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 & ELECTRONICS ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Mrs.K.S.L.LAVANYA
Course Name & Code : Power System Protection& 20EE24
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech, EEE., VII-Sem,A Sec A.Y : 2025-26

Pre-requisites : --NIL

Course Educational Objective: This course enables the student to acquire knowledge on Working of different electromagnetic and static relays, protective schemes for generator and transformers, feeders and bus bars. It also introduces distance protection by Microprocessor and numerical relays.

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

CO 1	Understand the working and operation of different types of electromagnetic and static relays.**(Understand-L2)**
CO 2	Analyze protective schemes for high power generator and transformers.**(Apply-L3)**
CO 3	Assess protective schemes for feeders and transmission lines. **(Apply-L3)**
CO 4	Analyse protective schemes for over voltages and grounding systems. **(Understand-L2)**
CO5	Understand the mechanism of microprocessor in numerical protection relays. **(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	PSO 4
CO1	2	2	-	-	-	-	-	-	-	-	-	1	3	-	-	
CO2	2	2	2	-	-	-	-	-	-	-	-	1	3	-	-	
CO3	2	2	2	-	-	-	-	-	-	-	-	2	3	-	-	
CO4	2	2	2	-	-	-	-	-	-	-	-	2	3	-	-	2
CO5	2	2	-	-	2	-	-	-	-	-	-	2	3	-	-	1

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

TEXT BOOKS:

1. Badri Ram and D.N Viswakarma, "Power System Protection and Switchgear", TMH Publications, 2nd Edition, 2011.
2. T.S.Madhava Rao, "Power system protection- Static Relays with microprocessor applications", Tata McGraw Hill, 2017.

REFERENCE :

1. C L Wadhwa, "Electrical Power Systems", New Age International Publisher, 8th edition(Multi Colour), 2022.
2. Paithankar and S.R.Bhide, "Fundamentals of Power System Protection", PHI, 2010.
3. C R Mason, "Art & Science of Protective Relaying", Wiley Eastern Ltd.

Part - B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : PROTECTIVE RELAYING

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 CEO's &Co's	1	30-06-2025		TLM1,TLM2	
2.	Classification of relays	1	30-06-2025		TLM1,TLM2	
3.	Induction type relays	1	02-07-2025		TLM1,TLM2	
4.	Inverse time characteristics relays	1	05-07-2025		TLM1,TLM2	
5.	Directional over-current and power relays	1	07-07-2025		TLM1,TLM2	
6.	Distance relays	1	07-07-2025		TLM1,TLM2	
7.	Definite distance and distance time relays	1	09-07-2025		TLM1,TLM2	
8.	Static relays	1	14-07-2025		TLM1,TLM2	
9.	Block diagram of static over-current relays	1	14-07-2025		TLM1,TLM2	
10.	Block diagram of static directional relays	1	16-07-2025		TLM1,TLM2	
11.	Block diagram of static distance relays	1	19-07-2025		TLM1,TLM2	
12.	Static differential relays	1	21-07-2025		TLM1,TLM2	
No. of classes required to complete UNIT-I : 12					No. of classes taken:	

UNIT-II : GENERATOR & TRANSFORMER PROTECTION

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	External and internal faults	1	21-07-2025		TLM1	
14	Differential protection	1	23-07-2025		TLM1,TLM2	
15	Biased circulating current protection	1	28-07-2025		TLM1,TLM2	
16	Self balance system	1	28-07-2025		TLM1	
17	Over-current protection	1	30-07-2025		TLM1	
18	Earth fault protection	1	02-08-2025		TTLM2	
19	Protection against failure of excitation	1	04-08-2025		TLM2	

20	Differential protection	1	04-08-2025		TLM2	
21	Buchholz's relay	1	06-08-2025		TLM1,TLM2	
22	Buchholz's relay operation	1	11-08-2025		TLM1,TLM2	
No. of classes required to complete UNIT-II : 10					No. of classes taken:	

UNIT-III: FEEDER & TRANSMISSION LINE PROTECTION

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	Protection of radial feeders	1	11-08-2025		TLM1 &TLM2	
24	protection of parallel feeders	1	13-08-2025		TLM1 &TLM2	
25	protection of ring mains	1	18-08-2025		TLM1 &TLM2	
26	differential pilot protection for feeders	1	18-08-2025		TLM1 &TLM2	
27	Merz Price voltage balance system	1	20-08-2025		TLM1 &TLM2	
28	Definite distance protection	1	23-08-2025		TLM1 &TLM2	
29	time distance protection	1	15-09-2025		TLM1 &TLM2	
30	Phase fault protection	1	15-09-2025		TLM1 &TLM2	
31	Earth fault protection	1	17-09-2025		TLM1 &TLM2	
32	Carrier current protection	1	20-09-2025		TLM1 &TLM2 TLM1 &TLM2	
No. of classes required to complete UNIT-III : 10					No. of classes taken:	

UNIT-IV : PROTECTION AGAINST OVER VOLTAGES AND GROUNDING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33	Causes of over voltages	1	22-09-2025		TLM1&TLM2	
34	Protection against lightning over voltages	1	22-09-2025		TLM1 &TLM2	
35	Valve type and zinc oxide lighting arresters	1	24-09-2025		TLM1&TLM2	
36	Insulation coordination	1	27-09-2025		TLM1&TLM2	
37	BIL,impulse ratio	1	01-10-2025		TLM1&TLM2	
38	Standard impulse test wave, volt-time characteristics.	1	04-10-2025		TLM1&TLM2	
39	Grounded and ungrounded neutral systems	2	06-10-2025		TLM1&TLM2	
40	Effects of ungrounded neutral on system performance	1	06-10-2025		TLM1&TLM2	

41	Methods of neutral grounding	1	08-10-2025		TLM1&TLM2	
42	Solid–resistance &Reactance	1	13-10-2025		TLM1&TLM2	
43	Arcing grounds and grounding Practices.	1	13-10-2025		TLM1&TLM2	
No. of classes required to complete UNIT-IV : 11					No. of classes taken:	

UNIT-V: MICROPROCESSOR BASED RELAYS AND NUMERICAL PROTECTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	**Teaching Learning Methods**	HOD Sign Weekly
44	over current relays	1	15-10-2025		TLM1 &TLM2	
45	impedance relay	1	18-10-2025		TLM1 &TLM2	
46	directional relay	1	20-10-2025		TLM1 &TLM2	
47	reactance relay.	1	20-10-2025		TLM1 &TLM2	
48	numerical relay	1	22-10-2025		TLM1 &TLM2	
49	numerical relaying algorithms	1	25-10-2025		TLM1 &TLM2	
50	Mann Morrison technique	1	27-10-2025		TLM1 &TLM2	
51	Differential equation technique	1	27-10-2025		TLM1 &TLM2	
52	discrete Fourier transform technique	1	29-10-2025		TLM1 &TLM2	
53	numerical over current protection	1	01-11-2025		TLM1 &TLM2	
54	numerical distance protection.	1	03-11-2025		TLM1 &TLM2	
55	Revision	1	05-11-2025		TLM1 &TLM2	
No. of classes required to complete UNIT-V : 12					No. of classes taken:	

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
56	Application of AI to Power system protection	2	10-11-2025		TLM1/ TLM2	CO5	T2,R1,R2	

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.

K.S.L.LAVANYA	K.S.L.LAVANYA	Dr.M.S.Giridhar	Dr.P.Sobha rani
Course Instructor	Course Coordinator	Module coordinatorCoordinator	HOD

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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.G.Nageswara Rao
Course Name & Code : Hybrid Electric Vehicles & 20EE27
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/VII/A **A.Y.:**2025-26
PREREQUISITE: Power Electronics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Understand the concept of electric and hybrid electric vehicles.(Understand-L2)
CO2	Analyze different configuration of hybrid electric vehicles. (Understand-L2)
CO3	Understand the performance of Plug- in hybrid electric vehicles. (Understand-L2)
CO4	Apply the power converters used in hybrid electric vehicles (Apply-L3)
CO5	Analyze different types of batteries and energy storage systems. (Understand-L2)

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

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

TEXTBOOKS:

T1 Ali Emadi, Advanced Electric Drive Vehicles, CRC Press,Ist Edition 2017.

T2 Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press,3rd Edition 2021.

REFERENCE BOOKS:

R1 MehrdadEhsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press,3rd Edition 2019.

R2 James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley,2nd Edition 2017.

R3 H. Partab Modern Electric Traction – Dhanpat Rai& Co, 2017.

R4 Pistooa G., "Power Sources Models, Sustanability, Infrstructure and the market", Elsevier 2008

R5 Mi Chris, Masrur A., and Gao D.W., " Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives" 2nd Edition,2017.

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.	Fundamentals of vehicle,	1	30/6/25		TLM1	
2.	Components of conventional vehicle	1	1/7/25		TLM1	
3.	Drive cycles and drive terrain;	1	2/7/25		TLM1	
4.	Concept of electric vehicle	2	4/7/25		TLM1	
5.	History of hybrid vehicles,	1	7/7/25		TLM2	
6.	Applications of Electric and Hybrid Electric Vehicles,	1	8/7/25		TLM1	
7.	Principle of magnetic levitation,	1	9/7/25		TLM1	
8.	Different Motors suitable for of Electric and Hybrid Electric Vehicles.	2	11/7/25		TLM1	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: HYBRIDIZATION OF AUTOMOBILE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
9.	Architectures of HEVs,	2	14/7/25 15/7/25		TLM1	
10.	Series and parallel HEVs,	2	18/7/25 21/7/25		TLM1	
11.	Complex HEVs.	2	22/7/25 23/7/25		TLM1	
12.	Plug-in hybrid vehicle,	3	25/7/25 28/7/25 29/7/25		TLM2	
13.	Constituents of PHEV,	2	30/7/25 1/8/25		TLM2	
14.	Comparison of HEV and PHEV;	1	4/8/25		TLM1	
15.	Fuel Cell vehicles and its constituents.	2	5/8/25		TLM1	
No. of classes required to complete UNIT-II: 14				**No. of classes taken:**		

UNIT-III: PLUG-IN HYBRID ELECTRIC VEHICLE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	PHEVs and EREVs blended PHEVs,	2	6/8/25 8/8/25		TLM1	
17.	PHEV Architectures,	2	11/8/25 12/8/25		TLM2	
18.	Equivalent electric range of blended PHEVs;	2	13/8/25 18/8/25		TLM1	
19.	Fuel economy of PHEVs,	2	19/8/25 20/8/25		TLM1	

20.	Power management of PHEVs,	1	22/8/25		TLM1	
21.	**Advancement of Electric Vehicle Technologies** **CONTENT BEYOND SYLLABUS**	3	1/9/25 3/9/25 6/9/25		TLM1	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: POWER ELECTRONICS IN HEVS

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.	Rectifiers used in HEVs,	3	15/9/25 16/9/25 17/9/25		TLM1	
23.	Buck converter	3	19/9/25 22/9/25 23/9/25 24/9/25		TLM1	
24.	Voltage source inverter, Current source inverter,	3	26/9/25 29/9/25 1/10/25		TLM1	
25.	Isolated bidirectional DC-DC converter,	2	3/10/25 13/10/25		TLM1	
26.	**Charging Methodologies** **CONTENT BEYOND SYLLABUS**	3	14/10/25 15/10/25 17/10/25		TLM1	
27.	Charging methods	3	20/10/25 22/10/25 24/10/25		TLM2	
No. of classes required to complete UNIT-IV: 17				**No. of classes taken:**		

UNIT-V: BATTERY AND STORAGE 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
28.	Energy Storage Parameters;	3	27/10/25 28/10/25 29/10/25		TLM1	
29.	Lead–Acid Batteries;	2	31/10/25 3/11/25		TLM1	
30.	Wireless Power Transfer Methods **CONTENT BEYOND SYLLABUS**	3	4/11/25 5/11/25 7/11/25		TLM2	
31.	Flywheels - Superconducting Magnetic Storage System;	2	10/11/25 11/11/25		TLM1	
32.	Pumped Hydroelectric Energy Storage; Economic Resource	2	12/11/25 14/11/25		TLM1	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr.G.Nageswara Rao**	**Dr.G.Nageswara Rao**		
Signature				

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr B V N R Siva Kumar
Course Name & Code : Embedded System Design, 20EC31
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., EEE., VII-Sem, A Sec A.Y : 2025-26

PRE-REQUISITE: Microprocessors and Microcontrollers.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on typical embedded system design methodologies, characteristics and design metrics, computational models for describing embedded system behavior, standard single purpose processors, various communication protocols and design technology for implementing embedded system.

