

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.M.S.GIRIDHAR
Course Name & Code	: POWER SYSTEM-II & 20EE12
L-T-P Structure	:2-1-0
Program/Sem/Sec	: B.TECH/V/A-SEC

**Credits:** 3 **A.Y.:** 2023-24

PREREQUISITE: Power Systems-I, Electrical Circuit Analysis.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** This course enables the student to learn performance of transmission lines, the voltage control and reactive power compensation methods of transmission lines. It also deals with importance of per unit representation of power system, symmetrical components, short circuit studies and protective devices

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

<b>CO1</b>	Analyze transmission line performance (Apply-L3)
CO2	Apply shunt compensation techniques to control reactive power of the transmission line (Understand-L2)
CO3	Determine the fault currents for symmetrical and unsymmetrical faults(Apply-L3)
<b>CO4</b>	Illustrate the protective relays and circuit breakers in power system protection. (Understand-L2)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2										1	3			
CO2	3	2										1	3			2
CO3	3	2	2									2	3			
CO4	2	2										2	3			
CO5	3	2										1	3			
<b>1</b> - Low <b>2</b> –Medium <b>3</b> - High																

#### **TEXTBOOKS:**

- **T1** John J.Grainger & W.D.Stevenson," Power System Analysis", McGraw Hill International, 2017.
- T2 D.P.Kothari and I.J.Nagrath, "Modern Power System Analysis", Tata McGraw-Hill Pub.Co., NewDelhi, Fourth Edition, 2011.

#### **REFERENCE BOOKS:**

- **R1** C.L.Wadhwa, "Electrical Power Systems", New Age International, 2016.
- **R2** Hadi Saadat, "Power System Analysis", Tata Mc Graw Hill Pub.Co.2002.

- **R3** VKMehta & Rohit Mehta, "Principles of Power Systems" (Multicolor Edition), S.Chand Publishing, fourth edition, 2006
- **R4** W.D.Stevenson, "Elements of Power system Analysis", McGraw Hill International Student Edition, 2004.

#### PART-B

#### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: PERFORMANCE OF TRANSMISSION LINES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Representation of lines	1	03-07-2023			
2.	Short transmission lines	2	04-07-2023 07-07-2023			
3.	Medium length lines, nominal-T and $\pi$ -representations	2	10-07-2023 11-07-2023			
4.	Long transmission lines. The equivalent circuit representation of a long Line	2	14-07-2023 15-07-2023			
5.	A, B, C, D constants, Ferranti Effect	2	17-07-2023 18-07-2023			
6.	Power flow through a transmission line	1	21-07-2023			
7.	Receiving end power circle diagram.	2	22-07-2023 24-07-2023			
No. of classes required to complete UNIT-I: 12 No. of classes taken:						

#### UNIT-II: VOLTAG ECONTROL IN POWERSYSTEM

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
8.	Introduction, methods of voltage control	1	25-07-2023			
9.	Shuntandseriescapacitors/Inductors	2	28-07-2023 31-07-2023			
10.	Tap-changingTransformers,synchronous phase-modifiers.	1	01-08-2023			
11.	Introduction-Concepts of Load compensation,	1	04-08-2023			
12.	Lodability characteristics of over head lines	2	05-08-2023 07-08-2023			
13.	Uncompensated transmission line	2	08-08-2023 11-08-2023			
14.	Symmetrical line Radial line with asynchronous load, Compensation of lines.	2	12-08-2023 14-08-2023			
No.	of classes required to complete UNIT-II:	11		No. of class	es taken:	

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.	Per Unit Representation of Power Systems	2	18-08-2023 19-08-2023			
16.	Symmetrical Fault (LLL) Analysis: Short circuit of synchronous machine unloaded	2	21-08-2023 22-08-2023			
17.	Short circuit of loaded synchronous machine	1	25-08-2023			
18.	Calculation of symmetrical short circuit currents for simple systems	2	26-08-2023 04-09-2023			
19.	Short circuit current computation through Thevenin's theorem.	2	05-09-2023 08-09-2023			
20.	R eactors and their location, short circuit capacity of a bus	2	09-09-2023 11-09-2023			
21.	Computation of circuit breaker capacities	1	12-09-2023			
22.	Short circuit current and MVA Calculations, Numerical Problems.	2	15-09-2023 16-09-2023			
	No. of classes required to complete U	NIT-III: 14	4	No. of class	es taken:	

#### UNIT-IV: UNSYMMETRICAL FAULT CALCULATIONS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Significance of positive, negative and zero sequence components	1	19-09-2023			
24.	Average 3-phase power in terms of symmetrical components	1	22-09-2023			
25.	Sequence impedances and sequence networks of power systems.	2	23-09-2023 25-09-2023			
26.	Unsymmetrical Fault Analysis: LG, LL, LLG faults without fault impedance, Numerical Problems	3	26-09-2023 29-09-2023 30-09-2023			
27.	Unsymmetrical Fault Analysis: LG, LL, LLG faults with fault impedance, Numerical Problems	3	03-10-2023 06-10-2023 07-10-2023			
No.	of classes required to complete UNIT-IV	V: 10		No. of classe	es taken:	

#### **UNIT-V: FUNDAMENTALS OF POWER SYSTEM 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
28.	Need for protective systems	1	09-10-2023			
29.	Nature and causes of faults, zones of protection, primary and backup protection	2	10-10-2023 13-10-2023			
30.	Essential qualities of protection	1	14-10-2023			
31.	Classification of Protective Relays based on technology and function	1	16-10-2023			
32.	Over current relays	2	17-10-2023 20-10-2023			

33.	Distance relays, Impedance, reactance and MHO relays	2	21-10-2023 24-10-2023			
34.	Bucholz relay, differential relays	2	27-10-2023 28-10-2023			
35.	Classification of circuit breakers	1	06-11-2023			
36.	Principle of operation of air blast circuit breakers.	1	07-11-2023			
37.	Principle of operation of vacuum, SF6 circuit breakers.	2	10-11-2023 11-11-2023			
No. o	of classes required to complete UNIT-V:	15		No. of classes	s 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))	<mark>M=30</mark>
Cumulative Internal Examination (CIE): M	<mark>30</mark>
Semester End Examination (SEE)	<mark>70</mark>
Total Marks = $CIE + SEE$	100

## PART-D

## **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.							
PO 2	<b>Problem analysis</b> : 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	<b>Design/development of solutions</b> : 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	<b>Conduct investigations of complex problems</b> : 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	<b>Modern tool usage</b> : 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	<b>The engineer and society</b> : 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	<b>Environment and sustainability</b> : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.							
<b>PO 8</b>	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.							
PO 9	<b>Individual and team work</b> : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.							
PO 10	<b>Communication</b> : 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	<b>Project management and finance</b> : 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	<b>Life-long learning</b> : 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
Name of the Faculty	Dr.M.S.Giridhar	Dr.M.S.Giridhar	Dr.P.Sobharani	Dr.J.Sivavaraprasad
Signature				



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# DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

# COURSE HANDOUT

#### PART-A

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Course Name & Code	: POWER SYSTEM-II & 20EE12						
L-T-P Structure	: 2-1-0						
Program/Sem/Sec	: B.TECH/V/B-SEC						

**Credits:** 3 **A.Y.:** 2023-24

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

<b>CO1</b>	Analyze transmission line performance (Apply-L3)
CO2	Apply shunt compensation techniques to control reactive power of the transmission line (Understand-L2)
CO3	Determine the fault currents for symmetrical and unsymmetrical faults(Apply-L3)
<b>CO4</b>	Illustrate the protective relays and circuit breakers in power system protection. (Understand-L2)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	<b>PO8</b>	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2										1	3			
CO2	3	2										1	3			2
CO3	3	2	2									2	3			
CO4	2	2										2	3			
CO5	3	2										1	3			
	<b>1</b> - Low <b>2</b> –Medium <b>3</b> - High															

#### **TEXTBOOKS:**

- **T1** John J.Grainger & W.D.Stevenson," Power System Analysis", McGraw Hill International, 2017.
- T2 D.P.Kothari and I.J.Nagrath, "Modern Power System Analysis", Tata McGraw-Hill Pub.Co., NewDelhi, Fourth Edition, 2011.

