	
37.	Syntax, Substitution	1	08-10-2025		TLM2	
38.	Unification, Deduction	1	09-10-2025		TLM2	
39.	Soundness, Completeness,	1	09-10-2025		TLM2	
40.	Consistency, Satisfiability	1	15-10-2025		TLM2	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: Expert 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
41.	Expert Systems	1	16-10-2025		TLM2	
42.	Architecture of Expert Systems	1	16-10-2025		TLM2	
43.	Roles of Expert Systems	1	22-10-2025		TLM2	
44.	Knowledge Acquisition	1	23-10-2025		TLM2	
45.	Meta Knowledge Heuristics	1	29-10-2025		TLM2	
46.	Typical Expert Systems – MYCIN, DART	1	30-10-2025		TLM2	
47.	XCON; Expert Systems Shells	1	30-10-2025		TLM2	
No. of classes required to complete UNIT-V: 07				**No. of classes taken:**		

Content Beyond 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	Textbook followed	HOD Sign
1.	Neural Networks	1	23-10-2024		TLM2	CO5	T1	
No. of classes		01			No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

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 (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2	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 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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques.
PSO 2	Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr SK Salma Asiya Begum**	**Dr SK Salma Asiya Begum**	**Dr. K.Devi Priya**	**Dr P Sobharani**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. P. RAJASEKHAR

Course Name & Code : Introduction to Database Systems - 23CSM4

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

Program/Sem/Sec : B.Tech/ V-Sem/Minors A.Y: 2025-26

PRE-REQUISITE: Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the students to know about Basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, and Indexing.

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

CO1	State the Basic Components of Database Management System and data modelling using Entity-Relationship Diagrams. **(Understand -L2)**
CO2	Examine the relational model using Structured Query Language (SQL). **(Apply- L3)**
CO3	Employ principles of normalization for effective database design. **(Apply- L3)**
CO4	Demonstrate the necessity of transaction processing, Concurrency control mechanisms and recovery strategies in DBMS. **(Understand- L2)**
CO5	Describe file organization, indexing techniques and the competency in selecting NoSQL Database. **(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	1	1	2	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	1	-	-	-	-	-	-	-	2	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-
CO4	2	1	2	-	-	-	-	-	-	-	-	-	1	3	-
CO5	2	1	2	-	-	-	-	-	-	-	-	-	1	3	-

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

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

TEXT BOOKS:

T1 Henry F. Korth, Abraham Silberschatz, S.Sudarshan, "Database System Concepts", McGraw Hill, 6th edition, 2009.

T2 RamezElmasri, ShamkanthB.Navathe, "Fundamentals of Database Systems", Addison Wesley, 6th edition, 2010.

REFERENCE BOOKS:

R1 Raghu Ramakrishnan, JohanneseGehrke, "Database Management System", McGraw Hill, 3rd edition, 2000.

R2 Date C J, "An Introduction to Database System", Pearson Education, 8th edition, 2003

R3 Sharad Maheshwari, Ruchin Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi, 2005

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT –I: Introduction & Data modeling using the Entity Relationship Model

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction , An overview of database managemen t system	1	02/07/25		**TLM1**	CO1	T1,T2,R1	
2.	Database system Vs file system	1	03/07/25		**TLM1**	CO1	T1,T2,R1	
3.	Database system concepts and architecture	1	03/07/25		**TLM1**	CO1	T1,T2,R1	
4.	Data models schema and instances	1	09/07/25		**TLM1**	CO1	T1,T2,R1	
5.	Data independenc e and data base language and interfaces	1	10/07/25		**TLM1**	CO1	T1,T2,R1	
6.	Data definitions language, DML, Overall Database Structure	1	10/07/25		**TLM1**	CO1	T1,T2,R1	
7.	**Tutorial – I**	1	16/07/25		**TLM3**			
8.	ER model concepts- notation for ER diagram	1	17/07/25		**TLM1/ TLM2**	CO1	T1,T2,R1	
9.	Mapping constraints, keys	1	17/07/25		**TLM1**	CO1	T1,T2,R1	
10.	Concepts of Super Key,	1	23/07/25		**TLM1**	CO1	T1,T2,R1	

	candidate key, primary key, Generalization, aggregation							
11.	Reduction of an ER diagrams to tables, Extended ER model, Relationships of higher degree	1	24/07/25		**TLM1/ TLM2**	CO1	T1,T2,R1	
12.	**Tutorial – II**	1	24/07/25		**TLM3**	CO1		
No. of classes required to complete UNIT-I		12			No. of classes taken:			

UNIT –II: Relational data Model and Language & Introduction to SQL

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
13.	Relational data model concepts	1	30/07/25		**TLM1**	CO2	T1,T2,R1	
14.	Integrity constraints: entity integrity, referential integrity	1	31/07/25		**TLM1**	CO2	T1,T2,R1	
15.	Keys constraints, Domain constraints	1	31/07/25		**TLM1**	CO2	T1,T2,R1	
16.	Relational algebra	1	06/08/25		**TLM1**	CO2	T1,T2,R1	
17.	Tutorial – III	1	07/08/25		**TLM3**			
18.	Characteristics of SQL, Advantage of SQL	1	07/08/25		**TLM1**	CO2	T1,T2,R1	
19.	SQL data types and literals, Types of SQL commands	1	13/08/25		**TLM1**	CO2	T1,T2,R1	
20.	SQL operators and their procedure	1	14/08/25		**TLM1**	CO2	T1,T2,R1	
21.	Tables, views and indexes,	1	14/08/25		**TLM1**	CO2	T1,T2,R1	
22.	Queries and sub queries,	1	20/08/25		**TLM1/ TLM2**	CO2	T1,T2,R1	

	Aggregate functions							
23.	Insert, update and delete operations	1	21/08/25		**TLM1**	CO2	T1,T2,R1	
24.	Unions, Intersection, Minus, Cursors in SQL	1	21/08/25		**TLM1**	CO2	T1,T2,R1	
No. of classes required to complete **UNIT-2**		12			No. of classes taken:			

UNIT –III: Normalization

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
25.	Functional Dependencies	1	03/09/25		**TLM1**	CO3	T1,T2,R1	
26.	Normal Forms: First, Second	1	04/09/25		**TLM1**	CO3	T1,T2,R1	
27.	Third Normal Forms	1	04/09/25		**TLM1**	CO3	T1,T2,R1	
28.	BCNF, Inclusion Dependences	1	10/09/25		**TLM1**	CO3	T1,T2,R1	
29.	Loss Less Join Decompositions	1	11/09/25		**TLM1**	CO3	T1,T2,R1	
30.	Normalization Using FD,MVD	1	11/09/25		**TLM3**			
31.	Normalization Using JD	1	17/09/25		**TLM1**	CO3	T1,T2,R1	
32.	Alternative Approaches to Database Design	1	18/09/25		**TLM1**	CO3	T1,T2,R1	
No. of classes required to complete **UNIT-3**		8			No. of classes taken:			