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

CO 1	Understand different design methodologies for embedded system design (Understand – L2)
CO 2	Design Control unit and data path using computational models (Apply – L3)
CO 3	Summarize the features of single-purpose processors and interfacing concepts (Understand – L2)
CO 4	Analyze various communication protocols (Analyze – L4)
CO 5	Develop embedded system using IC and Design Technology (Apply – L3)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2		-	-	-	-	-	-	-	-	1	-	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	-	2	
CO3	2	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-
CO 5	3	3	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).

T1 Frank Vahid/Tony Givargis, "Embedded System Design A Unified Hardware/Software Introduction" John Wiley &Sons,Inc.

T2 Raj Kamal, " Embedded Systems Architecture, Programming and Design" Tata Mcgraw Hill, 3rd Edition

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Embedded System 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	Embedded Systems Overview, COs	1	30-06-2025			
2	ES Characterstics, Spec.s	1	01-07-2025			
3	Design Challenge		02-07-2025			
4	Design Metrics	1	05-07-2025			
5	Processor Technology	1	07-07-2025			
6	IC Technology	1	08-07-2025			
7	Design Technology	1	09-07-2025			
8	Trade-offs	1	14-07-2025			
9	Single Purpose Processors (SPP)	1	15-07-2025			
10	RT Level Combinational Logic	1	16-07-2025			
11	RT Level Sequential Logic	1	19-07-2025			
12	Custom Single Purpose Processor	1	21-07-2025			
13	Optimizing Custom Single SPP	1	22-07-2025			
14	Examples	1	23-07-2025			
15	Revision	1	26-07-2025			
No. of classes required to complete UNIT-I: 15				No. of classes taken:		

UNIT-II: State Machine and Concurrent Process Models

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	Models vs Languages	1	28-07-2025			
2	FSMD with data path models	1	29-07-2025			
3	FSMD using state machines	1	30-07-2025			
4	Program State machine model	1	02-08-2025			
5	Discussion on state models	1	04-08-2025			
6	Concurrent Process Model	1	05-08-2025			
7	Concurrent Processes	1	06-08-2025			
8	Communication among processes	1	09-08-2025			
9	Synchronization among processes	1	11-08-2025			
10	Implementation	1	12-08-2025			
11	Comparision	1	13-08-2025			
12	Data flow models	1	18-08-2025			
13	Real-time Systems	1	19-08-2025			
14	Revision	1	20-08-2025			
15	Unit I & 2 Revision	1	23-08-2025			
No. of classes required to complete UNIT-II:15				No. of classes taken:		

UNIT-III: Standard Single-purpose Processors

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to Unit-III	1	15-09-2025			
2	Timers	1	16-09-2025			
3	Counters	1	17-09-2025			
4	Watchdog Timers	1	20-09-2025			
5	UART	1	22-09-2025			
6	LCD Controllers	1	23-09-2025			
7	Stepper Motor Controllers	1	24-09-2025			
8	Analog to digital Converters	1	27-09-2025			
9	Real-Time Clocks	1	29-09-2025			
10	Common memory types	1	30-09-2025			
11	Memory hierarchy and cache	1	06-10-2025			
12	Advanced RAM	1	07-10-2025			
No. of classes required to complete UNIT-III: 12				No. of classes taken:		

UNIT-IV: Interfacing - By Industry Expert

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	Microprocessor Interfacing	1	08-10-2025			
2	I/O Addressing	1	11-10-2025			
3	Interrupts	1	13-10-2025			
4	Direct Memory Access	1	14-10-2025			
5	Arbitration	1	15-10-2025			
6	Multilevel bus architectures	1	18-10-2025			
7	Serial Protocols	1	22-10-2025			
8	Parallel Protocols	1	25-10-2025			
9	Wireless Protocols	1	27-10-2025			
No. of classes required to complete UNIT-IV: 09				No. of classes taken:		

UNIT-V : IC and Design Technology

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to Unit-V	1	28-10-2025			
2	IC Technology: Full-Custom(VLSI) IC	1	29-10-2025			
3	Semi-custom IC Technology	1	01-11-2025			
4	Programmable logic	1	03-11-2025			
5	Devices (PLD) IC technology	1	04-11-2025			
6	Design technology: Automation	1	05-11-2025			
7	Synthesis, Verification	1	08-11-2025			
8	Hardware/Software Co-simulation	1	10-11-2025			
9	Reuse: Intellectual Property cores	1	11-11-2025			
10	Design Process Models	1	12-11-2025			
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

Topics beyond Syllabus:

S.No.	Topics to be covered	No. of	Tentative	Actual	Teaching	HOD

		Classes Required	Date of Completion	Date of Completion	Learning Methods	Sign Weekly
1	Internet of Things (IoT)	1	15-11-2025			
				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 (R14 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	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	**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
(Dr B V N R Siva Kumar)	(Dr B V N R Siva Kumar)	(Dr.P.Lachi Reddy)	(Dr G Srinivasulu)

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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. PHANEENDRA KANAKAMEDALA
Course Name & Code : CYBER SECURITY AND DIGITAL FORENSICS & 201T84
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B.Tech-EEE – A / V SEM
A.Y. : 2025-26

PRE-REQUISITE: Understanding of digital logic, operating system concepts, Computer hardware knowledge.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The Objective of the course is to provide the basic concepts of cybersecurity and digital Forensics which help to protect ourselves from various kinds of cyber-attacks. Digital forensics is a branch of forensics science encompassing the recovery and investigation of material found in digital devices, often in relaxation to computer crime. It enables students to gain experience to do independent study and research

CO1	Understand the implementation of cybercrime. **(Understand - L2)**
CO2	Identify key Tools and Methods used in Cybercrime. **(Remember- L1)**
CO3	Under the Concepts of Cyber Forensics. **(Understand- L2)**
CO4	Apply Cyber Forensics in collection of digital evidence and sources of evidence **(Apply- L3)**
CO5	Analyze the cyber forensics tools for present and future**(Analyze- L4)**

Course Articulation Matrix (Correlation between COs &POs, PSOs):

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

TEXT BOOKS:

1. Dejey, Dr.Murugan, "cyber Forensics", Oxford University Press, India, 2018

2. Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY,2011

REFERENCE BOOKS:

1. Michael Simpson, Kent Blackman and James e. Corley, "Hands on Ethical Hacking and Network Defense", Cengage, 2019
2. Computer Forensics, Computer Crime Investigation by John R.Vacca, Firewall Media, New Delhi
3. Alfred Basta, Nadine Basta, Mary Brown and Ravindra Kumar "Cyber Security and Cyber Laws", Cengage, 2018

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): SECTION A

UNIT-I: Introduction to Cybercrime

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1	Introduction to CSDF	1	30-6-2025		**TLM2**	CO1	
2	Cybercrime definition and origins of the word	1	01-7-2525		**TLM2**	CO1	
3	Cybercrime and Information Security	1	02-7-2025		**TLM2**	CO1	
4	Cybercriminals	1	04-7-2025		**TLM2**	CO1	
5	Classifications of Cybercrime	1	07-7-2025		**TLM2**	CO1	
6	Cyberstalking Cybercafé and Cybercrime	2	08-7-2025 09-7-2025		**TLM2**	CO1	
7	Botnets Security Challenges Posed by Mobile	2	11-7-2025 14-7-2025		**TLM2**	CO1	
8	Attacks on Mobile/Cell Phones Network and Computer Attacks	2	15-7-2025 16-7-2025		**TLM2**	CO1	
9	Unit-I Assignment Test	1	18-7-2025		**TLM2**	CO1	
No. of classes required to complete UNIT-I		12	No. of classes taken:				

UNIT-II: Tools and Methods

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
10	Proxy Servers and Anonymizers	1	21-7-2025		**TLM2**	CO2	
11	Phishing, Password Cracking	2	22-7-2025 23-7-2025		**TLM2**	CO2	
12	Key loggers and Spywares Virus and Worms	2	25-7-2025 28-7-2025		**TLM2**	CO2	
13	Trojan Horses and Backdoors Steganography	2	29-7-2025 30-7-2025		**TLM2**	CO2	
14	Sniffers, Spoofing, session Hijacking Buffer Overflow Identity Theft	2	01-8-2025 04-8-2025		**TLM1**	CO2	
15	Dos and DDos Attacks SQL Injection Port Scanning	2	05-8-2025 06-8-2025		**TLM2**	CO2	
16	Unit-II Assignment Test	1	08-8-2025		**TLM2**	CO2	
No. of classes required to complete UNIT-2		09	No. of classes taken:				

UNIT – III: Cyber Forensics

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
17	Cyber Forensics Definition	1	11-8-2025		**TLM2**	CO3	
18	Disk Forensics	2	12-8-2025 13-8-2025		**TLM**	CO3	
19	Network Forensics	2	18-08-2025 19-08-2025		**TLM2**	CO3	
20	Wireless Forensics	2	20-08-2025 22-08-2025		**TLM2**	CO3	
21	Database Forensics	2	15-09-2025 16-09-2025		**TLM2**	CO3	

22	Malware Forensics	2	17-09-2025 19-09-2025		**TLM2**	CO3	
23	Mobile Forensics	1	22-09-2025		**TLM2**	CO3	
24	Email Forensics	1	23-09-2025		**TLM1**	CO3	
25	Unit-III Assignment Test	1	24-09-2025		**TLM2**	CO3	
No. of classes required to complete UNIT-3		11	No. of classes taken:				

UNIT-IV: Digital Evidence

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
26	Introduction to Digital Evidence and Evidence Collection procedure	2	26-09-2025 29-09-2025		**TLM2**	CO4	
27	Source of Evidence Operating systems and their Boot Processes	2	01-10-2025 03-10-2025		**TLM2**	CO4	
28	File System Windows Registry	2	06-10-2025 07-10-2025		**TLM1**	CO4	
29	Windows Artifacts Browser Artifact	2	08-10-2025 10-10-2025		**TLM2**	CO4	
30	Linux Artifact	1	13-10-2025		**TLM1**	CO4	
31	Digital evidence on the internet	2	14-10-2025 15-10-2025		**TLM2**	CO4	
32	Impediments to collection of Digital Evidence	1	17-10-2025		**TLM1**	CO4	
33	Challenges with Digital Evidence	1	20-10-2025		**TLM2**	CO4	
34	Unit-III Assignment Test	1	22-10-2025		**TLM2**	CO4	
No. of classes required to complete UNIT-4		16	No. of classes taken:				

UNIT-V: Cyber Forensics

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
35	The Present and The Future Forensics Tools	1	24-10-2025		**TLM2**	CO5	
36	Cyber Forensics suite Imaging and Validation Tools	2	25-10-2024 27-10-2024		**TLM2**	CO5	
37	Tools for Integrity Verification and Hashing	1	28-10-2025 29-10-2025		**TLM2**	CO5	
38	Forensics Tools for Data Recovery Encryption/decryption	2	31-10-2025 03-11-2025		**TLM2**	CO5	
39	Forensics tools for Password Recovery Analyzing network	2	04-11-2025 05-11-2025		**TLM1**	CO5	
40	Forensics Tools for Email Analysis	2	07-11-2025 10-11-2025		**TLM2**	CO5	
41	Unit -5 Assignment test.	1	11-11-2025		**TLM2**	CO5	
No. of classes required to complete UNIT-5		8	No. of classes taken:				

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
1.	Using AI/ML to Analyze Cyber Threats	1	12-11-2025		TLM2	
2.	Cloud Security	1	14-11-2025		TLM2	

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:

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+A	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	Pursue a successful career in the area of Information Technology or its allied fields.
PEO 2	Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.
PEO 3	Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.
PEO 4	Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication and team work and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

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

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

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

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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

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

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solution sin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

PO9 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1 Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2 Design, Implement and Evaluate a computer-based system to meet desired needs.