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- **R1** C.L.Wadhwa, "Electrical Power Systems", New Age International, 2016.
- R2 Hadi Saadat, "Power System Analysis", Tata Mc Graw Hill Pub.Co.2002.
- **R3** VKMehta & Rohit Mehta, "Principles of Power Systems" (Multicolor Edition), S.Chand Publishing, fourth edition, 2006
- **R4** W.D.Stevenson, "Elements of Power system Analysis", McGraw Hill International Student Edition, 2004.

#### PART-B

#### **COURSE DELIVERY PLAN (LESSON PLAN):**

#### **UNIT-I: PERFORMANCE OF TRANSMISSION LINES**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Representation of lines	1	03-07-2023			
2.	Short transmission lines	2	04-07-2023 06-07-2023			
3.	Medium length lines, nominal-T and $\pi$ -representations	2	10-07-2023 11-07-2023			
4.	Long transmission lines. The equivalent circuit representation of a long Line	2	08-07-2023 13-07-2023			
5.	A, B, C, D constants, Ferranti Effect	2	15-07-2023 17-07-2023			
6.	Power flow through a transmission line	1	18-07-2023			
7.	Receiving end power circle diagram.	2	20-07-2023 22-07-2023			
No. o	of classes required to complete UNIT-I:		No. of classes	s taken:		

#### **UNIT-II: VOLTAG ECONTROL IN POWERSYSTEM**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
8.	Introduction, methods of voltage control	1	24-07-2023			
9.	Shuntandseriescapacitors/Inductors	2	25-07-2023 27-07-2023			
10.	Tap-changingTransformers,synchronous phase-modifiers.	1	31-07-2023			
11.	Introduction-Concepts of Load compensation,	1	01-08-2023			
12.	Lodability characteristics of over head lines	2	03-08-2023 05-08-2023			
13.	Uncompensated transmission line	2	07-08-2023 08-08-2023			
14.	Symmetrical line Radial line with asynchronous load, Compensation of lines.	2	10-08-2023 12-08-2023			
No.	of classes required to complete UNIT-II:	11		No. of classe	es taken:	

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.	Per Unit Representation of Power Systems	2	14-08-2023 17-08-2023			
16.	Symmetrical Fault (LLL) Analysis: Short circuit of synchronous machine unloaded	2	19-08-2023 21-08-2023			
17.	Short circuit of loaded synchronous machine	1	22-08-2023			
18.	Calculation of symmetrical short circuit currents for simple systems	2	24-08-2023 26-08-2023			
19.	Short circuit current computation through Thevenin's theorem.	2	04-09-2023 05-09-2023			
20.	R eactors and their location, short circuit capacity of a bus	2	07-09-2023 09-09-2023			
21.	Computation of circuit breaker capacities	1	11-09-2023			
22.	Short circuit current and MVA Calculations, Numerical Problems.	2	12-09-2023 14-09-2023			
	No. of classes required to complete U	NIT-III: 14	1	No. of class	es taken:	

#### UNIT-IV: UNSYMMETRICAL FAULT CALCULATIONS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Significance of positive, negative and zero sequence components	1	16-09-2023			
24.	Average 3-phase power in terms of symmetrical components	1	19-09-2023			
25.	Sequence impedances and sequence networks of power systems.	2	21-09-2023 23-09-2023			
26.	Unsymmetrical Fault Analysis: LG, LL, LLG faults without fault impedance, Numerical Problems	3	25-09-2023 26-09-2023 30-09-2023			
27.	Unsymmetrical Fault Analysis: LG, LL, LLG faults with fault impedance, Numerical Problems	3	03-10-2023 05-10-2023 07-10-2023			
No.	of classes required to complete UNIT-IV	V: 10		No. of classe	es taken:	

#### UNIT-V: FUNDAMENTALS OF POWER SYSTEM 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
28.	Need for protective systems	1	09-10-2023			
29.	Nature and causes of faults, zones of protection, primary and backup protection	2	10-10-2023 12-10-2023			
30.	Essential qualities of protection	1	14-10-2023			
31.	Classification of Protective Relays based on technology and function	1	16-10-2023			
32.	Over current relays	2	17-10-2023 19-10-2023			
33.	Distance relays, Impedance, reactance and MHO relays	2	21-10-2023 24-10-2023			

34.	Bucholz relay, differential relays	2	26-10-2023			
51.	Buchoiz relay, differential relays	2	28-10-2023			
35.	Classification of circuit breakers	1	06-11-2023			
26	Principle of operation of air blast circuit	1	07 11 2022			
50.	breakers.	1	07-11-2025			
27	Principle of operation of vacuum, SF6	2	09-11-2023			
37.	circuit breakers.	11-11-2023				
No. o	of classes required to complete UNIT-V:		No. of classes	s taken:		

Teaching	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))	<mark>M=30</mark>
Cumulative Internal Examination (CIE): M	<mark>30</mark>
Semester End Examination (SEE)	<mark>70</mark>
Total Marks = $CIE + SEE$	100

## PART-D

## **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis</b> : 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	<b>Design/development of solutions</b> : 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	<b>Conduct investigations of complex problems</b> : 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	<b>Modern tool usage</b> : 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	<b>The engineer and society</b> : 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	<b>Environment and sustainability</b> : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and team work</b> : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication</b> : 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	<b>Project management and finance</b> : 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	<b>Life-long learning</b> : 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
Name of the Faculty	Dr.M.S.Giridhar	Dr.M.S.Giridhar	Dr.P.Sobharani	Dr.J.Sivavaraprasad
Signature				

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#### **DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

#### **COURSE HANDOUT**

#### PART-A

Name of Course Instructor:Dr.T.NagadurgaCourse Name & Code: ELECTRICAL MACHINES-II - 20EE13L-T-P Structure: 2-1-0Program/Sem/Sec: B.Tech/V/A

**Credits:** 3 **A.Y.:** 2023-24

3

3

3

2

Pre-requisites: Electrical Circuit Analysis and Electrical Machines-I

**Course Educational Objectives:** This course enables the student to understand the analysis and performance of single phase and poly phase Induction motors which are the major part of domestic appliances, control systems, drives and agricultural pump sets. It also deals with detailed analysis of synchronous generators and motors which are the prime sources of electrical power generation.