UNIT –IV: Transaction Processing Concepts &Concurrency Control 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
33.	Transaction System	1	18/09/25		**TLM1**	CO4	T1,T2,R1	
34.	Testing Of Serializability	1	24/09/25		**TLM1**	CO4	T1,T2,R1	
35.	Serializability Of Schedules	1	25/09/25		**TLM1**	CO4	T1,T2,R1	
36.	Conflict & View Serializable Schedule	1	25/09/25		**TLM1**	CO4	T1,T2,R1	
37.	Recoverability, Log Based	1	01/10/25		**TLM1**	CO4	T1,T2,R1	

	Recovery, Checkpoints,							
38.	ARIES Algorithm, Deadlock Handling	1	08/10/25		**TLM1/ TLM2**	CO4	T1,T2,R1	
39.	Concurrency Control	1	09/10/25		**TLM1**	CO4	T1,T2,R1	
40.	Techniques For Concurrency Control	1	09/10/25		**TLM1**	CO4	T1,T2,R1	
41.	Time Stamping Protocols For Concurrency Control	1	15/10/25		**TLM1**	CO4	T1,T2,R1	
42.	Locking, Validation Based Protocol	1	16/10/25		**TLM1**	CO4	T1,T2,R1	
43.	Multiple Granularity, Concurrent Transactions	1	16/10/25		**TLM1**	CO4	T1,T2,R1	
No. of classes required to complete **UNIT-4**		11			No. of classes taken:			

UNIT-V: Storage and Indexing

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
44.	RAID Levels	1	22/10/25		**TLM1/TLM2**	CO5	T1,T2,R1	
45.	Page Formats	1	23/10/25		**TLM1/TLM2**	CO5	T1,T2,R1	
46.	Record Formats	1	23/10/25		**TLM1/TLM2**	CO5	T1,T2,R1	
47.	File Types And Organization	1	29/10/25		**TLM1/TLM2**	CO5	T1,T2,R1	
48.	B-Tree	1	30/10/25		**TLM1/TLM2**	CO5	T1,T2,R1	
49.	B+-Tree	1	30/10/25		**TLM1/TLM2**	CO5	T1,T2,R1	
No. of classes required to complete **UNIT-5**		06			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 (R23 Regulations):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, 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.

PROGRAM SPECIFIC OUTCOMES

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. P Rajasekhar	Mr. P Rajasekhar	Dr. D. Venkata Subbaiah	Dr. S. Nagarjuna Reddy

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr Shaik Salma Asiya Begum
Course Name & Code : Principles Of Artificial Intelligence Lab (23AMM6)
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech /EEE/V/A&B **A.Y:** 2024-2025

PRE-REQUISITE : Python.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objectives of the course are to:

- Make the student familiar with principles behind Object-Oriented Design and enable them to apply those principles in a project setting.
- Students will analyze applications and know how to take a pragmatic approach to software design and development.

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

CO1	Apply the basic principles of AI in problem solving using LISP/PROLOG. (Apply – L3)
CO2	Implement different algorithms using LISP/PROLOG. (Apply – L3)
CO3	Develop an Expert System using JESS/PROLOG. (Apply – L3)
CO4	Improve individual/teamwork skills, communication & report writing skills with ethical values.

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

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	Developing agent programs for real world problems.	3	04-07-2025		TLM4	
2	Implementation of Constraint satisfaction problems.	3	11-07-2025		TLM4	
3	Implementation of DFS for water jug problem using LISP/PROLOG.	3	18-07-2025		TLM4	
4	Implementation of A* for chess game problem using LISP/PROLOG.	3	25-07-2025		TLM4	
5	Implementation of BFS for tic-tac-toe problem using LISP/PROLOG/Java.	6	01-08-2025 22-08-2025		TLM4	
6	Implementation of TSP using heuristic approach using Java/LISP/PROLOG.	3	05-09-2025		TLM4	
7	Implementation of Simulated Annealing Algorithm using LISP/PROLOG.	3	12-09-2025		TLM4	
8	Implementation of Hill-climbing to solve 8-Puzzle Problem.	3	19-09-2025		TLM4	
9	Implementation of Monkey Banana Problem using LISP/PROLOG.	3	26-09-2025		TLM4	
10	Implementation of minimax algorithm for an application.	3	03-10-2025		TLM4	
11	Implementation of unification and resolution for real world problems.	3	10-10-2025		TLM4	
12	Implementation of knowledge representation schemes – use cases.	6	17-10-2025 24-10-2025			
13	Internal Exam	3	31-10-2025		TLM4	

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

PART-C

EVALUATION PROCESS (R23 Regulations):

According to Academic Regulations of R23 Distribution and Weightage of Marks For Laboratory Courses is as follows

(a) Continuous Internal Evaluation (CIE): The Continuous Internal Evaluation (CIE) is based on the following parameters:

Parameter	**Marks**
Day to Day work	10
Record	05
Internal Test	15
Total	30

(b) Semester End Examinations (SEE: The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 70 marks.

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 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.

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	**Dr SK Salma Asiya Begum**	**Dr SK Salma Asiya Begum**	**Dr. K.Devi Priya**	**Dr P Sobharani**
Signature				

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hodcse@lbrce.ac.in, cseoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor: Mr. P. Rajasekhar

Course Name & Code	**:** Introduction To Database Systems Lab -23CSM9	
L-T-P Structure	**:** 0-0-3	**Credits:**1.5
Program/Sem/Sec	: B. Tech/V Sem/Minors	**A.Y.:** 2025-26

PRE-REQUISITE: Programming language and Data Structures.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraints on a database
3. Writing Queries using advanced concepts of SQL
4. Programming PL/SQL including procedures, functions, cursors and triggers

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

CO 1	Implement SQL queries using DDL/DML commands.(**Apply-L3**)
CO 2	Apply different Integrity constraints & Normalization techniques for effective database design. (**Apply-L3**)
CO 3	Implement PL/SQL including procedures, functions, cursors and triggers. (**Apply-L3**)
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical Values