PSO3 Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. K. Phaneendra	Dr. K. Phaneendra	Dr. K. Phaneendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.K.Venkateswara Reddy, Assistant Professor

Course Name & Code	**:** ROBOTICS IN AUTOMATION - 20ME82	**Regulation**: R20
L-T-P Structure	**: 3-0-0**	**Credits:** 03
Program/Sem/Sec	: B.Tech VII Sem (A)	**A.Y.:** 2025-2026

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to impart knowledge about basic mathematics related to industrial robots for their control, design, and application in robotics & automation Industries.

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

CO1	Comprehend the anatomy of robots, end effectors. (**Understanding-L2)**
CO2	Categorize various actuators and sensors employed in industrial robots. **(Understanding-L2)**
CO3	Formulate transformations using DH parameters for kinematics and dynamics of robots. **(Applying-L3)**
CO4	Illustrate the control system and develop the robotic programming. **(Understanding-L2)**
CO5	Outline the robotic applications in present and future industrial scenario. **(Understanding-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	PSO4
CO1	3					2						2		2		
CO2	3	3	2									2		2	2	
CO3	3	3	2									2		2		
CO4	3	2	1				2					2		2		2
CO5	2					3	3					1		2		
	1 - Low					**2 –**Medium						**3 -** High				

TEXTBOOKS:

T1	Mikell P Groover, Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, "Industrial Robotics, Technology programming and Applications", McGraw Hill, 2012.
T2	Saeed B.Niku, Introduction to robotics- analysis ,systems &application, Second Edition, Willy India Private Limited, New Delhi,2011.

REFERENCE BOOKS:

R1	S.R. Deb, "Robotics Technology and flexible automation", Tata McGraw-Hill Education., 2009.
R2	Craig. J. J. "Introduction to Robotics- mechanics and control", Addison- Wesley, 2009.
R3	Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, "Robotics Engineering an Integrated Approach", PHI Learning, 2009.
R4	Fu. K. S., Gonzalez. R. C. & Lee C.S.G., "Robotics control, sensing, vision and intelligence", McGraw Hill Book co, 2007.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - A

UNIT-I: ROBOT ANATOMY & END EFFECTORS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	02-07-2025		TLM1/TLM2	
2.	History of robots	1	03-07-2025		TLM1/TLM2	
3.	Laws of robotics, Classification of robots	1	04-07-2025		TLM1/TLM2	
4.	Present status, and future trends	1	05-07-2025		TLM1/TLM2	
5.	Basic components of robotic system	1	05-07-2025		TLM1/TLM2	
6.	links, joints, types, configurations of robots	1	09-07-2025		TLM1/TLM2	
7.	Degree of freedom, Mechanisms and transmission	1	10-07-2025		TLM1/TLM2	
8.	End effectors	1	11-07-2025		TLM1/TLM2	
9.	Grippers-different methods of gripping	1	12-07-2025		TLM1/TLM2	
10.	Mechanical grippers	1	16-07-2025		TLM1/TLM2	
11.	Magnetic grippers	1	17-07-2025		TLM1/TLM2	
12.	Vacuum grippers	1	17-07-2025		TLM1/TLM2	
13.	Specifications of Robot	1	18-07-2025		TLM1/TLM2	
14.	Quiz-I	1	19-07-2025		TLM1/TLM2	
No. of classes required to complete UNIT-I:				**No. of classes taken:**		

UNIT-II: DRIVE SYSTEMS & SENSORS

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.	Introduction	1	23-07-2025		TLM1/TLM2	
16.	Hydraulic drives	1	24-07-2025		TLM1/TLM2	
17.	Pneumatic drives	1	25-07-2025		TLM1/TLM2	
18.	Electric systems, Advantages, limitations	1	26-07-2025		TLM1/TLM2	
19.	Industrial applications	1	30-07-2025		TLM1/TLM2	
20.	Sensors in robots	1	31-07-2025		TLM1/TLM2	
21.	Touch sensors, tactile sensor	1	01-08-2025		TLM1/TLM2	
22.	Proximity and range sensors	1	01-08-2025		TLM1/TLM2	

23.	Robotic vision sensor	1	02-08-2025		TLM1/TLM2	
24.	Force sensor, Light sensors	1	06-08-2025		TLM1/TLM2	
25.	Pressure sensors, applications	1	06-08-2025		TLM1/TLM2	
26.	Quiz-II	1	07-08-2025		TLM1/TLM2	
No. of classes required to complete UNIT-II:				**No. of classes taken:**		

UNIT-III: KINEMATICS & DYNAMICS OF ROBOTS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Introduction	1	08-08-2025		TLM1/TLM2	
28.	2D, 3D Transformation	1	08-08-2025		TLM1/TLM2	
29.	Rotation, translation, Examples	1	09-08-2025		TLM1/TLM2	
30.	Homogeneous coordinates multiple transformation	1	09-08-2025		TLM1/TLM2	
31.	Matrix representation	1	13-08-2025		TLM1/TLM2	
32.	Homogeneous transformations	1	14-08-2025		TLM1/TLM2	
33.	Inverse of transformations	1	20-08-2025		TLM1/TLM2	
34.	Forward kinematics of robots	1	21-08-2025		TLM1/TLM2	
35.	Inverse kinematics of robots, Problems	1	22-08-2025		TLM1/TLM2	
36.	D-H representation of robots	1	23-08-2025		TLM1/TLM2	
37.	Dynamics of Robots: Introduction	1	17-09-2025		TLM1/TLM2	
38.	Robot Arm dynamics, Significance	1	18-09-2025		TLM1/TLM2	
39.	Force and torque requirements for two degrees of freedom robotic arm	1	19-09-2025		TLM1/TLM2	
40.	Problems	1	20-09-2025		TLM1/TLM2	
41.	Quiz-III	1	24-09-2025		TLM1/TLM2	
No. of classes required to complete UNIT-III:				**No. of classes taken:**		

UNIT-IV: TRAJECTORY PLANNING AND ROBOT CONTROL

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.	Introduction	1	25-09-2025		TLM1/TLM2	
43.	Basics of Trajectory Planning	1	26-09-2025		TLM1/TLM2	
44.	Point to point control	1	27-09-2025		TLM1/TLM2	
45.	Continuous path control	1	27-09-2025		TLM1/TLM2	
46.	Interpolations	1	03-10-2025		TLM1/TLM2	
47.	Control system for robot joint	1	04-10-2025		TLM1/TLM2	
48.	Control actions	1	08-10-2025		TLM1/TLM2	
49.	Feedback devices	1	09-10-2025		TLM1/TLM2	
50.	Adaptive control	1	09-10-2025		TLM1/TLM2	
51.	Introduction to Robot Programming	1	10-10-2025		TLM1/TLM2	
52.	online programming	1	11-10-2025		TLM1/TLM2	
53.	off-line programming	1	15-10-2025		TLM1/TLM2	

54.	programming examples	1	16-10-2025		TLM1/TLM2	
55.	programming examples	1	17-10-2025		TLM1/TLM2	
56.	programming examples	1	18-10-2025		TLM1/TLM2	
No. of classes required to complete UNIT-IV:				**No. of classes taken:**		

UNIT-V: ROBOT APPLICATIONS, AUTOMATION AND INDUSTRY 4.0

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
57.	Introduction	1	22-10-2025		TLM1/TLM2	
58.	Robot Applications	1	23-10-2025		TLM1/TLM2	
59.	Material handling	1	24-10-2025		TLM1/TLM2	
60.	Machine loading and unloading	1	25-10-2025		TLM1/TLM2	
61.	Assembly, Inspection, Welding	1	25-10-2025		TLM1/TLM2	
62.	Spray painting	1	29-10-2025		TLM1/TLM2	
63.	Applications in unmanned systems	1	30-10-2025		TLM1/TLM2	
64.	Defense applications	1	31-10-2025		TLM1/TLM2	
65.	Medical, industries	1	01-11-2025		TLM1/TLM2	
66.	Introduction to Industry 4.0	1	05-11-2025		TLM1/TLM2	
67.	Robotics and Automation for Industry 4.0	1	06-11-2025		TLM1/TLM2	
68.	Robot safety	1	07-11-2025		TLM1/TLM2	
69.	Social robotics	1	08-11-2025		TLM1/TLM2	
No. of classes required to complete UNIT-V:				**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
70.	Multi robot coordination	1	12-11-2025		TLM1/TLM2	
71.	Artificial intelligence	1	13-11-2025		TLM1/TLM2	
72.	Cloud robotics	1	14-11-2025		TLM1/TLM2	
73.	Human–robot interaction	1	15-11-2025		TLM1/TLM2	

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

PART-C

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.
PEO 2	Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.
PEO 3	Work effectively as individuals and as team members in multidisciplinary projects.
PEO 4	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, andanalyse 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**	**Head of the Department**
Signature				
Name of the Faculty	**Mr.K.Venkateswara Reddy**	**Mr.K.Venkateswara Reddy**	**Mr.J.Subba Reddy**	**Dr.M.B.S.Sreekara Reddy**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. S. Uma Maheswara Reddy, Assistant Professor

Course Name & Code	**:** MANAGEMENT SCIENCE FOR ENGINEERS & 20HS02	**Regulation**: R20
L-T-P Structure	**: 3-0-0**	**Credits:** 03
Program/Sem/Sec	: B.Tech, EEE VII Sem (A)	**A.Y.:** 2025-2026

PREREQUISITE: Professional ethics and human values

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

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

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

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

1 - Low **2 –**Medium **3 -** High

TEXTBOOKS:

T1 Dr. A.R.Aryasri, Management Science, TMH, 10th edition, 2012

REFERENCE BOOKS:

R1 Koontz & weihrich – Essentials of management, TMH, 10th edition, 2015

R2 Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004

R3 O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT & CPM

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - A

UNIT-I: INTRODUCTION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Outcomes, Introduction to Subject	1	30-06-2025		**TLM1/TLM2**	
2.	Management-Nature and Importance	1	02-07-2025		**TLM1/TLM2**	
3.	Management functions	1	04-07-2025		**TLM1/TLM2**	
4.	Contributions of Taylor	1	05-07-2025		**TLM1/TLM2**	
5.	Fayal's Principles of management	1	07-07-2025		**TLM1/TLM2**	
6.	Contribution of Elton Mayo	1	09-07-2025		**TLM1/TLM2**	
7.	Maslow's & Herzberg's Two Factor Theory	1	11-07-2025		**TLM1/TLM2**	
8.	Douglas McGregor	1	12-07-2025		**TLM1/TLM2**	
9.	Basic Concepts of Organization-Authority	1	14-07-2025		**TLM1/TLM2**	
10.	Responsibility Delegation of Authority	1	16-07-2025		**TLM1/TLM2**	
11.	Departmentation and Decentralization	1	18-07-2025		**TLM1/TLM2**	
12.	Span of Control	1	19-07-2025		**TLM1/TLM2**	
13.	Line, Line and Staff organizations	1	21-07-2025		**TLM1/TLM2**	
14.	Functional, Committee	1	23-07-2025		**TLM1/TLM2**	
15.	Matrix Organizations	1	25-07-2025		**TLM1/TLM2**	
16.	Quiz-I	1	28-07-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-I: 16				**No. of classes taken:**		

UNIT-II: OPERATIONS MANAGEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Operations Management: Introduction	1	30-07-2025		**TLM1/TLM2**	
18.	Plant location	1	01-08-2025		**TLM1/TLM2**	
19.	Factors influencing location	1	02-08-2025		**TLM1/TLM2**	
20.	Principles	1	04-08-2025		**TLM1/TLM2**	

21.	Types of plant layouts	1	05-08-2025		**TLM1/TLM2**	
22.	Methods of production (job, batchproduction)	1	08-08-2025		**TLM1/TLM2**	
23.	Mass production	1	09-08-2025		**TLM1/TLM2**	
24.	Work study	1	11-08-2025		**TLM1/TLM2**	
25.	method study	1	13-08-2025		**TLM1/TLM2**	
26.	Work measurement		18-08-2025		**TLM1/TLM2**	
27.	Quiz-II	1	20-08-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: STATISTICAL QUALITY CONTROL, MATERIALS MANAGEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Statistical quality control Introduction	1	22-08-2025		**TLM1/TLM2**	
29.	Concept of Quality & Quality Control	1	23-08-2025		**TLM1/TLM2**	
30.	Functions, Meaning of SQC	1	25-08-2025		**TLM1/TLM2**	
31.	Variables and attributes, X-chart, R Chart	1	29-08-2025		**TLM1/TLM2**	
32.	C Chart and P Chart	1	30-08-2025		**TLM1/TLM2**	
33.	Acceptance sampling and Sampling plans	1	01-09-2025		**TLM1/TLM2**	
34.	Deming's contribution to quality	1	03-09-2025		**TLM1/TLM2**	
35.	Materials management	1	05-09-2025		**TLM1/TLM2**	
36.	Meaning and objectives	1	06-09-2025		**TLM1/TLM2**	
37.	Inventory control	1	15-09-2025		**TLM1/TLM2**	
38.	Need for inventory control	1	17-09-2025		**TLM1/TLM2**	
39.	Purchase procedure	1	19-09-2025		**TLM1/TLM2**	
40.	Store records	1	20-09-2025		**TLM1/TLM2**	
41.	EOQ	1	22-09-2025		**TLM1/TLM2**	
42.	Problems	1	24-09-2025		**TLM1/TLM2**	
43.	ABC analysis	1	26-09-2025		**TLM1/TLM2**	
44.	Stock levels	1	27-09-2025		**TLM1/TLM2**	
45.	Problems	1	29-09-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-III: 18				**No. of classes taken:**		

UNIT-IV: HUMAN RESOURCE MANAGEMENT (HRM)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Concepts of HRM	1	01-10-2025		**TLM1/TLM2**	
47.	Basic functions of HR manager	1	03-10-2025		**TLM1/TLM2**	
48.	Manpower planning	1	04-10-2025		**TLM1/TLM2**	
49.	Recruitment	1	06-10-2025		**TLM1/TLM2**	
50.	Selection	1	08-10-2025		**TLM1/TLM2**	
51.	Training and development	1	10-10-2025		**TLM1/TLM2**	
52.	Placement	1	11-10-2025		**TLM1/TLM2**	
53.	Wage and salary administration	1	13-10-2025		**TLM1/TLM2**	
54.	Promotion	1	15-10-2025		**TLM1/TLM2**	
55.	Transfers Separation	1	17-10-2025		**TLM1/TLM2**	
56.	Performance appraisal	1	18-10-2025		**TLM1/TLM2**	
57.	Job evaluation and merit rating	1	20-10-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: PROJECT MANAGEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
58.	Introduction : project management	1	22-10-2025		**TLM1/TLM2**	
59.	Early techniques in project management	1	24-10-2025		**TLM1/TLM2**	
60.	Network analysis	1	25-10-2025		**TLM1/TLM2**	
61.	Programme Evaluation and Review Technique (PERT)	1	27-10-2025		**TLM1/TLM2**	
62.	Problems	1	29-10-2025		**TLM1/TLM2**	
63.	Critical path method (CPM)	1	31-10-2025		**TLM1/TLM2**	
64.	Problems	1	01-11-2025		**TLM1/TLM2**	
65.	Identifying critical path	1	03-11-2025		**TLM1/TLM2**	
66.	Problems	1	05-11-2025		**TLM1/TLM2**	
67.	Problems	1	07-11-2025		**TLM1/TLM2**	
68.	Probability of completing project within given time	1	08-11-2025		**TLM1/TLM2**	
69.	Project cost analysis	1	10-11-2025		**TLM1/TLM2**	
70.	Problems	1	12-11-2025		**TLM1/TLM2**	
71.	project crashing	1	14-11-2025		**TLM1/TLM2**	
72.	Simple problems	1	15-11-2025		**TLM1/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 (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To 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.

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 analyse 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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	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	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr.S.Uma Maheswara Reddy	Mr. A.Nageswara Rao	Mr.J.Subba Reddy	Dr.M.B.S.Sreekara Reddy
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

Name of Course Instructor: Dr. Y. RAGHUVAMSI & Mrs. K. S. L. LAVANYA
Course Name & Code : SKILL ORIENTED COURSE-II (IoT) & 20EES4
L-T-P Structure : **1-0-2** **Credits: 2**
Program/Sem/Sec : B.Tech/VII/A **A.Y.:** 2025-26

Course Educational Objective (CEO): The objective of this course is to explore the interconnection and integration of the physical world and the cyberspace. Understand the design concepts in setting up IOT Devices. Study about the setup, configuration and installation of equipment for IOT.

Course Outcomes (COs): At the end of the course, the student will be able to:
CO1: Control different electrical and electronics applications using Arduino (**Apply-L3**)
CO2: Control different electrical and electronics applications using Raspberry Pi (**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	PSO3	PSO4
CO1	2	_	_	_	2	_	_	_	_	_	_	3	2	2	3	3
CO2	2	_	_	_	2	_	_	_	_	_	_	3	2	2	3	3

List of Experiments:

1. Interfacing LED, Push button using Arduino.
2. Interfacing DHT11-Temperature and humidity sensor using Arduino.
3. Interfacing Ultrasonic sensor using Arduino.
4. Interfacing PIR sensor using Arduino.
5. Design of Traffic Light Simulator using Arduino.
6. Interfacing RFID using Arduino/Raspberry Pi
7. Interfacing of LED, Push button with Raspberry Pi (Python Program).
8. Design of Motion Sensor Alarm using PIR Sensor.
9. Interfacing DHT11-Temperature and Humidity Sensor with Raspberry Pi.
10. Implementation of DC Motor and Stepper Motor Control with Raspberry Pi.

Project based experiments:

11. Raspberry Pi based Smart Phone Controlled Home Automation.
12. Smart Traffic light Controller.
13. Smart Health Monitoring System.

COURSE DELIVERY PLAN (LESSON PLAN):

SECTION-A SCHEDULE

DAY: Thursday

Batches: 20761A0252, 21761A0245, 22761A0201- 22761A0214, 22761A0216- 22761A0255, 23765A0201-23765A0202, 23765A0204-23765A0211, 23765A0213-23765A0215

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	18/09	25/09	09/10	16/10	23/10	30/10	06/11	13/11
Actual date																
20761A0252, 21761A0245, 22761A0201-22761A0214, 22761A0216-22761A0255, 23765A0201-23765A0202, 23765A0204-23765A0211, 23765A0213-23765A0215	Demo	Demo	1	2	3	4	5	6	7	8	9	10	REPETITION	REPETITION	REPETITION	INTERNAL TEST
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				
	Demo	Demo	1	2	3	4	5	6	7	8	9	10				

ACADEMIC CALENDAR:

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

PROGRAMME 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
Dr. Y. Raghuvamsi Mrs. K. S. L. Lavanya	Dr. Y. Raghuvamsi	Dr. G. Nageswara Rao	Dr. P. Sobha Rani

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L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
hodcse@lbrce.ac.in, cseoffice@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.Ch. Srinivasa Rao
CourseName&Code Introduction to Software Engineering &20CSM6
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem : B.Tech,VII-Sem(Minors) **A.Y. :** 2025-26

PREREQUISITE: Object Oriented Programming.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to provide an understanding of different s/w process models and how to choose one among them by gathering the requirements from a client and specifying them. Using those requirements in the design of the software architecture based on the choices with the help of modules and interfaces. To enable s/w development, by using different testing techniques like unit, integration and functional testing, quality assurance can be achieved.

CO1	Understand the fundamentals of software engineering concepts and software Process models. **(Understand-L2)**
CO2	Apply the requirement elicitation techniques for preparing SRS and design engineering. **(Apply-L3)**
CO3	Understanding the basic building blocks of UML, Class, and object diagrams. **(Understand-L2)**
CO4	Apply behavioral models for real world applications. **(Apply-L3)**
CO5	Demonstrate different software testing approaches for testing real time applications. **(Understand-L2)**

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

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

TEXTBOOKS:

T1 Roger S. Pressman, "Software engineering- A practitioner 's Approach", TMH InternationalEdition, 6th edition, 2005.

T2 Grady Booch, James Rum baugh, Ivar Jacobson, "The Unified Modeling Language User Guide", PEARSON,4thImpression,2012.