<u> </u>	Source and a contraction of the course, student will be able to																
	CO1	An	Analyze the performance of poly phase Induction motors Apply-L3)														
	CO2	Illu	Illustrate the operation of single phase induction motor (Understand-L2)														
	CO3	Exa	Examine the performance of the synchronous generator. (Apply-L3)														
	CO4	Analyze the performance of the synchronous motor. (Apply-L3)															
(	CO/PO	P01         P02         P03         P04         P05         P06         P07         P08         P09         P0         P0         P00         PS0         PS02         PS03         PS04															
	CO1	3	2	2											3		2

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

#### **TEXT BOOKS:**

2

3

2

CO2

CO3

**CO4** 

2

2

2

2

2

1. P.S. Bimbra, "Electrical Machinery", Khanna Publishers, 7th Edition, 2014

2. I.J.Nagrath & D.P.Kothari, "Electric Machines", Tata Mc Graw Hill, 5th Edition.2017

#### **REFERENCE:**

1. M.G. Say ,"Alternating Current Machines", John Wiley & Sons, 1976.

2. A. E. Fitzgerald, C. Kingsley and S. Umans, "Electric Machinery", Mc Graw-Hill Companies, 6th edition 2017.

3. Ashfaq Husain ,"Electric Machines", Dhanapati Rai&Co, New Delhi, 3rd edition , 2017.

4. Soft Starter Handbook, ABB Group.

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

#### **UNIT-I: THREE PHASE INDUCTION MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Subject & Course Outcomes	1	4/7/23		TLM1	
2.	Stator construction, Rotor construction details	1	6/7/23		TLM1	
3.	Types of three phase induction motor	1	7/7/23		TLM1	
4.	Working principle of three phase IM	1	8/7/23		TLM1	
5.	Production of rotating magnetic field, Synchronous speed, Slip equation	1	11/7/23		TLM1	
6.	Rotor emf and rotor frequency	1	13/7/23		TLM1	
7.	Tutorial-I	1	14/7/23		TLM3	
8.	Rotor reactance, rotor current and power factor	1	15/7/23		TLM1	
9.	Phasor diagram of three phase IM	1	18/7/23		TLM1	
10.	Equivalent circuit of three phase IM	1	20/7/23		TLM1	
11.	Tutorial-II	1	21/7/23		TLM3	
12.	Crawling and cogging	1	22/7/23		TLM1	
13.	Revision	1	25/7/23		TLM1	
14.	Quiz-I /ASSIGNMENT-I	1	27/7/23			
No.	of classes required to complete	UNIT-I: 1	4	No. of clas	sses takei	1:

#### **UNIT-II: PERFORMANCE OF INDUCTION MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Power stages -Rotor power input, rotor copper loss	1	28/7/23		TLM1	
16.	Mechanical power developed and their inter relation	1	1/8/23		TLM1	
17.	Torque equation- expressions for starting torque and running torque-condition for maximum torque	1	3/8/23		TLM1	
18.	Torque-slip characteristics	1	4/8/23		TLM1	
19.	Losses and efficiency	1	5/8/23		TLM1	
20.	Starting methods of Three Phase IM	1	8/8/23		TLM1	
21.	No load and blocked rotor tests –equivalent circuit	1	10/8/23		TLM1	
22.	Tutorial-III	1	11/8/23		TLM3	
23.	Circle Diagram	1	12/8/23		TLM1	
24.	Circle Diagram Numerical	1	17/8/23		TLM1	
25.	Operation of induction motor as induction generator	1	18/8/23		TLM1	

26.	Tutorial-IV	1	19/8/23		TLM3			
27.	Revision	1	22/8/23		TLM1			
28	Quiz-II/	1						
20.	ASSIGNMENT-II	T	24/8/23					
No.	No. of classes required to complete UNIT-II: 14 No. of classes taken:							

#### **UNIT-III: SINGLE PHASE INDUCTION MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Principle,operation - Double revolving field theory	1	25/8/23		TLM1	
30.	Split phase induction motor	1	26/8/23		TLM1	
31.	Capacitor start and run induction motors	1	5/9/23		TLM1	
32.	Shaded pole induction motor	1	7/9/23		TLM1	
33.	Equivalent circuit	1	8/9/23		TLM1	
34.	Revision	1	9/9/23		TLM1	
35.	Quiz-III/ ASSIGNMENT-III	1	12/9/23			
36.	Tutorial-V	1	14/9/23		TLM3	
No.	of classes required to complete U	JNIT-III: 8	8	No. of clas	sses takei	1:

#### **UNIT-IV: SYNCHRONOUS GENERATORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Construction of synchronous generators & Types of rotor	1	15/9/23		TLM1	
38.	Working principle & EMF equation	1	16/9/23		TLM1	
39.	Types of Rotors	1	19/9/23		TLM1	
40.	Armature reaction	2	21/9/23		TLM1	
41.	Phasor diagram of alternator	1	22/9/23		TLM1	
42.	Regulation Methods– EMF Method,MMF Method	1	23/9/23		TLM1	
43.	ZPF method	1	26/9/23		TLM1	
44.	Tutorial-VI	1	29/9/23		TLM3	
45.	Synchronizing to infinite bus bars	1	30/9/23		TLM1	
46.	Two reaction theory	1	3/10/23		TLM1	
47.	Parallel operation of synchronous generators	1	5/10/23		TLM1	
48.	Tutorial-VII		6/10/23		TLM3	
49.	Synchronous Machine constants		7/10/23		TLM1	
50.	Revision		10/10/23		TLM1	
51.	Quiz-IV/ASSIGNMENT-III		12/10/23			
No.	of classes required to complete l	UNIT-IV: 1	16	No. of clas	ses taker	1:

#### **UNIT-V: SYNCHRONOUS MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentativ Date of Completic	e Actual Date of on Completion	Teaching Learning Methods	HOD Sign Weekly	
52.	Constructional features, principle of operation	1	13/10/23		TLM1		
53.	Methods of starting	1	14/10/23		TLM1		
54.	Power developed, Effect of increased load with constant excitation	1	17/10/23		TLM1		
55.	Tutorial-VIII	1	19/10/23		TLM3		
56.	Synchronous motor with different excitations	1	21/10/23		TLM1		
57.	Effect of changing excitation constant load & Torque equation	1	24/10/23		TLM1		
58.	V curve and inverted V curve – hunting	1	26/10/23		TLM1		
59.	Tutorial-IX	1	27/10/23		TLM3		
60.	Quiz-V/ ASSIGNMENT-V		28/10/23				
No. of classes required to complete UNIT-V: 12 No. of classes taken:						n:	
Teachi	ing Learning Methods						
TLM	1 Chalk and Talk		TLM4	Demonstration (Lab/Field Visit)			
TLM	2 PPT		TLM5	ICT (NPTEL/Swavam Prabha/MOOCS)			

# PART-C

TLM6

Group Discussion/Project

#### **EVALUATION PROCESS (R20 Regulation):**

Tutorial

TLM3

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))	<mark>M=30</mark>
Cumulative Internal Examination (CIE): M	<mark>30</mark>
Semester End Examination (SEE)	<mark>70</mark>
Total Marks = $CIE + SEE$	100