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

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	Create, alter, insert rows and Dropping of table	3	04/07/25		TLM4	
2	Select Queries with Various Constraints	3	11/07/25		TLM4	
3	Sub Queries with Operations	3	18/07/25		TLM4	
4	Queries Using Aggregate Functions	3	25/07/25		TLM4	
5	Queries using Conversion functions -date-time	3	01/08/25		TLM4	
6	Queries using Conversion functions– strings	3	08/08/25		TLM4	
7	Simple PL/SQL program	3	22/08/25		TLM4	
8	COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.	3	05/09/25		TLM4	
9	Programs include NESTED IF, CASE	3	12/09/25		TLM4	
10	Programs using WHILE & FOR loops	3	19/09/25		TLM4	
11	creation of procedures – IN & OUT parameters	3	26/09/25		TLM4	
12	Stored functions in PL/SQL	3	03/10/25		TLM4	
13	Programs using CURSORS	3	10/10/25		TLM4	
14	Programs using TRIGGERS	3	17/10/25		TLM4	
15	Search operations using Index and Non-Index, Design database for Case study	3	24/10/25		TLM4	
16	Internal Exam	3	31/10/25		TLM4	

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

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	Marks
Day to Day Work	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Vice-voce	20
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.
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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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. P Rajasekhar	Mr. P Rajasekhar	Dr. D. Venkata Subbaiah	Dr. S. Nagarjuna Reddy

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.P.DEEPAK REDDY, Mrs.R.PADMA
Course Name & Code : POWER ELECTRONICS LAB-23EE57
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/V/A-Section **A.Y.:** 2025-26

Course Objectives: This course enables the student to learn the characteristics of various power electronic devices and analyze the performance of various converters.

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

CO1	Analyse characteristics of various power electronic devices **(Apply-L3)**
CO2	Design various firing circuits for SCR. **(Apply-L3)**
CO3	Analyse the performance of different power converters with resistive and inductive loads. **(Apply-L3)**

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3	PSO4
CO1	2	3		2		1	1		1				1	1	2	1
CO2	2	3	3	2		1	1		1				2	2	1	1
CO3	2	3		2		1	1		1				2	1	1	1
1 - Low						**2 –**Medium							**3 -** High			

List of Experiments

Any 10 experiments of the following are required to be conducted

1. Characteristics of SCR - Power MOSFET & Power IGBT.
2. R, RC & UJT firing circuits for SCR.
3. Single -Phase semi-converter with R & RL loads.
4. Single -Phase full-converter with R & RL loads.
5. Three- Phase full-converter with R & RL loads.
6. Single-phase dual converter in circulating current & non circulating current mode of operation.
7. Single-Phase AC Voltage Regulator with R & RL Loads.
8. Single-phase step down Cycloconverter with R & RL Loads.
9. Boost converter in Continuous Conduction Mode operation.
10. Buck converter in Continuous Conduction Mode operation.
11. Single -Phase square wave bridge inverter with R & RL Loads.
12. Single - Phase PWM inverter.
13. Three-phase bridge inverter with 120^0 and 180^0 conduction mode.
14. SPWM control of Three-phase bridge inverter

Part - B
COURSE DELIVERY PLAN (LESSON PLAN):

DAY : Wednesday
Batches : 23761A0201-235 (32)

B.NO.	H.T. Nos	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week	XV Week	XVI Week
	Tentative date	**2/7**	**9/7**	**16/7**	**23/7**	**30/7**	**6/8**	**13/8**	**20/8**	**3/9**	**10/9**	**17/9**	**24/9**	**1/10**	**8/10**	**15/10**	**22/10 29/10**
	Actual date																
B-1	23761A0201 23761A0202 23761A0203	DEMO	1	2	3	4	5	6	7	8	9	10	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	**INTERNAL EXAM**	REVISION OF EXPERIMENTS
B-2	23761A0205 23761A0206 23761A0208	DEMO	2	3	4	5	1	7	8	9	10	6					
B-3	23761A0209 23761A0210 23761A0212	DEMO	3	4	5	1	2	8	9	10	6	7					
B-4	23761A0213 23761A0214 23761A0215	DEMO	4	5	1	2	3	9	10	6	7	8					
B-5	23761A0216 23761A0217 23761A0218	DEMO	5	1	2	3	4	10	6	7	8	9					
B-6	23761A0219 23761A0220 23761A0221	DEMO	1	2	3	4	5	6	7	8	9	10					
B-7	23761A0222 23761A0223 23761A0224	DEMO	2	3	4	5	1	7	8	9	10	6					
B-8	23761A0225 23761A0226 23761A0227	DEMO	3	4	5	1	2	8	9	10	6	7					
B-9	23761A0228 23761A0229 23761A0230 23761A0231	DEMO	4	5	1	2	3	9	10	6	7	8					
B-10	23761A0232 23761A0233 23761A0234 23761A0235	DEMO	5	1	2	3	4	10	6	7	8	9					

DAY : Saturday
Batches : 23761A0236-259 & 24765A0201-211 (32)

B.NO.	H.T. Nos	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week	XV Week	XV Week
	Tentative date	**5/7**	**12/7**	**19/7**	**26/7**	**2/8**	**9/8**	**23/8**	**6/9**	**13/9**	**20/9**	**27/9**	**4/10**	**11/10**	**18/10**	**25/10**	**1/11**
	Actual date																
B-1	23761A0236 23761A0237 24761A0238	DEMO	1	2	3	4	5	6	7	8	9	10	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	**INTERNAL EXAM**	REVISION OF EXPERIMENTS
B-2	23761A0239 23761A0240 24761A0241	DEMO	2	3	4	5	1	7	8	9	10	6					
B-3	23761A0242 23761A0244 23761A0245	DEMO	3	4	5	1	2	8	9	10	6	7					
B-4	23761A0246 23761A0247 23761A0249	DEMO	4	5	1	2	3	9	10	6	7	8					
B-5	23761A0250 23761A0252 24765A0253	DEMO	5	1	2	3	4	10	6	7	8	9					
B-6	23761A0254 23761A0255 24765A0256	DEMO	1	2	3	4	5	6	7	8	9	10					
B-7	23761A0257 24765A0258 24765A0259	DEMO	2	3	4	5	1	7	8	9	10	6					
B-8	24765A0201 24765A0202 24765A0203	DEMO	3	4	5	1	2	8	9	10	6	7					
B-9	23761A0204 23761A0205 24765A0206 24765A0207	DEMO	4	5	1	2	3	9	10	6	7	8					
B-10	23761A0208 23761A0209 24765A0210 24765A0211	DEMO	5	1	2	3	4	10	6	7	8	9					

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Day – Day Evaluation	A=10
Record	B=05
Internal Exam	C=15
Cumulative Internal Examination (CIE) : A+B+C	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	50

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	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Mr.P.Deepak Reddy Mrs.R.Padma	**Mr.P.Deepak Reddy**	**Mr. P. Deepak Reddy**	**Dr.P.Sobha Rani**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.K.NAGALINGA CHARY, Mr.A.V.RAVI KUMAR
Course Name & Code : POWER ELECTRONICS LAB-23EE57
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/V/B-Section **A.Y.:** 2025-26

Course Objectives: This course enables the student to learn the characteristics of various power electronic devices and analyze the performance of various converters.