REFERENCE BOOKS:

R1 Software Engineering- Concepts and practices: Ugrasen Suman, Cengage learning

R2 Object- oriented analysis and design using UML", Mahesh P. Matha, PHI

R3 Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI **R4 .**

https://onlinecourses.nptel.ac.in/noc20_cs68 **[1,2,3,4,5]**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Software and software Engineering

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.	CEOs and COs discussion	1	04/07/2025		TLM2	
2.	The evolving role of Software	1	04/07/2025		TLM2	
3.	Characteristics of Software	1	05/07/2025		TLM2	
4.	Importance of software Engineering	1	05/07/2025		TLM2	
5.	Changing nature of software	1	11/07/2025		TLM2	
6.	Legacy Software	1	11/07/2025		TLM2	
7.	Software Myths	1	12/07/2025		TLM2	
8.	Software process model: layered. technology	1	12/07/2025		TLM2	
9.	Process framework The process and product	1	18/07/2025		TLM2	
10.	Waterfall model	1	18/07/2025		TLM2	
11.	Incremental model	1	19/07/2025		TLM2	
12.	Spiral and V model	1	19/07/2025		TLM2	
13.	Component based s/w development	1	25/07/2025		TLM2	
14.	Unified Process model	1	25/07/2025		TLM2	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Requirements Analysis and Software 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
15.	Requirements gathering	1	01/08/2025		TLM2	
16.	Requirement analysis	1	01/08/2025		TLM2	
17.	Software requirement specification	1	02/08/2025		TLM2	
18.	SRS document case study	1	02/08/2025		TLM2	
19.	Overview of design process	1	08/08/2025		TLM2	
20.	Design concepts	1	08/08/2025		TLM2	
21.	Architectural concepts	1	09/08/2025		TLM2	
22.	Examples	1	09/08/2025		TLM2	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

UNIT-III: Design using UML

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Building Blocks of UML	1	22/08/2025		TLM2	
25.	Defining things	1	22/08/2025		TLM2	
26.	Defining relationships and diagrams	1	23/08/2025		TLM2	
27.	Common Mechanism in UML	1	23/08/2025		TLM2	
28.	Class diagrams	1	19/09/2025		TLM2	
29.	Examples	1	19/09/2025		TLM2	
30.	Object diagrams and examples	1	20/09/2025		TLM2	
31.	Revision	1	20/09/2025		TLM2	
No. of classes required to complete UNIT-III: 08				**No. of classes taken:**		

UNIT-IV: Behavioral Modeling

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.	Interactions	1	26/09/2025		TLM2	
33.	Interaction diagrams	1	26/09/2025		TLM2	
34.	Use-cases	1	27/09/2025		TLM2	
35.	Use-case diagrams	1	27/09/2025		TLM2	
36.	Activity diagrams	1	03/10/2025		TLM2	
37.	Events and signals, state machines	1	03/10/2025		TLM2	
38.	processes and Threads, time, and space	1	04/10/2025		TLM2	
39.	State chart diagrams	1	04/10/2025		TLM2	
40.	Component diagrams	1	10/10/2025		TLM2	
41.	Deployment diagrams	1	10/10/2025		TLM2	
42.	Examples	1	11/10/2025		TLM2	
43.	Revision	1	11/10/2025		TLM2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Testing Techniques

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Software testing fundamentals	1	17/10/2025		TLM2	
45.	Unit testing	1	17/10/2025		TLM2	
46.	Integration testing	2	18/10/2025		TLM2	
47.	Blackbox testing	1	24/10/2025		TLM2	
48.	Whitebox testing	1	24/10/2025		TLM2	
49.	Debugging	2	25/10/2025		TLM2	
50.	System testing	2	31/10/2025		TLM2	
51.	Examples	2	01/11/2025		TLM2	
52.	Revision	2	07/11/2025		TLM2	
No. of classes required to complete UNIT-V: 14				**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
50	Case study version control	2	08/11/2025		TLM6	
51	Case study test case preparation	2	14/11/2025		TLM6	

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Ch. Srinivasa Rao**	**Ch. Srinivasa Rao**	**Dr.D.V. Subbaiah**	**Dr. Nagarjuna Reddy**
Signature				

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Department of Electrical and Electronics Engineering
Accredited by NBA under Tier-I

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.M.S.Giridhar
Course Name & Code : 20EE25: Renewable and Distributed Generation Technologies
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech VII sem B/S **A.Y.:** 2025-26

PREREQUISITE: Fundamentals of Electrical Engineering, Power system-I

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the students to acquire knowledge on solar radiation data, Maximum power point techniques in solar PV and Wind energy conversion systems. It also introduces the concepts of impact of distributed generation on transmission and distribution system.

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

CO1	Understand fundamentals of solar energy systems
CO2	Understand wind energy conversion systems
CO3	Analyze the need of distributed generation in grid integration

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

TEXTBOOKS:

T1	John Twidell and Tony Weir, "Renewable Energy Resources", Taylor and Francis -3rd Edition, 2015.
T2	H. Lee Willis, Walter G. Scott , "Distributed Power Generation – Planning and Evaluation", Marcel Decker Press, 2000

REFERENCE BOOKS:

R1	John Andrews and Nick Jelly, "Energy Science: Principles, Technologies and Impacts", Oxford University Press,4th Edition,2022
R2	S. P. Sukhatme and J. K. Nayak, "Solar Energy: Principles of Thermal Collection and Storage",4th Edition, TMH, New Delhi,2017
R3	Godfrey Boyle, "Renewable Energy", oxford university press, 3rd edition, 2012
R4	Ahmed and Zobaa, Ramesh C Bansal, "Handbook of renewable technology", World scientific, Singapore,2021
R5	Ramesh & Kumar, "Renewable Energy Technologies", Narosa Publications.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Fundamentals of Energy Systems, Solar Energy and Solar Thermal 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, COs	1	30-06-2025		TLM1	
2.	Energy conservation principle, Energy scenario (world and India)	1	01-07-2025		TLM2	
3.	Various forms of renewable energy	1	02-07-2025		TLM2	
4.	Solar radiation**:** Outside earth's atmosphere ,Earth surface	1	04-07-2025		TLM2	
5.	Analysis of solar radiation data , Geometry	2	07-07-2025 08-07-2025		TLM2	
6.	Radiation on tilted surfaces	1	09-07-2025		TLM2	
7.	Liquid flat plate collectors**:** Performance analysis	1	11-07-2025		TLM2	
8.	Transmissivity- Absorptivity product	1	14-07-2025		TLM1	
9.	collector efficiency factor , Collector heat removal factor	1	15-07-2025		TLM2	
10.	Introduction to solar air heaters	1	16-07-2025		TLM1	
11.	Concentrating collectors	1	18-07-2025		TLM2	
12.	solar pond, solar thermal plants	2	21-07-2025 22-07-2025		TLM2	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Solar Photovoltaic 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
13.	Solar photovoltaic cell, module, array	1	23-07-2025		TLM1	
14.	construction , Efficiency of solar cells	1	25-07-2025		TLM2	
15.	Developing technologies	1	28-07-2025		TLM2	
16.	Cell I-V characteristics , Equivalent circuit of solar cell	2	29-07-2025 30-07-2025		TLM1	
17.	Series resistance ,Shunt resistance	1	01-08-2025		TLM2	
18.	Applications and systems	1	04-08-2025		TLM2	
19.	Balance of system components	1	05-08-2025		TLM2	
20.	System Design**:** storage sizing , PV system sizing	1	06-08-2025		TLM1	
21.	Maximum power point techniques**:** Perturb and observe (P&O) technique	1	08-08-2025		TLM1	
22.	Incremental conduction Technique	1	11-08-2025		TLM2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: Wind Energy

S. No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	HOD Sign

		Required	Completion	Completion	Methods	Weekly
23.	Sources of wind energy	1	12-08-2025		TLM1	
24.	Wind patterns	1	13-08-2025		TLM2	
25.	Types of turbines –Horizontal axis and vertical axis machines	2	18-08-2025 19-08-2025		TLM2	
26.	Kinetic energy of wind – Betz coefficient	2	20-08-2025 22-08-2025		TLM2	
27.	Tip–speed ratio , Efficiency	1	15-09-2025		TLM1	
28.	Power output of wind turbine	1	16-09-2025		TLM2	
29.	Selection of generator (synchronous, induction)	1	17-09-2025		TLM1	
30.	Maximum power point tracking	1	19-09-2025		TLM2	
31.	Wind farms – Power generation for utility grids.	2	22-09-2025 23-09-2025		TLM2	
32.	Review of UNIT	1	24-09-2025		TLM2	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Need for Distributed Generation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Renewable sources in distributed generation	1	26-09-2025		TLM1	
34.	Current scenario in distributed generation	2	29-09-2025 01-10-2025		TLM2	
35.	Planning of DGs	2	03-10-2025 06-10-2025		TLM2	
36.	Siting and sizing of DGs	1	07-10-2025		TLM1	
37.	Optimal placement of DG sources in distribution systems	2	08-10-2025 10-10-2025		TLM2	
No. of classes required to complete UNIT-IV: 8				**No. of classes taken:**		

UNIT-V: Grid Integration of DGs and Technical Impacts of DGs

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38.	Different types of interfaces	3	13-10-2025 14-10-2025 15-10-2025		TLM1	
39.	Inverter based DGs	2	17-10-2025 20-10-2025		TLM2	
40.	rotating machine-based interfaces	1	22-10-2025		TLM2	
41.	Aggregation of multiple DG units	2	24-10-2025 27-10-2025		TLM1	
42.	Energy storage elements – Batteries, ultra capacitors, flywheels	3	28-10-2025 29-10-2025 31-10-2025		TLM2	
43.	DG Impact on - Transmission and Distribution systems	2	03-11-2025 04-11-2025		TLM1	
44.	DG Impact on De-regulation	2	05-11-2025 07-11-2025		TLM2	
45.	Impact of DGs upon protective relaying	1	10-11-2025		TLM2	
46.	Impact of DGs upon transient and dynamic stability of existing distribution systems.	2	11-11-2025 14-11-2025		TLM2	
No. of classes required to complete UNIT-V: 18				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr.M.S.Giridhar	Dr.M.S.Giridhar	Dr.P.Sobha Rani
Signature			

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.G.Nageswara Rao
Course Name & Code **:** Hybrid Electric Vehicles & 20EE27
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/VII/B **A.Y.:**2025-26
PREREQUISITE: Power Electronics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

CO1	Understand the concept of electric and hybrid electric vehicles.(Understand-L2)
CO2	Analyze different configuration of hybrid electric vehicles. (Understand-L2)
CO3	Understand the performance of Plug- in hybrid electric vehicles. (Understand-L2)
CO4	Apply the power converters used in hybrid electric vehicles (Apply-L3)
CO5	Analyze different types of batteries and energy storage systems. (Understand-L2)

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

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

TEXTBOOKS:

T1 Ali Emadi, Advanced Electric Drive Vehicles, CRC Press,Ist Edition 2017.

T2 Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press,3rd Edition 2021.

REFERENCE BOOKS:

R1 MehrdadEhsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press,3rd Edition 2019.

R2 James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley,2nd Edition 2017.

R3 H. Partab Modern Electric Traction – Dhanpat Rai& Co, 2017.

R4 Pistooa G., "Power Sources Models, Sustanability, Infrstructure and the market", Elsevier 2008

R5 Mi Chris, Masrur A., and Gao D.W., " Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives" 2nd Edition,2017.