#### PART-D

PROGR	AMME OUTCOMES (POs):
PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis</b> : 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	<b>Design/development of solutions</b> : 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	<b>Conduct investigations of complex problems</b> : 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	<b>Modern tool usage</b> : 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	<b>The engineer and society</b> : 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	<b>Environment and sustainability</b> : 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	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and team work</b> : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication</b> : 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	<b>Project management and finance</b> : 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	<b>Life-long learning</b> : Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr.T.Nagadurga	Dr.T.Nagadurga	Mr.P.Deepak Reddy	Dr.J.SIVAVARA PRASAD
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)



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#### **DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

#### **COURSE HANDOUT**

#### PART-A

Name of Course Instructor:Mr.K.NAGALINGA CHARYCourse Name & Code: ELECTRICAL MACHINES-II – 20EE13L-T-P Structure: 2-1-0Program/Sem/Sec: B.Tech/V/BA.Y.:

**Credits:** 3 **A.Y.:** 2023-24

3

3

2

Pre-requisites: Electrical Circuit Analysis and Electrical Machines-I

**Course Educational Objectives:** This course enables the student to understand the analysis and performance of single phase and poly phase Induction motors which are the major part of domestic appliances, control systems, drives and agricultural pump sets. It also deals with detailed analysis of synchronous generators and motors which are the prime sources of electrical power generation.

COORS	COURSE OUTCOMES (COS). At the end of the course, student will be able to														
C01	An	Analyze the performance of poly phase Induction motors (Apply-L3)													
CO2	Illu	Illustrate the operation of single phase induction motor (Understand-L2)													
CO3	Exa	Examine the performance of the synchronous generator. (Apply-L3)													
C04	CO4 Analyze the performance of the synchronous motor. (Apply-L3)														
CO/PO	CO/PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO         PO         PO         PS0         PS02         PS03         PS04														
CO1	3	2	2											3	2
CO2	2	2												3	

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

#### **TEXT BOOKS:**

3

2

CO3

**CO4** 

2

2

2

2

1. P.S. Bimbra, "Electrical Machinery", Khanna Publishers, 7th Edition, 2014

2. I.J.Nagrath & D.P.Kothari, "Electric Machines", Tata Mc Graw Hill, 5th Edition.2017

#### **REFERENCE:**

1. M.G. Say ,"Alternating Current Machines", John Wiley & Sons, 1976.

2. A. E. Fitzgerald, C. Kingsley and S. Umans, "Electric Machinery", Mc Graw-Hill Companies, 6th edition 2017.

3. Ashfaq Husain ,"Electric Machines", Dhanapati Rai&Co, New Delhi, 3rd edition , 2017.

4. Soft Starter Handbook, ABB Group.

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

#### **UNIT-I: THREE PHASE INDUCTION MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Subject & Course Outcomes	1	11-07-2023		TLM1	
2.	Stator construction, Rotor construction details	1	13-07-2023		TLM1	
3.	Types of three phase induction motor	1	14-07-2023		TLM1	
4.	Working principle of three phase IM	1	18-07-2023		TLM1	
5.	Production of rotating magnetic field, Synchronous speed, Slip equation	1	20-07-2023		TLM1	
6.	Rotor emf and rotor frequency	1	21-07-2023		TLM1	
7.	Rotor reactance, rotor current and power factor	1	22-07-2023		TLM1	
8.	Phasor diagram of three phase IM	1	25-07-2023		TLM1	
9.	Tutorial-I	1	27-07-2023		TLM3	
10.	Equivalent circuit of three phase IM	1	28-07-2023		TLM1	
11.	Crawling and cogging	1	01-08-2023		TLM1	
12.	Tutorial-II	1	03-08-2023		TLM3	
	No. of classes required to complet	e UNIT-I: 1	2	No. of clas	sses takei	1:

#### **UNIT-II: PERFORMANCE OF INDUCTION MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Power stages -Rotor power input, rotor copper loss	1	04-08-2023		TLM1	
14.	Mechanical power developed and their inter relation	1	05-08-2023		TLM1	
15.	Torque equation- expressions for starting torque and running torque-condition for maximum torque	1	08-08-2023		TLM1	
16.	Torque-slip characteristics	1	10-08-2023		TLM1	
17.	Losses and efficiency	1	11-08-2023		TLM1	
18.	Tutorial-III	1	17-08-2023		TLM3	
19.	Starting methods of Three Phase IM	1	18-08-2023		TLM1	
20.	No load and blocked rotor tests –equivalent circuit	1	19-08-2023		TLM1	
21.	Circle Diagram	1	22-08-2023		TLM1	

22.	Tutorial-IV	1	24-08-2023	]	TLM3
23.	Circle Diagram Numerical	1	25-08-2023	ŋ	TLM1
24.	Operation of induction motor as induction generator	1	26-08-2023	ŋ	TLM1
No.	of classes required to complete	12	No. of classe	es taken:	

#### **UNIT-III: SINGLE PHASE INDUCTION MOTORS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly		
25.	Principle,operation - Double revolving field theory	1	05-09-2023		TLM1			
26.	Split phase induction motor	1	07-09-2023		TLM1			
27.	Assignment-I	1	08-09-2023					
28.	Capacitor start and run induction motors	1	12-09-2023		TLM1			
29.	Shaded pole induction motor	1	14-09-2023		TLM1			
30.	Equivalent circuit	1	15-09-2023		TLM1			
31.	Tutorial-V	1	16-09-2023		TLM3			
No.	No. of classes required to complete UNIT-III: 7 No. of classes taken:							

#### **UNIT-IV: SYNCHRONOUS GENERATORS**

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.	Construction of synchronous generators & Types of rotor	1	19-09-2023		TLM1	
33.	Working principle & EMF equation	1	21-09-2023		TLM1	
34.	Types of Rotors	1	22-09-2023		TLM1	
35.	Armature reaction, Phasor diagram of alternator	1	23-09-2023		TLM1	
36.	Tutorial-VI	1	26-09-2023		TLM3	
37.	Regulation Methods– EMF Method	1	29-09-2023		TLM1	
38.	MMF Method	1	30-09-2023			
39.	ZPF method	1	03-10-2023		TLM1	
40.	Synchronizing to infinite bus bars	1	05-10-2023		TLM1	
41.	Two reaction theory	1	06-10-2023		TLM1	
42.	Parallel operation of synchronous generators	1	07-10-2023		TLM1	
43.	Synchronous Machine constants	1	10-10-2023		TLM1	
44.	Tutorial-VII		12-10-2023		TLM3	
No.	of classes required to complete	UNIT-IV: 1	13	No. of clas	ses taker	1:

#### **UNIT-V: SYNCHRONOUS MOTORS**

S. No.	Topics to be covered	No. of Classes Require	Tentativ Date of d Completi	e Act Dat on Comp	cual ce of letion	Teaching Learning Methods	HOD Sign Weekly
45.	Constructional features, principle of operation	1	13-10-20	23		TLM1	
46.	Methods of starting	1	17-10-20	23		TLM1	
47.	Power developed, Effect of increased load with constant excitation		19-10-20	23		TLM1	
48.	Synchronous motor with different excitations	1	20-10-20	23		TLM1	
49.	Effect of changing excitation constant load & Torque equation	1	21-10-20	23		TLM1	
50.	Tutorial-VIII	1	24-10-20	23		TLM3	
51.	V curve and inverted V curve – hunting	1	26-10-20	23		TLM1	
52.	Tutorial-IX	1	27-10-20	23		TLM3	
53.	ASSIGNMENT-II	1	28-10-20	23			
54.	Contend Beyond Syllabus		28-10-20	23			
No. of classes required to complete UNIT-V: 9 No. of classes taken:						1:	
Teachi	Teaching Learning Methods						
TLM	TLM1     Chalk and Talk     TLM4     Demonstration (Lab/Field Visit)						

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))	<mark>M=30</mark>
Cumulative Internal Examination (CIE): M	<mark>30</mark>
Semester End Examination (SEE)	<mark>70</mark>
Total Marks = $CIE + SEE$	100

#### PART-D

PROGR	AMME OUTCOMES (POs):
PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis</b> : 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	<b>Design/development of solutions</b> : 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	<b>Conduct investigations of complex problems</b> : 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	<b>Modern tool usage</b> : 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	<b>The engineer and society</b> : 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	<b>Environment and sustainability</b> : 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	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and team work</b> : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication</b> : 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	<b>Project management and finance</b> : 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	<b>Life-long learning</b> : Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.K.NAGALINGA CHARY	Dr.T.NAGA DURGA	Mr.P.DEEPAK REDDY	Dr.J.SIVAVARA PRASAD
Signature				



#### DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

# COURSE HANDOUT

### PART-A

Name of Course Instructor	: Dr. J.Sivavara Prasad		
Course Name & Code	: Power Electronics-20EE14		
L-T-P Structure	: 2-1-0	Credits	: 3
Program/Sem/Sec	: B.Tech., EEE., V-Sem., Section- A&B	A.Y	: 2023-24

**PRE-REQUISITE:** Electronics circuits and Devices (20EE01), Electrical Circuit Analysis(20EE05)

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

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

CO1: Understand the characteristics of various power semiconductor devices. (Understand- L2)

CO2: Analyze the operating principles for single-phase and three phase thyristor based rectifiers (Apply-L3)

**CO3**: Analyze operation of dc-dc converters in steady state in continuous and discontinuous modes (**Apply-L3**)

**CO4**: Interpret the operation of ac voltage controllers and cyclo converters (**Understand-L2**) **CO5**: Understand the operation and performance of inverters (**Understand-L2**)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2											2			2
CO2	2	2											1	2	2	2
CO3	2	2										1	2		2	2
CO4	2	2										2	2		2	
CO5	2	2										2			2	

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

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. Md.H.Rashid "Power Electronics", Pearson Education fourth Edition, first Indian Reprint-2014.
- 2. Dr.P.S. Bhimbra, "Power Electronics", Khanna Publishers, 5<sup>th</sup> Edition, 2012.

#### **REFERENCES:**

- 1. Ned Mohan, T.M. Undeland and William P.Robbins, "Power Electronic Converters-Applications", John Wiley & Sons, 3rd Edition, , 2009
- 2. M D Singh, K B Khanchandani "Power Electronics", Tata MC Graw Hill Publishers,2<sup>nd</sup> edition 2006.

# PART-B

#### COURSE DELIVERY PLAN (LESSON PLAN): A Section

#### **UNIT-I:**POWER SEMI-CONDUCTOR DEVICES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	04.07.2023		TLM1	
2.	Introduction to Power semiconductor switches, Thyristor family	1	05.07.2023		TLM1	
3.	SCR operation& Characteristics of SCR	1	06.07.2023		TLM2	
4.	Two transistor model	1	11.07.2023		TLM1	
5.	Static and dynamic characteristics	1	12.07.2023		TLM1	
6.	Turn on and Turn off methods	1	13.07.2023		TLM2	
7.	TUTORIAL-1	1	15.07.2023		TLM3	
8.	Series and Parallel operation of thyristors	1	18.07.2023		TLM1	
9.	Gate triggering circuits	1	19.07.2023		TLM1	
10.	Protection	1	20.07.2023		TLM1	
11.	Snubber circuits, Characteristics of GTO & IGBT	1	22.07.2023		TLM1	
12.	TUTORIAL-2	1	25.07.2023		TLM3	
No. of	classes required to complete UNIT-I:12	2		No. of classes	s taken:	

#### UNIT-II: COMMUTATIONS & PHASE-CONTROLLED RECTIFIERS

		No. of	Tentative	Actual	Teaching	HOD
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Sign
	_	Required	Completion	Completion	Methods	Weekly
1.	Natural commutation, Forced commutation circuits	1	26.07.2023		TLM1	¥
2.	Self, Impulse and complimentary commutations	1	27.07.2023		TLM1	
3.	Single phase Half wave bridge controlled rectifiers with R and RL loads–continuous and discontinuous modes	1	01.07.2023		TLM2	
4.	Numericals on single phase half wave bridge controlled rectifiers	1	02.08.2023		TLM1	
5.	TUTORIAL-3	1	03.08.2023		TLM3	
6.	Full wave bridge controlled rectifiers with R and RL loads– continuous and discontinuous modes	1	05.08.2023		TLM2	
7.	Numericals on full wave bridge controlled rectifiers	1	08.08.2023		TLM1	
8.	effect of freewheeling diode	1	09.08.2023		TLM1	
9.	Dual converters-single phase	1	10.08.2023		TLM1	
10.	Dual converters- three phase	1	16.08.2023		TLM1	
11.	Effect of Source impedance	1	17.08.2023		TLM1	

12.	TUTORIAL-4	1	19.08.2023		TLM3	
13.	Problems	1	22.08.2023		TLM1	
No. of classes required to complete UNIT-II:13				No. of classes	taken:	

#### UNIT-III: AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

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.	Single phase ac voltage controller with R and RL loads continuous and discontinuous modes	1	23.08.2023		TLM1	
2.	Problems on single phase ac voltage controller with R and RL loads	1	24.08.2023		TLM2	
3.	Three phase ac voltage controller with R and RL loads continuous and discontinuous modes	1	26.08.2023		TLM1	
4.	Problems on Three phase ac voltage controller with R and RL loads	1	05.09.2023		TLM2	
5.	TUTORIAL-5	1	07.09.2023		TLM3	
б.	Principle of operation of Cyclo- converter	1	12.09.2023		TLM1	
7.	Single phase to single phase cyclo converters-Midpoint type	1	13.09.2023		TLM1	
8.	Single phase to single phase cyclo converters-Bridge type	1	14.09.2023		TLM1	
9.	Problems on Single phase to single phase cyclo converters	1	16.09.2023			
10.	Problems	1	19.09.2023			
No. of	classes required to complete UNIT-III	10		No. of classes	taken:	