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

CO1	Analyse characteristics of various power electronic devices **(Apply-L3)**
CO2	Design various firing circuits for SCR. **(Apply-L3)**
CO3	Analyse the performance of different power converters with resistive and inductive loads. **(Apply-L3)**

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3	PSO4
CO1	2	3		2		1	1		1				1	1	2	1
CO2	2	3	3	2		1	1		1				2	2	1	1
CO3	2	3		2		1	1		1				2	1	1	1
1 - Low						**2 –**Medium							**3 -** High			

List of Experiments

Any 10 experiments of the following are required to be conducted

1. Characteristics of SCR - Power MOSFET & Power IGBT.
2. R, RC & UJT firing circuits for SCR.
3. Single -Phase semi-converter with R & RL loads.
4. Single -Phase full-converter with R & RL loads.
5. Three- Phase full-converter with R & RL loads.
6. Single-phase dual converter in circulating current & non circulating current mode of operation.
7. Single-Phase AC Voltage Regulator with R & RL Loads.
8. Single-phase step down Cycloconverter with R & RL Loads.
9. Boost converter in Continuous Conduction Mode operation.
10. Buck converter in Continuous Conduction Mode operation.
11. Single -Phase square wave bridge inverter with R & RL Loads.
12. Single - Phase PWM inverter.
13. Three-phase bridge inverter with 120^0 and 180^0 conduction mode.
14. SPWM control of Three-phase bridge inverter

Part - B
COURSE DELIVERY PLAN (LESSON PLAN):

DAY : Tuesday
Batches : 23761A0259-294 (34)

B.NO.	H.T. Nos	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week	XV Week	XVI Week
	Tentative date	**01/ 07**	**08/ 07**	**15/ 07**	**22/ 07**	**29/ 07**	**05/ 08**	**12/ 08**	**19/ 08**	**02/ 09**	**09/ 09**	**16/ 09**	**23/ 09**	**07/ 10**	**14/ 10**	**21/ 10**	**28/ 10**
	Actual date																
B-1	23761A0260 23761A0270 23761A0280 23761A0290	DEMO	1	2	3	4	5	6	7	8	9	10	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	**INTERNAL EXAM**	REVISION OF EXPERIMENTS
B-2	23761A0261 23761A0271 23761A0281 23761A0291	DEMO	2	3	4	5	1	7	8	9	10	6					
B-3	23761A0262 23761A0282 23761A0292	DEMO	3	4	5	1	2	8	9	10	6	7					
B-4	23761A0263 23761A0273 23761A0283 23761A0293	DEMO	4	5	1	2	3	9	10	6	7	8					
B-5	23761A0264 23761A0274 23761A0284 23761A0294	DEMO	5	1	2	3	4	10	6	7	8	9					
B-6	23761A0265 23761A0275 23761A0285	DEMO	1	2	3	4	5	6	7	8	9	10					
B-7	23761A0266 23761A0276 23761A0286	DEMO	2	3	4	5	1	7	8	9	10	6					
B-8	23761A0267 23761A0277 23761A0287	DEMO	3	4	5	1	2	8	9	10	6	7					
B-9	23761A0268 23761A0278 23761A0288	DEMO	4	5	1	2	3	9	10	6	7	8					
B-10	23761A0269 23761A0279 23761A0289	DEMO	5	1	2	3	4	10	6	7	8	9					

DAY : Thursday
Batches : 23761A096-2B7 & 24765A0212-227 (33)

B.NO.	H.T. Nos	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week	XV Week	XV Week
	Tentative date	**03/ 07**	**10/ 07**	**17/ 07**	**24/ 07**	**31/ 07**	**07/ 08**	**14/ 08**	**21/ 08**	**04/ 09**	**11/ 09**	**18/ 08**	**25/ 08**	**09/ 10**	**16/ 10**	**23/ 10**	**30/ 10**
	Actual date																
B-1	23761A02A5 23761A02B5 24765A0215 24765A0227	DEMO	1	2	3	4	5	6	7	8	9	10	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	**INTERNAL EXAM**	REVISION OF EXPERIMENTS
B-2	23761A0296 23761A02B6 24765A0216 24765A0226	DEMO	2	3	4	5	1	7	8	9	10	6					
B-3	23761A0297 23761A02A7 23761A02B7	DEMO	3	4	5	1	2	8	9	10	6	7					
B-4	23761A02A8 24765A0217 24765A0218	DEMO	4	5	1	2	3	9	10	6	7	8					
B-5	23761A0299 23761A02A9 24765A0219	DEMO	5	1	2	3	4	10	6	7	8	9					
B-6	23761A02A0 23761A02B0 24765A0220	DEMO	1	2	3	4	5	6	7	8	9	10					
B-7	23761A02A1 24765A0221 24765A0224	DEMO	2	3	4	5	1	7	8	9	10	6					
B-8	23761A02B2 24765A0212 24765A0222	DEMO	3	4	5	1	2	8	9	10	6	7					
B-9	23761A02A3 23761A02B3 24765A0213 24765A0223	DEMO	4	5	1	2	3	9	10	6	7	8					
B-10	23761A02A4 23761A02B4 24765A0214	DEMO	5	1	2	3	4	10	6	7	8	9					

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Day – Day Evaluation	A=10
Record	B=05
Internal Exam	C=15
Cumulative Internal Examination (CIE) : A+B+C	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	50

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 a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Mr.K.Nagalinga Chary Mr.A.V.Ravi Kumar	**Mr.P.Deepak Reddy**	**Mr. P. Deepak Reddy**	**Dr.P.Sobha Rani**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENT OF EEE

COURSE HANDOUT
BATCH-I

Name of Course Instructor(s): 1.Dr. M. Uma Vani, 2.Dr.B.Pangedaiah
Course Name & Code : ADC Lab (23EE58)
L-T-P Structure : 0-0-3 **Credits: 1.5**
Program/Sem/Sec : B.Tech/V/A **A.Y.: 2025-26**
PREREQUISITE: BEEE

Course Objectives: To impart knowledge on

- Analysis of transistor amplifiers
- Analysis of feedback amplifiers and oscillators
- Realization of digital circuits such data routing, registers and counters.