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.	Fundamentals of vehicle,	1	30/6/25		TLM1	
2.	Components of conventional vehicle	1	1/7/25		TLM1	
3.	Drive cycles and drive terrain;	1	2/7/25		TLM1	
4.	Concept of electric vehicle	2	4/7/25		TLM1	
5.	History of hybrid vehicles,	1	7/7/25		TLM2	
6.	Applications of Electric and Hybrid Electric Vehicles,	1	8/7/25		TLM1	
7.	Principle of magnetic levitation,	1	9/7/25		TLM1	
8.	Different Motors suitable for of Electric and Hybrid Electric Vehicles.	2	11/7/25		TLM1	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: HYBRIDIZATION OF AUTOMOBILE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
9.	Architectures of HEVs,	2	14/7/25 15/7/25		TLM1	
10.	Series and parallel HEVs,	2	18/7/25 21/7/25		TLM1	
11.	Complex HEVs.	2	22/7/25 23/7/25		TLM1	
12.	Plug-in hybrid vehicle,	3	25/7/25 28/7/25 29/7/25		TLM2	
13.	Constituents of PHEV,	2	30/7/25 1/8/25		TLM2	
14.	Comparison of HEV and PHEV;	1	4/8/25		TLM1	
15.	Fuel Cell vehicles and its constituents.	2	5/8/25		TLM1	
No. of classes required to complete UNIT-II: 14				**No. of classes taken:**		

UNIT-III: PLUG-IN HYBRID ELECTRIC VEHICLE

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	PHEVs and EREVs blended PHEVs,	2	6/8/25 8/8/25		TLM1	
17.	PHEV Architectures,	2	11/8/25 12/8/25		TLM2	
18.	Equivalent electric range of blended PHEVs;	2	13/8/25 18/8/25		TLM1	
19.	Fuel economy of PHEVs,	2	19/8/25 20/8/25		TLM1	

20.	Power management of PHEVs,	1	22/8/25		TLM1	
21.	Vehicle to grid technology, PHEV battery charging. **CONTENT BEYOND SYLLABUS**	3	1/9/25 3/9/25 6/9/25		TLM1	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: POWER ELECTRONICS IN HEVS

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.	Rectifiers used in HEVs,	3	15/9/25 16/9/25 17/9/25		TLM1	
23.	Buck converter	3	19/9/25 22/9/25 23/9/25 24/9/25		TLM1	
24.	Voltage source inverter, Current source inverter,	3	26/9/25 29/9/25 1/10/25		TLM1	
25.	Isolated bidirectional DC-DC converter,	2	3/10/25 13/10/25		TLM1	
26.	PWM rectifier **CONTENT BEYOND SYLLABUS**	3	14/10/25 15/10/25 17/10/25		TLM1	
27.	Charging methods	3	20/10/25 22/10/25 24/10/25		TLM2	
No. of classes required to complete UNIT-IV: 17				**No. of classes taken:**		

UNIT-V: BATTERY AND STORAGE 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
28.	Energy Storage Parameters;	3	27/10/25 28/10/25 29/10/25		TLM1	
29.	Lead–Acid Batteries;	2	31/10/25 3/11/25		TLM1	
30.	Lithium-ion batteries-Ultra capacitors **CONTENT BEYOND SYLLABUS**	3	4/11/25 5/11/25 7/11/25		TLM2	
31.	Flywheels - Superconducting Magnetic Storage System;	2	10/11/25 11/11/25		TLM1	
32.	Pumped Hydroelectric Energy Storage; Economic Resource	2	12/11/25 14/11/25		TLM1	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr.G.Nageswara Rao**	**Dr.G.Nageswara Rao**		
Signature				

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. T.Anil Raju
Course Name & Code : Analog and Digital Signal Processing & 20EE30
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., EEE., VII-Sem., Sections- B A.Y :2025-26

PRE-REQUISITES: Differential Equations and liner algebra, Transformation techniques

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the student to Understand Discrete Fourier Transform and its computation. It also deals with Discrete Fourier Series, Fast Fourier Series, Z-transforms and concepts of filter design

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

CO 1	Classify different types of signals and systems
CO 2	Analyze DFT and FFT
CO 3	Design digital filters using different techniques

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		2	1	1		1		1	1		2			3	1
CO2	2		3	1	1		1		1	1		2			3	1
CO3		2	3		1										3	1
CO4		2	3		1										3	1

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

TEXT BOOKS:

T1 John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms, and Applications", Pearson Prentice Hall, illustrated 4th edition, 2007.
T2 A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", Pearson education, 3rd edition, 2013.

REFERENCE BOOKS:

R1 Andreas Antoniou "Digital Signal Processing", TATA McGraw Hill edition, 2006.
R2 MH Hayes, Schaum's, "Digital Signal Processing: Outlines", TATA Mc-Graw Hill professional, 1999.
R3 C. Britton, Rorabaugh, "DSP Primer", Tata McGraw Hill edition, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: CLASSIFICATION OF SIGNALS AND 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 and COs	1	30-06-2025		TLM1	
2.	Signals, Systems, and DSP	1	03-07-2025		TLM1	
3.	Continuous time signals (CT signals)	1	03-07-2025		TLM2	
4.	Discrete time signals (DT signals)	1	05-07-2025		TLM2	
5.	Classification of CT signals	1	07-07-2025		TLM2	
6.	Classification of DT signals	1	10-07-2025		TLM2	
7.	Static and Dynamic, Linear and Non-Linear	1	10-07-2025		TLM2	
8.	Time-variant & Time-invariant	1	12-07-2025		TLM2	
9.	Causal & Noncausal	1	14-07-2025		TLM2	
10.	Stable & Unstable systems	1	17-07-2025		TLM2	
11.	Linear Constant Coefficient Difference Equations	1	17-07-2025		TLM2	
12.	Problems	1	19-07-2025		TLM2	
13.	Sampling Theorem	1	21-07-2025		TLM1	
14.	Convolution theorem	1	24-07-2025		TLM1	
No. of classes required to complete UNIT-I:14				No. of classes taken:		

UNIT-II: DISCRETE FOURIER SERIES & FAST FOURIER TRANSFORM

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Properties of discrete Fourier series	1	24-07-2025		TLM1	
2.	DFS representation of periodic sequences	1	28-07-2025		TLM1	
3.	Discrete Fourier transforms	1	31-07-2025		TLM2	
4.	Discrete Fourier transforms	1	31-07-2025		TLM2	
5.	Properties of DFT	1	02-08-2025		TLM2	
6.	Linear convolution of sequences using DFT	1	04-08-2025		TLM2	
7.	Relation between Z-transform and DFS	1	07-08-2025		TLM2	
8.	Fast Fourier transforms (FFT)	1	07-08-2025		TLM2	
9.	Radix-2 decimation in time	1	09-08-2025		TLM2	
10.	Radix-2 decimation in frequency	1	11-08-2025		TLM2	
11.	FFT Algorithm	1	14-08-2025		TLM1	
12.	IFFT Algorithm	1	14-08-2025		TLM1	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: REALIZATION OF DIGITAL FILTERS

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.	Realizations of Digital Filters	1	18-08-2025		TLM1	
2.	Z – transforms and Applications &Solution of difference equations of digital filters	1	21-08-2025		TLM2	
3.	Block diagram representation of linear constant-coefficient difference equations	1	21-08-2025		TLM2	
4.	Basic structures of IIR systems	1	23-08-2025		TLM2	
	I Mid Exams(08-09-2025 to 13-08-2025)					
5.	Transposed forms	1	15-09-2025		TLM2	
6.	Basic structures of FIR systems	1	18-09-2025		TLM2	

7.	Design of FIR systems Direct From-I	1	18-09-2025		TLM2	
8.	Design of FIR systems Direct From-I	1	20-09-2025		TLM2	
9.	Design of FIR systems Direct From-II	1	22-09-2025		TLM2	
10.	Design of FIR systems Direct From-II	1	25-09-2025		TLM2	
11.	Design of FIR systems Cascade	1	25-09-2025		TLM1	
No. of classes required to complete UNIT-III:12				No. of classes taken:		

UNIT-IV: IIR DIGITAL FILTERS

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.	Analog filter approximations	1	27-09-2025		TLM1	
2.	Butterworth filters	1	29-09-2025		TLM2	
3.	Chebyshev filters	1	04-10-2025		TLM2	
4.	Design of IIR Digital filters from analog filters	1	06-10-2025		TLM2	
5.	problems	1	09-10-2025		TLM2	
6.	Design of IIR Digital filters from analog filters	1	09-10-2025		TLM2	
7.	Problems	1	11-10-2025		TLM2	
8.	Design Examples: Analog-Digital transformations	1	13-10-2025		TLM2	
9.	Problems	1	16-10-2025		TLM2	
10.	Design Examples: Analog-Digital transformations	1	16-10-2025		TLM2	
11.	Design of IIR systems Direct From-I	1	18-10-2025		TLM2	
12.	Design of IIR systems Direct From-I	1	20-10-2025		TLM2	
13.	Design of IIR systems Direct From-II	1	23-10-2025		TLM2	
14.	Design of IIR systems Direct From-II	1	23-10-2025		TLM2	
No. of classes required to complete UNIT-IV:14				No. of classes taken:		

UNIT-V: FIR DIGITAL FILTERS

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.	Characteristics of FIR Digital Filters	1	25-10-2025		TLM1	
2.	Frequency response	1	27-10-2025		TLM2	
3.	Design of FIR Digital Filters using Window Techniques	1	29-10-2025		TLM2	
4.	Design of FIR Digital Filters using Window Techniques	1	29-10-2025		TLM2	
5.	Design of FIR Digital Filters using Window Techniques	1	01-11-2025		TLM2	
6.	Design of FIR Digital Filters using Window Techniques	1	03-11-2025		TLM2	
7.	Frequency Sampling technique	1	06-11-2025		TLM2	
8.	Frequency Sampling technique	1	06-11-2025		TLM2	
9.	Comparison of IIR & FIR filters	1	10-11-2025		TLM2	
10.	Problems	1	13-11-2025		TLM1	
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	HOD Sign
1.	Adaptive Digital Signal Processing	1	13-11-2025		TLM2	
2.	Noise Cancellation	1	15-11-2025		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 Regulations):

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.
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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
PSO 4	Design controllers for electrical and electronic systems to improve their performance.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. T.Anil Raju	Mr. P.Deepak Reddy	Mr. P. Deepak Reddy	Dr. P.Sobharani

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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. PHANEENDRA KANAKAMEDALA
Course Name & Code : CYBER SECURITY AND DIGITAL FORENSICS & 201T84
L-T-P Structure : 3-0-0 **Credits:** 03
Program/Sem/Sec : B.Tech-EEE – B / V SEM
A.Y. : 2025-26

PRE-REQUISITE: Understanding of digital logic, operating system concepts, Computer hardware knowledge.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The Objective of the course is to provide the basic concepts of cybersecurity and digital Forensics which help to protect ourselves from various kinds of cyber-attacks. Digital forensics is a branch of forensics science encompassing the recovery and investigation of material found in digital devices, often in relaxation to computer crime. It enables students to gain experience to do independent study and research

CO1	Understand the implementation of cybercrime. **(Understand - L2)**
CO2	Identify key Tools and Methods used in Cybercrime. **(Remember- L1)**
CO3	Under the Concepts of Cyber Forensics. **(Understand- L2)**
CO4	Apply Cyber Forensics in collection of digital evidence and sources of evidence **(Apply- L3)**
CO5	Analyze the cyber forensics tools for present and future**(Analyze- L4)**

Course Articulation Matrix (Correlation between COs &POs, PSOs):

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

TEXT BOOKS:

1. Dejey, Dr.Murugan, "cyber Forensics", Oxford University Press, India, 2018

2. Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY,2011

REFERENCE BOOKS:

1. Michael Simpson, Kent Blackman and James e. Corley, "Hands on Ethical Hacking and Network Defense", Cengage, 2019
2. Computer Forensics, Computer Crime Investigation by John R.Vacca, Firewall Media, New Delhi
3. Alfred Basta, Nadine Basta, Mary Brown and Ravindra Kumar "Cyber Security and Cyber Laws", Cengage, 2018