#### **UNIT-IV : DC TO DC CONVERTERS**

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.	Principle of operation dc to dc converters	1	20.09.2023		TLM1	
2.	Step-up and step-down chopper	1	21.09.2023		TLM2	
3.	Control Strategies of dc to dc converters	1	23.09.2023		TLM1	
4.	Derivation of average load voltage, load current for continuous current operation	1	26.09.2023		TLM1	
5.	Numericals on step up chopper	1	27.09.2023		TLM1	
6.	TUTORIAL-6	1	30.09.2023		TLM3	
7.	Derivation of average load voltage, load current for discontinuous current operation	1	03.10.2023		TLM1	
8.	Analysis of Class A chopper	1	04.10.2023		TLM2	
9.	TUTORIAL-7	1	05.10.2023		TLM3	
10.	Problems		07.10.2023			
No. of	classes required to complete UNIT-IV:	:10	•	No. of classes	taken:	

#### **UNIT-V : INVERTERS**

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.	Single phase Voltage Source Inverter	1	10.10.2023		TLM1	Ĭ
2.	Single phase Current source inverters	1	11.10.2023		TLM1	
3.	Comparison between VSI and CSI	1	12.10.2023		TLM1	
4.	Analysis with R & RL loads	1	17.10.2023		TLM2	
5.	3-phase inverters–180 and 120 degree mode of operation	1	18.10.2023		TLM1	
6.	TUTORIAL-8	1	19.10.2023		TLM3	
7.	Single Pulse Width Modulation	1	21.10.2023		TLM1	
8.	Multiple Pulse Width Modulation	1	24.10.2023		TLM1	
9.	Sinusoidal PWM	1	25.10.2023		TLM2	
10.	Single phase Current source inverters with ideal switches	1	26.10.2023		TLM1	
11.	Content beyond syllabus	1	28.10.2023		TLM2	
No. of classe	es required to complete UNIT-V:	11		No. of classes	taken:	

#### COURSE DELIVERY PLAN (LESSON PLAN): B- Section

#### **UNIT-I:**POWER SEMI-CONDUCTOR DEVICES

		No. of	Tentative	Actual	Teaching	HOD
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Sign
		Required	Completion	Completion	Methods	Weekly
1.	Introduction to Course and COs	1	05.07.2023		TLM1	
	Introduction to Power		06.07.2023			
2.	semiconductor switches, Thyristor	1			TLM1	
	family					
3	SCR operation & Characteristics of	1	07.07.2023		TI M2	
5.	SCR	1			12012	
4	Two transistor model	1	10.07.2023		TLM1	
		1			12001	
5.	Static and dynamic characteristics	1	12.07.2023		TLM1	
	·····					
6.	Turn on and Turn off methods	1	13.07.2023		TLM2	
			14.07.2022			
7.	TUTORIAL-1	1	14.07.2023		TLM3	
	Sorias and Perellal operation of		17 07 2023		TI M1	
8.	thuristors	1	17.07.2023		I LIVI I	
			19.07.2023		TI M1	
9.	Gate triggering circuits	1	19.07.2023		I LIVII	
			20.07.2023		TLM1	
10.	Protection	1	20.07.2025		12.011	
	Snubber circuits. Characteristics of		21.07.2023		TLM1	
11.	GTO & IGBT	1				
10			24.07.2023		TLM3	
12.	TUTORIAL-2	l				
No. of	classes required to complete UNIT-I:12	2	•	No. of classes	taken:	•

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.	Natural commutation, Forced commutation circuits	1	26.07.2023		TLM1	Ĩ
2.	Self, Impulse and complimentary commutations	1	27.07.2023		TLM1	
3.	Single phase Half wave bridge controlled rectifiers with R and RL loads–continuous and discontinuous modes	1	28.07.2023		TLM2	
4.	Numericals on single phase half wave bridge controlled rectifiers	1	31.07.2023		TLM1	
5.	TUTORIAL-3	1	02.08.2023		TLM3	
6.	Full wave bridge controlled rectifiers with R and RL loads– continuous and discontinuous modes	1	03.08.2023		TLM2	
7.	Numericals on full wave bridge controlled rectifiers	1	04.08.2023		TLM1	
8.	effect of freewheeling diode	1	07.08.2023		TLM1	
9.	Dual converters-single phase	1	09.08.2023		TLM1	
10.	Dual converters- three phase	1	10.08.2023		TLM1	
11.	Effect of Source impedance	1	11.08.2023		TLM1	
12.	TUTORIAL-4	1	14.08.2023		TLM3	
13.	Problems	1	16.08.2023		TLM1	
No. of	classes required to complete UNIT-II:	13		No. of classes	taken:	

#### **UNIT-II:** COMMUTATIONS & PHASE-CONTROLLED RECTIFIERS

UNIT-III: AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

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.	Single phase ac voltage controller with R and RL loads continuous and discontinuous modes	1	17.08.2023		TLM1	
2.	Problems on single phase ac voltage controller with R and RL loads	1	18.08.2023		TLM2	
3.	Three phase ac voltage controller with R and RL loads continuous and discontinuous modes	1	21.08.2023		TLM1	
4.	Problems on Three phase ac voltage controller with R and RL loads	2	23.08.2023 24.08.2023		TLM2	
5.	TUTORIAL-5	1	25.08.2023		TLM3	
6.	Principle of operation of Cyclo- converter	1	04.09.2023		TLM1	
7.	Single phase to single phase cyclo converters-Midpoint type	1	07.09.2023		TLM1	
8.	Single phase to single phase cyclo converters-Bridge type	1	08.09.2023		TLM1	
9.	Problems on Single phase to single phase cyclo converters	1	11.09.2023			
10.	Problems	1	13.09.2023			
No. of	classes required to complete UNIT-III	: 11		No. of classes	s taken:	

#### **UNIT-IV : DC TO DC CONVERTERS**

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.	Principle of operation dc to dc converters	1	14.09.2023		TLM1	
2.	Step-up and step-down chopper	1	15.09.2023		TLM2	
3.	Control Strategies of dc to dc converters	1	20.09.2023		TLM1	
4.	Derivation of average load voltage, load current for continuous current operation	1	21.09.2023		TLM1	
5.	Numericals on step up chopper	1	22.09.2023		TLM1	
6.	TUTORIAL-6	1	25.09.2023		TLM3	
7.	Derivation of average load voltage, load current for discontinuous current operation	1	27.09.2023		TLM1	
8.	Analysis of Class A chopper	2	29.09.2023 04.10.2023		TLM2	
9.	TUTORIAL-7	1	05.10.2023		TLM3	
No. of	No. of classes required to complete UNIT-IV:10				taken:	

#### **UNIT-V : INVERTERS**

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.	Single phase Voltage Source Inverter	1	06.10.2023		TLM1	
2.	Single phase Current source inverters	1	09.10.2023		TLM1	
3.	Comparison between VSI and CSI	1	11.10.2023		TLM1	
4.	Analysis with R & RL loads	1	12.10.2023		TLM2	
5.	3-phase inverters–180 and 120 degree mode of operation	1	13.10.2023		TLM1	
6.	TUTORIAL-8	1	16.10.2023		TLM3	
7.	Single Pulse Width Modulation	1	18.10.2023		TLM1	
8.	Multiple Pulse Width Modulation	1	19.10.2023		TLM1	
9.	Sinusoidal PWM	1	20.10.2023		TLM2	
10.	Single phase Current source inverters with ideal switches	1	25.10.2023 26.10.2023		TLM1	
11.	Content beyond syllabus	1	27.10.2023		TLM2	
No. of classe	s 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 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)	A1=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):	30
Semester End Examination (SEE)	70
Total Marks = $CIE + SEE$	100