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

CO1	Analyse diode clipper/clamper circuits and transistor biasing. **(Apply-L4)**
CO2	Illustrate the operation of feedback amplifiers and oscillator circuits. **(Apply-L2)**
CO3	Analyze the applications of linear IC's. **(Apply-L4)**
CO4	Demonstrate the operation of digital circuits such as arithmetic, data routing, registers and counters. **(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	PSO4
CO1	2	3		2		1	1		1						2	
CO2	3	-		2		1	1		1						2	2
CO3	2	3		2		1	1		1						2	
CO4	2	2		2		1	1		1						2	1
1 - Low						**2 –**Medium							**3 -** High			

Lesson Plan: V-Sem EEE, A Sec, Batch-I

S. No.	List of Experiments	No. of Lab Slots Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	**Part-A Experiments DC Lab Demonstration (Batches I & II)**	1	2-7-2025		**TLM 1/4/5**	
2.	Analysis of clipper and clamper circuits.	1	9-7-2025		TLM4/5	
3.	Analysis of self-bias to a transistor.	1	16-7-2025		TLM4/5	
4.	Analysis of Wien Bridge oscillator and RC-phase shift oscillator.	1	23-7-2025		TLM4/5	
5.	Analysis of Integrator and Differentiator Circuits using IC 741.	**1**	30-7-2025		TLM4/5	
6.	Analysis of Monostable and Astable multivibrator operation using IC 555 Timer.	**1**	6-8-2025		TLM4/5	
7.	**Part-B Experiments DC Lab Demonstration (Batches I & II)**	1	13-8-2025		**TLM 1/4/5**	
8.	Design of Full adder and Full Subtractor using logic gates.	1	20-8-2025		TLM4/5	
9.	Implementation of 3 to 8 line decoder using logic gates and IC 7445.	1	3-9-2025		TLM4/5	
10.	Implementation of 8 to 1 multiplexer using logic gates and IC 74151.	1	10-9-2025		TLM4/5	
11.	Verify the operation of master-slave JK flip-flop using IC7476.	1	17-9-2025		TLM4/5	
12.	Implementation of Mod-8 synchronous up/down counters using flip-flops.	1	24-9-2025		TLM4/5	
13.	**Repetition class**	1	8-10-2025		TLM4/5	
14.	**Internal Lab Exam**	**1**	15-10-2025		TLM4/5	
15.	**Revision class**	**1**	22-10-2025		TLM4/5	
16.	**Revision class**	**1**	29-10-2025		TLM4/5	
No. of lab slots required to complete 10 experiments: 12 (Including Demo classes)				**No. of lab slots taken:**		

Content Beyond the Syllabus:

S. No.	List of Experiments	No. of Lab Slots Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods
1.	**Conduction of experiments using software: Logisim/ MULTISIM**	1	2-7-2025		**TLM 2/4/5**
2.	**Experiments conduction in Virtual Lab**	1	13-8-2025		**TLM2/4/5**

Title	Course Instructor	Course Coordinator	Module Coordinator	HoD
Name of the Faculty	1.Dr. M. Uma Vani, 2.Dr.B.Pangedaiah	Dr.M.UmaVani	Dr.AVGA Marthanda	Dr.P.Sobha Rani
Signatures	**1.** **2.**			

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DEPARTMENT OF EEE

COURSE HANDOUT
BATCH-II

Name of Course Instructor(s): 1.Dr. M. Uma Vani, 2.Dr.B.Pangedaiah
Course Name & Code : **ADC Lab (23EE58)**
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech/V/A **A.Y.: 2025-26**
PREREQUISITE: BEEE

Course Objectives: To impart knowledge on

- Analysis of transistor amplifiers
- Analysis of feedback amplifiers and oscillators
- Realization of digital circuits such data routing, registers and counters.

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

CO1	Analyse diode clipper/clamper circuits and transistor biasing. **(Apply-L4)**
CO2	Illustrate the operation of feedback amplifiers and oscillator circuits. **(Apply-L2)**
CO3	Analyze the applications of linear IC's. **(Apply-L4)**
CO4	Demonstrate the operation of digital circuits such as arithmetic, data routing, registers and counters. **(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	PSO4
CO1	2	3		2		1	1		1						2	
CO2	3	-		2		1	1		1						2	2
CO3	2	3		2		1	1		1						2	
CO4	2	2		2		1	1		1						2	1
1 - Low					**2** –Medium							**3** - High				

Lesson Plan:V-Sem EEE, A Sec, Batch-II

S. No.	List of Experiments	No. of Lab Slots Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Analysis of clipper and clamper circuits.	1	5-7-2025		TLM 4/5	
2.	Analysis of self-bias to a transistor.	1	19-7-2025		TLM4/5	
3.	Analysis of Wien Bridge oscillator and RC-phase shift oscillator.	1	26-7-2025		TLM4/5	
4.	Analysis of Integrator and Differentiator Circuits using IC 741.	1	2-8-2025		TLM4/5	
5.	Analysis of Monostable and Astable multivibrator operation using IC 555 Timer.	**1**	16-8-2025		TLM4/5	
6.	Design of Full adder and Full Subtractor using logic gates.	**1**	23-8-2025		TLM4/5	
7.	Implementation of 3 to 8 line decoder using logic gates and IC 7445.	1	6-9-2025		TLM4/5	
8.	Implementation of 8 to 1 multiplexer using logic gates and IC 74151.	1	20-9-2025		TLM4/5	
9.	Verify the operation of master-slave JK flip-flop using IC7476.	1	4-10-2025		TLM4/5	
10.	Implementation of Mod-8 synchronous up/down counters using flip-flops.	1	18-10-2025		TLM4/5	
11.	**Repetition class**	1	25-10-2025		TLM4/5	
12.	**Internal Lab Exam**	**1**	**Extra Lab to be generated**		**TLM4/5**	
No. of lab slots required to complete 10 experiments: 12 (Including Demo class)				**No. of lab slots taken:**		

Note: Demonstration classes along with Batch-I is being planned.

Content Beyond the Syllabus

S. No.	List of Experiments	No. of Lab Slots Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods
1.	**Conduction of experiments using software: Logisim/ MULTISIM**	1	2-7-2025		**TLM 2/4/5**
2.	**Experiments conduction in Virtual Lab**	1	13-8-2025		**TLM2/4/5**

Title	Course Instructor	Course Coordinator	Module Coordinator	HoD
Name of the Faculty	1.Dr. M. Uma Vani, 2.Dr.B.Pangedaiah	Dr.M.UmaVani	Dr.AVGA Marthanda	Dr.P.Sobha Rani
Signatures	**1.** **2.**			

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.R.A.NAIK, Mr.P.RATNAKAR KUMAR
Course Name & Code : Analog And Digital Circuits Lab-23EE58

L-T-P Structure : **0-0-3** **Credits:** 1.5

Program/Sem/Sec : B.Tech/V/B-Section **A.Y.:** 2025-26

Course Objectives: To impart knowledge on

- Analysis of transistor amplifiers
- Analysis of feedback amplifiers and oscillators
- Realization of digital circuits such data routing, registers and counters.