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): SECTION A

UNIT-I: Introduction to Cybercrime

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1	Introduction to CSDF	1	30-6-2025		**TLM2**	CO1	
2	Cybercrime definition and origins of the word	1	01-7-2525		**TLM2**	CO1	
3	Cybercrime and Information Security	1	02-7-2025		**TLM2**	CO1	
4	Cybercriminals	1	04-7-2025		**TLM2**	CO1	
5	Classifications of Cybercrime	1	07-7-2025		**TLM2**	CO1	
6	Cyberstalking Cybercafé and Cybercrime	2	08-7-2025 09-7-2025		**TLM2**	CO1	
7	Botnets Security Challenges Posed by Mobile	2	11-7-2025 14-7-2025		**TLM2**	CO1	
8	Attacks on Mobile/Cell Phones Network and Computer Attacks	2	15-7-2025 16-7-2025		**TLM2**	CO1	
9	Unit-I Assignment Test	1	18-7-2025		**TLM2**	CO1	
No. of classes required to complete UNIT-I		12	No. of classes taken:				

UNIT-II: Tools and Methods

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
10	Proxy Servers and Anonymizers	1	21-7-2025		**TLM2**	CO2	
11	Phishing, Password Cracking	2	22-7-2025 23-7-2025		**TLM2**	CO2	
12	Key loggers and Spywares Virus and Worms	2	25-7-2025 28-7-2025		**TLM2**	CO2	
13	Trojan Horses and Backdoors Steganography	2	29-7-2025 30-7-2025		**TLM2**	CO2	
14	Sniffers, Spoofing, session Hijacking Buffer Overflow Identity Theft	2	01-8-2025 04-8-2025		**TLM1**	CO2	
15	Dos and DDos Attacks SQL Injection Port Scanning	2	05-8-2025 06-8-2025		**TLM2**	CO2	
16	Unit-II Assignment Test	1	08-8-2025		**TLM2**	CO2	
No. of classes required to complete UNIT-2		09	No. of classes taken:				

UNIT – III: Cyber Forensics

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
17	Cyber Forensics Definition	1	11-8-2025		**TLM2**	CO3	
18	Disk Forensics	2	12-8-2025 13-8-2025		**TLM**	CO3	
19	Network Forensics	2	18-08-2025 19-08-2025		**TLM2**	CO3	
20	Wireless Forensics	2	20-08-2025 22-08-2025		**TLM2**	CO3	
21	Database Forensics	2	15-09-2025 16-09-2025		**TLM2**	CO3	

22	Malware Forensics	2	17-09-2025 19-09-2025		**TLM2**	CO3	
23	Mobile Forensics	1	22-09-2025		**TLM2**	CO3	
24	Email Forensics	1	23-09-2025		**TLM1**	CO3	
25	Unit-III Assignment Test	1	24-09-2025		**TLM2**	CO3	
No. of classes required to complete UNIT-3		11	No. of classes taken:				

UNIT-IV: Digital Evidence

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
26	Introduction to Digital Evidence and Evidence Collection procedure	2	26-09-2025 29-09-2025		**TLM2**	CO4	
27	Source of Evidence Operating systems and their Boot Processes	2	01-10-2025 03-10-2025		**TLM2**	CO4	
28	File System Windows Registry	2	06-10-2025 07-10-2025		**TLM1**	CO4	
29	Windows Artifacts Browser Artifact	2	08-10-2025 10-10-2025		**TLM2**	CO4	
30	Linux Artifact	1	13-10-2025		**TLM1**	CO4	
31	Digital evidence on the internet	2	14-10-2025 15-10-2025		**TLM2**	CO4	
32	Impediments to collection of Digital Evidence	1	17-10-2025		**TLM1**	CO4	
33	Challenges with Digital Evidence	1	20-10-2025		**TLM2**	CO4	
34	Unit-III Assignment Test	1	22-10-2025		**TLM2**	CO4	
No. of classes required to complete UNIT-4		16	No. of classes taken:				

UNIT-V: Cyber Forensics

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
35	The Present and The Future Forensics Tools	1	24-10-2025		**TLM2**	CO5	
36	Cyber Forensics suite Imaging and Validation Tools	2	25-10-2024 27-10-2024		**TLM2**	CO5	
37	Tools for Integrity Verification and Hashing	1	28-10-2025 29-10-2025		**TLM2**	CO5	
38	Forensics Tools for Data Recovery Encryption/decryption	2	31-10-2025 03-11-2025		**TLM2**	CO5	
39	Forensics tools for Password Recovery Analyzing network	2	04-11-2025 05-11-2025		**TLM1**	CO5	
40	Forensics Tools for Email Analysis	2	07-11-2025 10-11-2025		**TLM2**	CO5	
41	Unit -5 Assignment test.	1	11-11-2025		**TLM2**	CO5	
No. of classes required to complete UNIT-5		8	No. of classes taken:				

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
1.	Using AI/ML to Analyze Cyber Threats	1	12-11-2025		TLM2	
2.	Cloud Security	1	14-11-2025		TLM2	

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:

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+A	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	Pursue a successful career in the area of Information Technology or its allied fields.
PEO 2	Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.
PEO 3	Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.
PEO 4	Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication and team work and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

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

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

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

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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

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

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solution sin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

PO9 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1 Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2 Design, Implement and Evaluate a computer-based system to meet desired needs.

PSO3 Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. K. Phaneendra	Dr. K. Phaneendra	Dr. K. Phaneendra	Dr. D. Ratna Kishore
Signature				

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.K.Venkateswara Reddy, Assistant Professor

Course Name & Code	**:** ROBOTICS IN AUTOMATION - 20ME82	**Regulation**: R20
L-T-P Structure	**: 3-0-0**	**Credits:** 03
Program/Sem/Sec	: B.Tech VII Sem (B)	**A.Y.:** 2025-2026

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to impart knowledge about basic mathematics related to industrial robots for their control, design, and application in robotics & automation Industries.

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

CO1	Comprehend the anatomy of robots, end effectors. (**Understanding-L2)**
CO2	Categorize various actuators and sensors employed in industrial robots. **(Understanding-L2)**
CO3	Formulate transformations using DH parameters for kinematics and dynamics of robots. **(Applying-L3)**
CO4	Illustrate the control system and develop the robotic programming. **(Understanding-L2)**
CO5	Outline the robotic applications in present and future industrial scenario. **(Understanding-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	PSO4
CO1	3					2						2		2		
CO2	3	3	2									2		2	2	
CO3	3	3	2									2		2		
CO4	3	2	1				2					2		2		2
CO5	2					3	3					1		2		
	1 - Low					**2 –**Medium						**3 -** High				

TEXTBOOKS:

T1	Mikell P Groover, Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, "Industrial Robotics, Technology programming and Applications", McGraw Hill, 2012.
T2	Saeed B.Niku, Introduction to robotics- analysis ,systems &application, Second Edition, Willy India Private Limited, New Delhi,2011.

REFERENCE BOOKS:

R1	S.R. Deb, "Robotics Technology and flexible automation", Tata McGraw-Hill Education., 2009.
R2	Craig. J. J. "Introduction to Robotics- mechanics and control", Addison- Wesley, 2009.
R3	Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, "Robotics Engineering an Integrated Approach", PHI Learning, 2009.
R4	Fu. K. S., Gonzalez. R. C. & Lee C.S.G., "Robotics control, sensing, vision and intelligence", McGraw Hill Book co, 2007.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: ROBOT ANATOMY & END EFFECTORS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	30-06-2025		TLM1/TLM2	
2.	History of robots	1	01-07-2025		TLM1/TLM2	
3.	Laws of robotics, Classification of robots	1	02-07-2025		TLM1/TLM2	
4.	Present status, and future trends	1	05-07-2025		TLM1/TLM2	
5.	Basic components of robotic system	1	05-07-2025		TLM1/TLM2	
6.	links, joints, types, configurations of robots	1	07-07-2025		TLM1/TLM2	
7.	Degree of freedom, Mechanisms and transmission	1	08-07-2025		TLM1/TLM2	
8.	End effectors	1	09-07-2025		TLM1/TLM2	
9.	Grippers-different methods of gripping	1	12-07-2025		TLM1/TLM2	
10.	Mechanical grippers	1	14-07-2025		TLM1/TLM2	
11.	Magnetic grippers	1	14-07-2025		TLM1/TLM2	
12.	Vacuum grippers	1	15-07-2025		TLM1/TLM2	
13.	Specifications of Robot	1	16-07-2025		TLM1/TLM2	
14.	Quiz-I	1	19-07-2025		TLM1/TLM2	
No. of classes required to complete UNIT-I:				**No. of classes taken:**		

UNIT-II: DRIVE SYSTEMS & SENSORS

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.	Introduction	1	21-07-2025		TLM1/TLM2	
16.	Hydraulic drives	1	22-07-2025		TLM1/TLM2	
17.	Pneumatic drives	1	23-07-2025		TLM1/TLM2	
18.	Electric systems, Advantages, limitations	1	26-07-2025		TLM1/TLM2	
19.	Industrial applications	1	28-07-2025		TLM1/TLM2	
20.	Sensors in robots	1	29-07-2025		TLM1/TLM2	
21.	Touch sensors, tactile sensor	1	30-07-2025		TLM1/TLM2	
22.	Proximity and range sensors	1	02-08-2025		TLM1/TLM2	

23.	Robotic vision sensor	1	04-08-2025		TLM1/TLM2	
24.	Force sensor, Light sensors	1	04-08-2025		TLM1/TLM2	
25.	Pressure sensors, applications	1	05-08-2025		TLM1/TLM2	
26.	Quiz-II	1	05-08-2025		TLM1/TLM2	
No. of classes required to complete UNIT-II:				**No. of classes taken:**		

UNIT-III: KINEMATICS & DYNAMICS OF ROBOTS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Introduction	1	06-08-2025		TLM1/TLM2	
28.	2D, 3D Transformation	1	09-08-2025		TLM1/TLM2	
29.	Rotation, translation, Examples	1	11-08-2025		TLM1/TLM2	
30.	Homogeneous coordinates multiple transformation	1	12-08-2025		TLM1/TLM2	
31.	Matrix representation	1	13-08-2025		TLM1/TLM2	
32.	Homogeneous transformations	1	13-08-2025		TLM1/TLM2	
33.	Inverse of transformations	1	18-08-2025		TLM1/TLM2	
34.	Forward kinematics of robots	1	19-08-2025		TLM1/TLM2	
35.	Inverse kinematics of robots, Problems	1	20-08-2025		TLM1/TLM2	
36.	D-H representation of robots	1	23-08-2025		TLM1/TLM2	
37.	Dynamics of Robots: Introduction	1	15-09-2025		TLM1/TLM2	
38.	Robot Arm dynamics, Significance	1	16-09-2025		TLM1/TLM2	
39.	Force and torque requirements for two degrees of freedom robotic arm	1	17-09-2025		TLM1/TLM2	
40.	Problems	1	20-09-2025		TLM1/TLM2	
41.	Quiz-III	1	20-09-2025		TLM1/TLM2	
No. of classes required to complete UNIT-III:				**No. of classes taken:**		

UNIT-IV: TRAJECTORY PLANNING AND ROBOT CONTROL

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.	Introduction	1	22-09-2025		TLM1/TLM2	
43.	Basics of Trajectory Planning	1	22-09-2025		TLM1/TLM2	
44.	Point to point control	1	23-09-2025		TLM1/TLM2	
45.	Continuous path control	1	24-09-2025		TLM1/TLM2	
46.	Interpolations	1	27-09-2025		TLM1/TLM2	
47.	Control system for robot joint	1	04-10-2025		TLM1/TLM2	
48.	Control actions	1	06-10-2025		TLM1/TLM2	
49.	Feedback devices	1	06-10-2025		TLM1/TLM2	
50.	Adaptive control	1	07-10-2025		TLM1/TLM2	
51.	Introduction to Robot Programming	1	08-10-2025		TLM1/TLM2	
52.	online programming	1	11-10-2025		TLM1/TLM2	
53.	off-line programming	1	13-10-2025		TLM1/TLM2	