## PART-D

#### **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering
	problems.
<b>PO 2</b>	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	<b>Design/development of solutions</b> : 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
<b>DO 4</b>	Considerations.
PO 4	<b>Conduct investigations of complex problems:</b> 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
105	engineering and IT tools including prediction and modelling to complex engineering activities
	with an understanding of the limitations
PO 6	<b>The engineer and society</b> : 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
<b>PO 7</b>	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.
<b>PO 8</b>	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
<b>DO 11</b>	clear instructions.
PO 11	<b>Project management and finance</b> : Demonstrate knowledge and understanding of the
	engineering and management principles and apply these to one's own work, as a member and
DO 12	leader in a team, to manage projects and in multidisciplinary environments.
PU 12	Line-iong learning: Recognize the need for, and nave the preparation and ability to engage in
	independent and me-iong 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

Dr.J.S.V.Prasad	Dr.J.S.V.Prasad	Dr.J.S.V.Prasad
Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)



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#### **DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

#### <u>COURSE HANDOUT</u> <u>PART-A</u>

Name of Course Instruc	tor: Mr. R.ANJANEYULU NAIK	
Course Name & Code :	inear and Digital IC Applications – 20EE	16
L-T-P Structure	: 3-0-0	Credits: 3
Program/Sem/Sec	: B.Tech/V SEM, A SEC	<b>A.Y.:</b> 2023-24

Pre-requisites: Digital Electronics.

**Course Educational Objectives:** This course enables the student to understand the linear and digital integrated circuits and their applications.

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

CO1	Analyze linear ICs for engineering applications (Apply-L3)
CO2	Design various Filters using their frequency bands(Apply-L3)
CO3	Design all combinational and Sequential circuits using Digital ICs (Apply-L3)
CO4	Compare various memory devices (Understand-L2)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3	PSO4
CO1	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-
CO3	3	3	-	2	1	-	-	-	-	-	-	-	-	-	3	2
CO4	3	3	-	2	1	-	-	-	-	-	-	-	-	-	3	2

#### **TEXT BOOKS:**

- T1 D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd.
- **T2** John F. Wakerly, "Digital Design: Principles and Practices", Pearson education, 5th edition, 2017.

#### **REFERENCE:**

- **R1** R.F. Coughlin and Fredrick F Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI.
- **R2** Denton J. Daibey, "Operational Amplifiers and Linear Integrated Circuits: Theory and Applications", TMH.
- **R3** Serigo Franco, "Design with Operational amplifiers and Analog Integrated circuits", McGraw Hill.
- **R4** Thomas L. Floyd, "Digital Fundamentals", Pearson Education, 10th edition, 2011.
- **R5** Ramakanth A. Gayakwad, "Op-Amp & Linear ICs", PHI.

#### Part - B

## COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I: Operational Amplifier

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to subject and awareness on COs	1	10-07-2023		TLM2	
2.	Introduction to Unit-I: Basic Information of Op-Amp, Ideal and practical Op-Amp	1	11-07-2023		TLM2	
3.	Op-Amp AC&DC characteristics	1	12-07-2023		TLM2	
4.	741 Op-Amp and its features, Modes of operation-inverting, non inverting, differential	1	13-07-2023		TLM2	
5.	APPLICATIONS:Summer, subtractor, IA	1	17-07-2023		TLM2	
6.	Log and anti log amplifiers, Sample and hold circuits, multipliers	1	18-07-2023		TLM2	
7.	Dividers, differentiators Integrators	1	19-07-2023		TLM3	
8.	Comparators	1	20-07-2023		TLM2	
9.	Comparators	1	24-07-2023		TLM2	
10.	Schmitt trigger, multivibrators	1 Inlete · 10	25-07-2023	No of class	TLM2	

#### **UNIT-II: Active Filers and Oscillators**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Introduction to Unit-II: 1 <sup>st</sup> order low pass filter, high pass filter	1	26-07-2023		TLM2	
12.	Band pass filter Band reject filter, All pass filter	1	27-07-2023		TLM2	
13.	Oscillators types and principle of operation	1	1-08-2023		TLM2	
14.	Oscillators types and principle of operation	1	2-08-2023		TLM3	
15.	RC phase shift oscillator	1	3-08-2023		TLM2	

16.	Wein and Quadrature Oscillators	1	7-08-2023	TLM2			
17.	Wave form generators- triangular, sawtooth	1	8-08-2023	TLM2			
18.	Wave form generators- Square	1	9-08-2023	TLM2			
No. of	No. of classes required to complete : 8 No. of classes taken:						

## UNIT-III: Timers & A/D-D/A Converters

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Introduction to Unit-III: 555 Timer, functional diagram	1	14-08-2023		TLM2	
20.	Monostable and Astable operations and Applications	1	16-08-2023		TLM2	
21.	VCO	1	17-08-2023		TLM3	
22.	PLL-introduction, block schematic	1	21-08-2023		TLM2	
23.	Introduction to converters, Basic DAC techniques	1	22-08-2023		TLM2	
24.	Weighted resistor and R-2R ladder DAC	1	23-08-2023		TLM2	
25.	Inverted R-2R DAC , IC 1408 DAC, Types of ADCs: Parallel comparator type ADC	1	24-08-2023		TLM2	
	I MID EXAMS	28-08-2023	TO 02-09-202	23		
26.	Counter type, successive approximation ADC	1	04-09-2023		TLM2	
27.	Dual slop ADC,	1	05-09-2023		TLM3	
28.	specifications of DAC and ADC	1	07-09-2023		TLM2	
No. of	classes required to com	plete : 10		No. of classes	taken:	

## UNIT-IV: Logic Families and Combinational Circuits

		No. of	Tentative	Actual	Teaching	HOD
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Sign
		Required	Completion	Completion	Methods	Weekly
20	Classification of	1	12-09-2023		TLNAO	
29.	integrated circuits,	T				
20	Comparision of various	1	13-09-2023		TI M2	
50.	logic families					

31.	Standard TTL NAND gate, analysis & Charecteristics	1	14-09-2023		TLM2	
32.	TTL open collector O/Ps, tristate TTL,	1	19-09-2023		TLM2	
33.	IC interfacing-TTL driving CMOS	1	20-09-2023		TLM2	
34.	CMOS driving TTL	1	21-09-2023		TLM3	
35.	MOS and CMOS open drain and tristate outputs, CMOS transmission gate	1	25-09-2023		TLM2	
36.	Design using TTL- 74XX decoders, demux, Decoders & drivers for LED & LCD display, encoder	1	26-09-2023		TLM2	
37.	Priority encoder, multiplexers & their applications Parity generator /checker circuits	1	27-09-2023		TLM2	
38.	Parallel binary adder/subtractor circuit using 2's complement system and Digital comparator circuit	1	03-10-2023		TLM2	
No. of o	classes required to co	mplete : 1	0	No. of class	ses taken:	