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

CO1	Analyze diode clipper/clamper circuits and transistor biasing.
CO2	Illustrate the operation of feedback amplifiers and oscillator circuits.
CO3	Analyze the applications of linear IC's
CO4	Demonstrate the operation of digital circuits such as arithmetic, data routing, registers and counters.

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3	PSO4
CO1	2	3		2		1	1		1				1	1	2	1
CO2	2	3	3	2		1	1		1				2	2	1	1
CO3	2	3		2		1	1		1				2	1	1	1
1 - Low						**2 –**Medium							**3 -** High			

List of Experiments

Any 5 of the Following Experiments are to be conducted from each PART.

PART- A.

1. Analysis of clipper and clamper circuits.
2. Analysis of self-bias to a transistor.
3. Analysis of voltage series and current series feedback amplifiers.
4. Analysis of Wien Bridge oscillator and RC-phase shift oscillator.
5. Analysis of Integrator and Differentiator Circuits using IC 741.
6. Analysis of Monostable and Astable multivibrator operation using IC 555 Timer.
7. Analysis of Schmitt Trigger Circuits using IC 741 and IC 555.
8. Verify the PLL characteristics using IC 565.
9. Analysis of 8 bit A to D and D to A circuits

PART-B

1. Design of Full adder and Full Subtractor using logic gates.
2. Realization of parallel adder/subtractor using IC 7483.
3. Implementation of 3 to 8 line decoder using logic gates and IC 7445.
4. Implementation of 8 to 1 multiplexer using logic gates and IC 74151.
5. Verify the operation of master-slave JK flip-flop using IC7476.
6. Realization of the following shift registers using IC7495.
    a) SISO
    b) SIPO
    c) PISO
    d) PIPO
7. Implementation ofMod-10 ripples counter using flip-flops and IC 7490.
8. Implementation of Mod-8 synchronous up/down counters using flip-flops.
9. Implementation of 4 bit Ring Counter and Johnson Counter using D flip-flops/J-K flip-flops.

Part - B
COURSE DELIVERY PLAN (LESSON PLAN):

DAY : Tuesday

Batches : 23761A096-2B7 & 24765A0212-227 (33)

B.NO.	H.T. Nos	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week	XV Week	XV Week
	Tentative date	**01/ 07**	**08/ 07**	**15/ 07**	**22/ 07**	**29/ 07**	**05/ 08**	**12/ 08**	**19/ 08**	**02/ 09**	**09/ 09**	**16/ 09**	**23/ 09**	**07/ 10**	**14/ 10**	**21/ 10**	**28/ 10**
	Actual date																
B-1	23761A02A5 23761A02B5 24765A0215 24765A0227	DEMO	1	2	3	4	5	6	7	8	9	10	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	**INTERNAL EXAM**	REVISION OF EXPERIMENTS
B-2	23761A0296 23761A02B6 24765A0216 24765A0226	DEMO	2	3	4	5	1	7	8	9	10	6					
B-3	23761A0297 23761A02A7 23761A02B7	DEMO	3	4	5	1	2	8	9	10	6	7					
B-4	23761A02A8 24765A0217 24765A0218	DEMO	4	5	1	2	3	9	10	6	7	8					
B-5	23761A0299 23761A02A9 24765A0219	DEMO	5	1	2	3	4	10	6	7	8	9					
B-6	23761A02A0 23761A02B0 24765A0220	DEMO	1	2	3	4	5	6	7	8	9	10					
B-7	23761A02A1 24765A0221 24765A0224	DEMO	2	3	4	5	1	7	8	9	10	6					
B-8	23761A02B2 24765A0212 24765A0222	DEMO	3	4	5	1	2	8	9	10	6	7					
B-9	23761A02A3 23761A02B3 24765A0213 24765A0223	DEMO	4	5	1	2	3	9	10	6	7	8					
B-10	23761A02A4 23761A02B4 24765A0214	DEMO	5	1	2	3	4	10	6	7	8	9					

DAY : Thursday

Batches : 23761A0259-294 (34)

B.NO.	H.T. Nos	I Week	II Week	III Week	IV Week	V Week	VI Week	VII Week	VIII Week	IX Week	X Week	XI Week	XII Week	XIII Week	XIV Week	XV Week	XVI Week
	Tentative date	**03/ 07**	**10/ 07**	**17/ 07**	**24/ 07**	**31/ 07**	**07/ 08**	**14/ 08**	**21/ 08**	**04/ 09**	**11/ 09**	**18/ 08**	**25/ 08**	**09/ 10**	**16/ 10**	**23/ 10**	**30/ 10**
	Actual date																
B-1	23761A0260 23761A0270 23761A0280 23761A0290	DEMO	1	2	3	4	5	6	7	8	9	10	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	REVISION OF EXPERIMENTS	**INTERNAL EXAM**	REVISION OF EXPERIMENTS
B-2	23761A0261 23761A0271 23761A0281 23761A0291	DEMO	2	3	4	5	1	7	8	9	10	6					
B-3	23761A0262 23761A0282 23761A0292	DEMO	3	4	5	1	2	8	9	10	6	7					
B-4	23761A0263 23761A0273 23761A0283 23761A0293	DEMO	4	5	1	2	3	9	10	6	7	8					
B-5	23761A0264 23761A0274 23761A0284 23761A0294	DEMO	5	1	2	3	4	10	6	7	8	9					
B-6	23761A0265 23761A0275 23761A0285	DEMO	1	2	3	4	5	6	7	8	9	10					
B-7	23761A0266 23761A0276 23761A0286	DEMO	2	3	4	5	1	7	8	9	10	6					
B-8	23761A0267 23761A0277 23761A0287	DEMO	3	4	5	1	2	8	9	10	6	7					
B-9	23761A0268 23761A0278 23761A0288	DEMO	4	5	1	2	3	9	10	6	7	8					
B-10	23761A0269 23761A0279 23761A0289	DEMO	5	1	2	3	4	10	6	7	8	9					

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Day – Day Evaluation	A=10
Record	B=05
Internal Exam	C=15
Cumulative Internal Examination (CIE) : A+B+C	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	50

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 a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Mr.R.A.NAIK P.Ratnakar Kumar	Dr.M.UmaVani	Dr. A V G A Marthanda	Dr.P.Sobha Rani
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

Name of Course Instructor: Mr. P. SRIHARI & Mr. J. V. PAVAN CHAND
Course Name & Code **:** IOT APPLICATIONS OF ELECTRICAL ENGINEERING LAB & 23EES1
L-T-P Structure **: 0-1-2** **Credits: 2**
Program/Sem/Sec : B.Tech/V/A **A.Y.:** 2025-26

Pre-requisite: Concepts of Computer Organization, Computer Networks.