54.	programming examples	1	14-10-2025		TLM1/TLM2	
55.	programming examples	1	15-10-2025		TLM1/TLM2	
56.	programming examples	1	18-10-2025		TLM1/TLM2	
No. of classes required to complete UNIT-IV:				**No. of classes taken:**		

UNIT-V: ROBOT APPLICATIONS, AUTOMATION AND INDUSTRY 4.0

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
57.	Introduction	1	21-10-2025		TLM1/TLM2	
58.	Robot Applications	1	22-10-2025		TLM1/TLM2	
59.	Material handling	1	25-10-2025		TLM1/TLM2	
60.	Machine loading and unloading	1	27-10-2025		TLM1/TLM2	
61.	Assembly, Inspection, Welding	1	28-10-2025		TLM1/TLM2	
62.	Spray painting	1	29-10-2025		TLM1/TLM2	
63.	Applications in unmanned systems	1	01-11-2025		TLM1/TLM2	
64.	Defence applications	1	01-11-2025		TLM1/TLM2	
65.	Medical, industries	1	03-11-2025		TLM1/TLM2	
66.	Introduction to Industry 4.0	1	04-11-2025		TLM1/TLM2	
67.	Robotics and Automation for Industry 4.0	1	05-11-2025		TLM1/TLM2	
68.	Robot safety	1	08-11-2025		TLM1/TLM2	
69.	Social robotics	1	08-11-2025		TLM1/TLM2	
No. of classes required to complete UNIT-V:				**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
70.	Multi robot coordination	1	10-11-2025		TLM1/TLM2	
71.	Artificial intelligence	1	11-11-2025		TLM1/TLM2	
72.	Cloud robotics	1	12-11-2025		TLM1/TLM2	
73.	Human–robot interaction	1	15-11-2025		TLM1/TLM2	

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.
PEO 2	Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.
PEO 3	Work effectively as individuals and as team members in multidisciplinary projects.
PEO 4	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 analyse 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**	**Head of the Department**
Signature				
Name of the Faculty	Mr.K.Venkateswara Reddy	Mr.K.Venkateswara Reddy	Mr.J.Subba Reddy	Dr.M.B.S.Sreekara Reddy

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution

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

L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. S. Uma Maheswara Reddy, Assistant Professor

Course Name & Code	**:** MANAGEMENT SCIENCE FOR ENGINEERS & 20HS02	**Regulation**: R20
L-T-P Structure	**: 3-0-0**	**Credits:** 03
Program/Sem/Sec	: B.Tech, EEE VII Sem (B)	**A.Y.:** 2025-2026

PREREQUISITE: Professional ethics and human values

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

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

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

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

TEXTBOOKS:

T1 Dr. A.R.Aryasri, Management Science, TMH, 10th edition, 2012

REFERENCE BOOKS:

R1 Koontz & weihrich – Essentials of management, TMH, 10th edition, 2015

R2 Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004

R3 O.P. Khana, Industrial engineering and Management L.S.Srinath, PERT & CPM

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - A

UNIT-I: INTRODUCTION

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Outcomes, Introduction to Subject	1	01-07-2025		**TLM1/TLM2**	
2.	Management-Nature and Importance	1	03-07-2025		**TLM1/TLM2**	
3.	Management functions	1	04-07-2025		**TLM1/TLM2**	
4.	Contributions of Taylor	1	05-07-2025		**TLM1/TLM2**	
5.	Fayal's Principles of management	1	08-07-2025		**TLM1/TLM2**	
6.	Contribution of Elton Mayo	1	10-07-2025		**TLM1/TLM2**	
7.	Maslow's & Herzberg's Two Factor Theory	1	11-07-2025		**TLM1/TLM2**	
8.	Douglas McGregor	1	12-07-2025		**TLM1/TLM2**	
9.	Basic Concepts of Organization-Authority	1	15-07-2025		**TLM1/TLM2**	
10.	Responsibility Delegation of Authority	1	17-07-2025		**TLM1/TLM2**	
11.	Departmentation and Decentralization	1	18-07-2025		**TLM1/TLM2**	
12.	Span of Control	1	19-07-2025		**TLM1/TLM2**	
13.	Line, Line and Staff organizations	1	22-07-2025		**TLM1/TLM2**	
14.	Functional, Committee	1	24-07-2025		**TLM1/TLM2**	
15.	Matrix Organizations	1	25-07-2025		**TLM1/TLM2**	
16.	Quiz-I	1	29-07-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-I: 16				**No. of classes taken:**		

UNIT-II: OPERATIONS MANAGEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Operations Management: Introduction	1	31-07-2025		**TLM1/TLM2**	
18.	Plant location	1	01-08-2025		**TLM1/TLM2**	
19.	Factors influencing location	1	02-08-2025		**TLM1/TLM2**	
20.	Principles	1	05-08-2025		**TLM1/TLM2**	

21.	Types of plant layouts	1	07-08-2025		**TLM1/TLM2**	
22.	Methods of production (job, batchproduction)	1	08-08-2025		**TLM1/TLM2**	
23.	Mass production	1	09-08-2025		**TLM1/TLM2**	
24.	Work study	1	12-08-2025		**TLM1/TLM2**	
25.	method study	1	14-08-2025		**TLM1/TLM2**	
26.	Work measurement		19-08-2025		**TLM1/TLM2**	
27.	Quiz-II	1	21-08-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: STATISTICAL QUALITY CONTROL, MATERIALS MANAGEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Statistical quality control Introduction	1	22-08-2025		**TLM1/TLM2**	
29.	Concept of Quality & Quality Control	1	23-08-2025		**TLM1/TLM2**	
30.	Functions, Meaning of SQC	1	26-08-2025		**TLM1/TLM2**	
31.	Variables and attributes, X-chart, R Chart	1	28-08-2025		**TLM1/TLM2**	
32.	C Chart and P Chart	1	29-08-2025		**TLM1/TLM2**	
33.	Acceptance sampling and Sampling plans	1	30-08-2025		**TLM1/TLM2**	
34.	Deming's contribution to quality	1	02-09-2025		**TLM1/TLM2**	
35.	Materials management	1	04-09-2025		**TLM1/TLM2**	
36.	Meaning and objectives	1	05-09-2025		**TLM1/TLM2**	
37.	Inventory control	1	06-09-2025		**TLM1/TLM2**	
38.	Need for inventory control	1	16-09-2025		**TLM1/TLM2**	
39.	Purchase procedure	1	18-09-2025		**TLM1/TLM2**	
40.	Store records	1	19-09-2025		**TLM1/TLM2**	
41.	EOQ	1	20-09-2025		**TLM1/TLM2**	
42.	Problems	1	23-09-2025		**TLM1/TLM2**	
43.	ABC analysis	1	25-09-2025		**TLM1/TLM2**	
44.	Stock levels	1	26-09-2025		**TLM1/TLM2**	
45.	Problems	1	27-09-2025		**TLM1/TLM2**	
No. of classes required to complete UNIT-III: 18				**No. of classes taken:**		

UNIT-IV: HUMAN RESOURCE MANAGEMENT (HRM)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Concepts of HRM	1	03-10-2025		TLM1/TLM2	
47.	Basic functions of HR manager	1	04-10-2025		TLM1/TLM2	
48.	Manpower planning	1	07-10-2025		TLM1/TLM2	
49.	Recruitment	1	09-10-2025		TLM1/TLM2	
50.	Selection	1	10-10-2025		TLM1/TLM2	
51.	Training and development	1	11-10-2025		TLM1/TLM2	
52.	Placement	1	14-10-2025		TLM1/TLM2	
53.	Wage and salary administration	1	16-10-2025		TLM1/TLM2	
54.	Promotion	1	17-10-2025		TLM1/TLM2	
55.	Transfers Separation	1	18-10-2025		TLM1/TLM2	
56.	Performance appraisal	1	23-10-2025		TLM1/TLM2	
57.	Job evaluation and merit rating	1	24-10-2025		TLM1/TLM2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: PROJECT MANAGEMENT

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
58.	Introduction : project management	1	25-10-2025		TLM1/TLM2	
59.	Early techniques in project management	1	28-10-2025		TLM1/TLM2	
60.	Network analysis	1	30-10-2025		TLM1/TLM2	
61.	Programme Evaluation and Review Technique (PERT)	1	31-10-2025		TLM1/TLM2	
62.	Problems	1	01-11-2025		TLM1/TLM2	
63.	Critical path method (CPM)	1	04-11-2025		TLM1/TLM2	
64.	Problems	1	06-11-2025		TLM1/TLM2	
65.	Identifying critical path	1	07-11-2025		TLM1/TLM2	
66.	Problems	1	08-11-2025		TLM1/TLM2	
67.	Probability of completing project within given time	1	11-11-2025		TLM1/TLM2	
68.	Project cost analysis	1	13-11-2025		TLM1/TLM2	
69.	Problems	1	14-11-2025		TLM1/TLM2	
70.	project crashing	1	15-11-2025		TLM1/TLM2	
No. of classes required to complete UNIT-V: 13				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To 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.

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 analyse 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	Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	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	Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr.S.Uma Maheswara Reddy	Mr. A.Nageswara Rao	Mr.J.Subba Reddy	Dr.M.B.S.Sreekara Reddy
Signature				

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE HANDOUT

Name of Course Instructor: Mr. P. SRIHARI & Mrs R Padma
Course Name & Code : SKILL ORIENTED COURSE-II (IoT) & 20EES4
L-T-P Structure : **1-0-2** **Credits: 2**
Program/Sem/Sec : B.Tech/VII/B **A.Y.:** 2025-26

Course Educational Objective (CEO): The objective of this course is to explore the interconnection and integration of the physical world and the cyberspace. Understand the design concepts in setting up IOT Devices. Study about the setup, configuration and installation of equipment for IOT.

Course Outcomes (COs): At the end of the course, the student will be able to:
CO1: Control different electrical and electronics applications using Arduino (**Apply-L3**) CO2: Control different electrical and electronics applications using Raspberry Pi (**Apply-L3**)

List of Experiments:

1. Interfacing LED, Push button using Arduino.
2. Interfacing DHT11-Temperature and humidity sensor using Arduino.
3. Interfacing Ultrasonic sensor using Arduino.
4. Interfacing PIR sensor using Arduino.
5. Design of Traffic Light Simulator using Arduino.
6. Interfacing RFID using Arduino/Raspberry Pi
7. Interfacing of LED, Push button with Raspberry Pi (Python Program).
8. Design of Motion Sensor Alarm using PIR Sensor.
9. Interfacing DHT11-Temperature and Humidity Sensor with Raspberry Pi.
10. Implementation of DC Motor and Stepper Motor Control with Raspberry Pi.

Project based experiments:

11. Raspberry Pi based Smart Phone Controlled Home Automation.
12. Smart Traffic light Controller.
13. Smart Health Monitoring System.

COURSE DELIVERY PLAN (LESSON PLAN):

SECTION-A SCHEDULE

DAY: Wednes Day

Batches:

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	02/7	09/07	16/07	23/07	30/7	06/08	13/8	20/8	17/9	24/9	8/10	15/10	22/10	29/10	05/11	12/11
Actual date																
	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
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					
	Demo	1	2	3	4	5	6	7	8	9	10					

ACADEMIC CALENDAR:

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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 Mrs R.Padma	Mr. P. Srihari	Dr. G. Nageswara Rao	Dr P Sobha Rani