Course Educational Objectives: This course enables the students to understand the working of Arduino, programming of Raspberry PI, various sensors with Arduino/Raspberry Pi. It also helps the students to interface various wireless communication devices with Arduino/Raspberry Pi.

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

CO1: Demonstrate the Arduino Integrated Development Environment with embedded c. **(Apply-L3)**
CO2: Develop the embedded Python program in Raspberry Pi OS. **(Apply-L3)**
CO3: Interface various sensors with Arduino/Raspberry Pi in the IoT environment. **(Apply-L3)**
CO4: Demonstrate the interconnection of various wireless communication technologies. **(Apply-L3)**

Topics to be covered in Tutorials

Module–1: Programming Arduino: (3 hrs)
Arduino - Classification of Arduino Boards - Pin diagrams – Arduino Integrated Development Environment (IDE) – Programming Arduino.

Module–2: Sensors: (5 hrs)
Working of temperature sensor, proximity sensor, IR sensor, Light sensor, ultrasonic sensor, PIR Sensor, Colour sensor, Soil Sensor, Heart Beat Sensor, Fire Alarms etc. Actuators: Stepper Motor, Servo Motor and their integration with Arduino/Raspberry Pi.

Module–3: Raspberry Pi: (2 hrs)
Introduction, Classification of Rasperberry Pi Series - Pin diagrams – Programming Rasperberry Pi.

Module–4: Display: (2 hrs)
Working of LEDs, LED, OLED display, LCDs, Seven Segment Display, Touch Screen etc. Analog Input and Digital Output Converter etc. and their integration with Arduino/Raspberry Pi.

Module–5: Wireless Communication Devices: (4 hrs)
Working of Bluetooth, Wi-Fi, Radio Frequency Identification (RFID), GPRS/GSM Technology, ZigBee, etc and their integration with Arduino/Raspberry Pi. Features of Alexa.

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

CO1: Demonstrate the Arduino Integrated Development Environment with embedded C. **(Apply-L3)**

CO2: Develop the embedded Python program in Raspberry Pi OS. **(Apply-L3)**

CO3: Interface various sensors with Arduino/Raspberry Pi in the IoT environment. **(Apply-L3)**

CO4: Demonstrate the interconnection of various wireless communication technologies. **(Apply-L3)**

CO-PO Mapping:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS O 4
CO1	2	2	2	2	2	1	1		1			1			2	
CO2	2	2	2	2	2	1	1		1			1			2	
CO3	2	2	2	2	2	1	1		1			1			2	
CO4	2	2	2	2	2	1	1		1			1			2	

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. Interfacing of LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. Interfacing of Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. Interfacing of temperature sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. Interfacing of Organic Light Emitting Diode (OLED) with Arduino/Raspberry Pi
6. Interfacing of Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7. Interfacing of Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
8. Write a program on Arduino/Raspberry Pi to upload and retrieve temperature and humidity data to thingspeak cloud.
9. Interfacing of 7 Segment Display with Arduino/Raspberry Pi
10. Interfacing of Joystick with Arduino/Raspberry Pi
11. Interfacing of Analog Input & Digital Output with Arduino/Raspberry Pi
12. Night Light Controlled & Monitoring System
13. Interfacing of Fire Alarm Using Arduino/Raspberry Pi
14. IR Remote Control for Home Appliances
15. A Heart Rate Monitoring System
16. Alexa based Home Automation System

COURSE DELIVERY PLAN (LESSON PLAN):

SECTION-A SCHEDULE

DAY: Tuesday

Batches: 23761A0201-23761A0259, 24765A0201-24765A0211

Week/ H.T. Nos	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIV	XV	XVI	XVII
Tentative date	1/7	8/7	15/7	22/7	29/7	5/8	12/8	19/8	2/9	9/9	16/9	23/9	07/10	14/10	21/10	28/10
Actual date																
23761A0201-23761A0259, 24765A0201-24765A0211	Demo	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	REVISION	REVISION	REVISION	REVISION	INTERNAL EXAM

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8 W
I Mid Examinations	25-08-2025	30-08-2025	1 W
II Phase of Instructions	01-09-2025	01-11-2025	9 W
II Mid Examinations	03-11-2025	08-11-2025	1 W
Preparation and Practicals	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	2 W

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

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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
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PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

Course Instructors	Course Coordinator	Module Coordinator	HOD
Mr. P. Srihari Mr. J.V. Pavan Chand	Mr. P. Srihari	Dr. G. Nageswara Rao	Dr. P. Sobha Rani

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

Name of Course Instructor: Mr. P. SRIHARI & Mr. IMRAN ABDUL
Course Name & Code **:** IOT APPLICATIONS OF ELECTRICAL ENGINEERING LAB & 23EES1
L-T-P Structure **: 0-1-2** **Credits: 2**
Program/Sem/Sec : B.Tech/V/B **A.Y.:** 2025-26

Pre-requisite: Concepts of Computer Organization, Computer Networks.

Course Educational Objectives: This course enables the students to understand the working of Arduino, programming of Raspberry PI, various sensors with Arduino/Raspberry Pi. It also helps the students to interface various wireless communication devices with Arduino/Raspberry Pi.

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

CO1: Demonstrate the Arduino Integrated Development Environment with embedded c. **(Apply-L3)**
CO2: Develop the embedded Python program in Raspberry Pi OS. **(Apply-L3)**
CO3: Interface various sensors with Arduino/Raspberry Pi in the IoT environment. **(Apply-L3)**
CO4: Demonstrate the interconnection of various wireless communication technologies. **(Apply-L3)**

Topics to be covered in Tutorials

Module–1: Programming Arduino: (3 hrs)
Arduino - Classification of Arduino Boards - Pin diagrams – Arduino Integrated Development Environment (IDE) – Programming Arduino.

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Working of temperature sensor, proximity sensor, IR sensor, Light sensor, ultrasonic sensor, PIR Sensor, Colour sensor, Soil Sensor, Heart Beat Sensor, Fire Alarms etc. Actuators: Stepper Motor, Servo Motor and their integration with Arduino/Raspberry Pi.

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Working of Bluetooth, Wi-Fi, Radio Frequency Identification (RFID), GPRS/GSM Technology, ZigBee, etc and their integration with Arduino/Raspberry Pi. Features of Alexa.

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CO3: Interface various sensors with Arduino/Raspberry Pi in the IoT environment. **(Apply-L3)**

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CO-PO Mapping:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS O 4
CO1	2	2	2	2	2	1	1		1			1			2	
CO2	2	2	2	2	2	1	1		1			1			2	
CO3	2	2	2	2	2	1	1		1			1			2	
CO4	2	2	2	2	2	1	1		1			1			2	

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
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13. Interfacing of Fire Alarm Using Arduino/Raspberry Pi
14. IR Remote Control for Home Appliances
15. A Heart Rate Monitoring System
16. Alexa based Home Automation System

COURSE DELIVERY PLAN (LESSON PLAN):

SECTION-B SCHEDULE

DAY: Monday

Batches: 23761A0260-23761A02B7, 24765A0212-24765A0227

Week/ H.T. Nos	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIV	XV	XVI	XVII
Tentative date	30/6	07/7	14/7	21/7	28/07	4/8	11/8	18/8	1/9	8/9	15/9	22/9	6/10	8/10	13/10	27/10
Actual date																
23761A0260-23761A02B7, 24765A0212-24765A0227	Demo	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	REVISION	REVISION	REVISION	REVISION	INTERNAL EXAM

ACADEMIC CALENDAR:

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

Course Instructors	Course Coordinator	Module Coordinator	HOD
Mr. P. Srihari Mr. Imran Abdul	Mr. P. Srihari	Dr. G. Nageswara Rao	Dr. P. Sobha Rani

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

Name of Course Instructor: Mrs. R. PADMA & Mrs. K. S. L. LAVANYA
Course Name & Code : TINKERING LAB & 23EM01
L-T-P Structure : **0-0-2** **Credits: 1**
Program/Sem/Sec : B.Tech/V/A **A.Y.:** 2025-26

Course Educational Objectives (CEO): The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Outcomes (COs): At the end of the course - students will be able to:
CO1: Use Arduino boards for controlling various applications. **(Apply-L3)**
CO2: Control various applications using ESP32. **(Apply-L3)**
CO3: Design of different real time applications using breadboard, Mobile App and 3D printer. **(Apply-L3)**
CO-PO Mapping:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	3	2	2	1	1	-	1	-	-	1	-	2	2	-
CO2	2	3	3	2	2	1	1	-	1	-	-	1	-	2	2	-
CO3	2	3	3	2	2	1	1	-	1	-	-	1	-	2	2	-

List of Experiments:

1) Make your own parallel and series circuits using breadboard for any application of your choice.
2) Demonstrate a traffic light circuit using breadboard.
3) Build and demonstrate automatic Street Light using LDR.
4) Simulate the Arduino LED blinking activity in Tinkercad.
5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
6) Interfacing IR Sensor and Servo Motor with Arduino.
7) Blink LED using ESP32.
8) LDR Interfacing with ESP32.
9) Control an LED using Mobile App.
10) Design and 3D print a Walking Robot
11) Design and 3D Print a Rocket.
12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
13) Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

1) https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2) https://atl.aim.gov.in/ATL-Equipment-Manual/
3) https://aim.gov.in/pdf/Level-1.pdf
4) https://aim.gov.in/pdf/Level-2.pdf
5) https://aim.gov.in/pdf/Level-3.pdf

COURSE DELIVERY PLAN (LESSON PLAN):

SECTION-A SCHEDULE

DAY: Monday

Batches: 23761A0201-23761A0259, 24765A0201-24765A0211

Week/ H.T. Nos	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIV	XV	XVI	XVII
Tentative date	30/6	07/7	14/7	21/7	28/07	4/8	11/8	18/8	1/9	8/9	15/9	22/9	6/10	8/10	13/10	27/10
Actual date																
23761A0201-23761A0259, 24765A0201-24765A0211	Demo	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	REVISION	REVISION	INTERNAL EXAM

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8 W
I Mid Examinations	25-08-2025	30-08-2025	1 W
II Phase of Instructions	01-09-2025	01-11-2025	9 W
II Mid Examinations	03-11-2025	08-11-2025	1 W
Preparation and Practicals	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	2 W

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	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO 2	Design and analyze electrical machines, modern drive and lighting systems
PSO 3	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO4	Design controllers for electrical and electronic systems to improve their performance.

Course Instructors	Course Coordinator	Module Coordinator	HOD
Mrs. R. Padma Mrs. K. S. L. Lavanya		Dr. G. Nageswara Rao	Dr. P. Sobha Rani

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

Name of Course Instructor: Mrs. G. TABITA & Dr. Y. RAGHUVAMSI
Course Name & Code : TINKERING LAB & 23EM01
L-T-P Structure : **0-0-2** **Credits: 1**
Program/Sem/Sec : B.Tech/V/B **A.Y.:** 2025-26

Course Educational Objectives (CEO): The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Outcomes (COs): At the end of the course - students will be able to:
CO1: Use Arduino boards for controlling various applications. **(Apply-L3)**
CO2: Control various applications using ESP32. **(Apply-L3)**
CO3: Design of different real time applications using breadboard, Mobile App and 3D printer. **(Apply-L3)**
CO-PO Mapping:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	3	2	2	1	1	-	1	-	-	1	-	2	2	-
CO2	2	3	3	2	2	1	1	-	1	-	-	1	-	2	2	-
CO3	2	3	3	2	2	1	1	-	1	-	-	1	-	2	2	-

List of Experiments:

1) Make your own parallel and series circuits using breadboard for any application of your choice.
2) Demonstrate a traffic light circuit using breadboard.
3) Build and demonstrate automatic Street Light using LDR.
4) Simulate the Arduino LED blinking activity in Tinkercad.
5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
6) Interfacing IR Sensor and Servo Motor with Arduino.
7) Blink LED using ESP32.
8) LDR Interfacing with ESP32.
9) Control an LED using Mobile App.
10) Design and 3D print a Walking Robot
11) Design and 3D Print a Rocket.
12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
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3) https://aim.gov.in/pdf/Level-1.pdf
4) https://aim.gov.in/pdf/Level-2.pdf
5) https://aim.gov.in/pdf/Level-3.pdf

COURSE DELIVERY PLAN (LESSON PLAN):
SECTION-B SCHEDULE

DAY: Saturday
Batches: 23761A0260-23761A02B7, 24765A0212-24765A0227

Week/ H.T. Nos	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIV	XV	XVI
Tentative date	5/7	12/7	19/7	26/7	2/8	9/8	23/8	6/9	13/9	20/9	27/9	11/10	18/10	25/10	1/11
Actual date															
23761A0260-23761A02B7, 24765A0212-24765A0227	Demo	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	REVISION	INTERNAL EXAM

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Course Instructors	Course Coordinator	Module Coordinator	HOD
Mrs. G. Tabita Dr. Y. Raghuvamsi	Dr. Y. Raghuvamsi	Dr. G. Nageswara Rao	Dr. P. Sobha Rani