# UNIT-V: Sequential Circuits and Memories

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39.	74XX series of counters	1	04-10-2023		TLM2	
40.	ROM architecture	1	05-10-2023		TLM2	
41.	ROM TYPES	1	06-10-2023		TLM2	
42.	ROM Applications	1	09-10-2023		TLM2	
43.	RAM architecture	1	10-10-2023		TLM2	
44.	Static & Dynamic RAM	1	11-10-2023		TLM2	
45.	Synchronous DRAMs	1	12-10-2023		TLM2	
		BEYOND T	HE SYLLABUS			

	46.	Stability of op-amp	1	16-10-2023		TLM2	
	47.	Projects with ICs	1	17-10-2023		TLM2	
	48.	REVISION		18-10-2023 19-10-2023			
N	lo. of c	lasses required to c	No. of class	es taken:			

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

#### 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)					
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	<mark>M=30</mark>				
Cumulative Internal Examination (CIE): M	<mark>30</mark>				
Semester End Examination (SEE)	70				
Total Marks = CIE + SEE	100				

## PART-D

PRO	GRAMME OUTCOMES (POs):
DO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals,
PUI	and an engineering specialization to the solution of complex engineering problems.
	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering
PO 2	problems reaching substantiated conclusions using first principles of mathematics, natural sciences,
	and engineering sciences.
	<b>Design/development of solutions</b> : Design solutions for complex engineering problems and design
PO 3	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.
	Conduct investigations of complex problems: Use research-based knowledge and research
PO 4	methods including design of experiments, analysis and interpretation of data, and synthesis of the
	information to provide valid conclusions.
	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern
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107	development
	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of
PO 8	the engineering practice.
<b>DO 0</b>	Individual and team work: Function effectively as an individual, and as a member or leader in
P0 9	diverse teams, and in multidisciplinary settings.
	<b>Communication</b> : Communicate effectively on complex engineering activities with the engineering
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1010	reports and design documentation, make effective presentations, and give and receive clear
	instructions.
	Project management and finance: Demonstrate knowledge and understanding of the engineering
PO 11	and management principles and apply these to one's own work, as a member and leader in a team,
	to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in
	independent and life-long learning in the broadest context of technological change.

# **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. B.Pangedaiah	Mr. B.Pangedaiah	Dr. G.Nageswararao	Dr.J.S.V.PRASAD
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 & ELECTRONICS ENGINEERING**

#### <u>COURSE HANDOUT</u> <u>PART-A</u>

Name of Course Instruc	tor: Mr. R.ANJANEYULU NAIK	
Course Name & Code :	Linear and Digital IC Applications – 20EE1	16
L-T-P Structure	: 3-0-0	Credits: 3
Program/Sem/Sec	: B.Tech/V SEM, B SEC	<b>A.Y.:</b> 2023-24

Pre-requisites: Digital Electronics.

**Course Educational Objectives:** This course enables the student to understand the linear and digital integrated circuits and their applications.

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

CO1	Analyze linear ICs for engineering applications (Apply-L3)
CO2	Design various Filters using their frequency bands(Apply-L3)
CO3	Design all combinational and Sequential circuits using Digital ICs (Apply-L3)
CO4	Compare various memory devices (Understand-L2)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3	PSO4
CO1	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-
CO3	3	3	-	2	1	-	-	-	-	-	-	-	-	-	3	2
CO4	3	3	-	2	1	-	-	-	-	-	-	-	-	-	3	2

#### **TEXT BOOKS:**

- T1 D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd.
- **T2** John F. Wakerly, "Digital Design: Principles and Practices", Pearson education, 5th edition, 2017.

#### **REFERENCE:**

- **R1** R.F. Coughlin and Fredrick F Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI.
- **R2** Denton J. Daibey, "Operational Amplifiers and Linear Integrated Circuits: Theory and Applications", TMH.
- **R3** Serigo Franco, "Design with Operational amplifiers and Analog Integrated circuits", McGraw Hill.
- **R4** Thomas L. Floyd, "Digital Fundamentals", Pearson Education, 10th edition, 2011.
- **R5** Ramakanth A. Gayakwad, "Op-Amp & Linear ICs", PHI.

#### Part - B

## COURSE DELIVERY PLAN (LESSON PLAN): Section-B

## UNIT-I: Operational Amplifier

		No. of	Tentative	Actual	Teaching	HOD			
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Sign			
		Required	Completion	Completion	Methods	Weekly			
	03-07-2023 TO 08-07-203 CSP PROJECT								
1	Introduction to subject	1	10-07-2023		TI M2				
1.	and awareness on COs	-							
	Introduction to Unit-I:								
2	Basic Information of	1			TINAO				
Ζ.	Op-Amp, Ideal and	T	11 07 2022						
	practical Op-Amp		11-07-2025						
2	Op-Amp AC&DC	1	12-07-2023		TINAO				
5.	characteristics	Ţ							
	741 Op-Amp and its								
	features, Modes of								
4.	operation-inverting,	1			TLM2				
	non inverting,		15-07-2023						
	differential								
5.	APPLICATIONS:Summer,	1	17-07-2023		TLM2				
	subtractor, IA								
	Log and anti log								
6.	amplifiers, Sample and	1	18-07-2023		TLM2				
	noid circuits, multipliers								
7.	Dividers, differentiators	1	19-07-2023		TLM3				
	Integrators		22-07-2023						
8.	Comparators	1	22-07-2023		TLM2				
9.	Comparators	1	24-07-2023		TLM2				
10.	Schmitt trigger,	1	25-07-2023		TLM2				
No. of	multiviorators	nloto i 10		No of alcost	a talvan:				
NO. 0I	classes required to com	INO. OF CLASSE	ез такеп:						

#### UNIT-II: Active Filers and Oscillators

		No. of	Tentative	Actual	Teaching	HOD
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Sign
		Required	Completion	Completion	Methods	Weekly
	Introduction to Unit-II: 1 <sup>st</sup>		26-07-2023			
11.	order low pass filter, high	1			TLM2	
	pass filter					
12	Band pass filter Band reject	1	1-08-2023		TI N/2	
12.	filter, All pass filter	1				
12	Oscillators types and	1	2-08-2023		TI N/2	
15.	principle of operation	Ţ				
1.4	Oscillators types and	1	5-08-2023		TINAO	
14.	principle of operation	L			I LIVIS	

15.	RC phase shift oscillator	1	7-08-2023	TLM2	
16.	Wein and Quadrature Oscillators	1	8-08-2023	TLM2	
17.	Wave form generators- triangular, sawtooth	1	9-08-2023	TLM2	
18.	Wave form generators- Square	1	14-08-2023	TLM2	
No. of	classes required to complet	te : 9	No.	of classes taken:	

#### UNIT-III: Timers & A/D-D/A Converters

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Introduction to Unit-III: 555 Timer, functional diagram	1	16-08-2023		TLM2	
20.	Monostable and Astable operations and Applications	1	17-08-2023		TLM2	
21.	VCO	1	21-08-2023		TLM3	
22.	PLL-introduction, block schematic	1	22-08-2023		TLM2	
23.	Introduction to converters, Basic DAC techniques	1	23-08-2023		TLM2	
24.	Weighted resistor and R-2R ladder DAC	1	26-08-2023		TLM2	
25.	Inverted R-2R DAC , IC 1408 DAC, Types of ADCs: Parallel comparator type ADC	1	04-09-2023		TLM2	
	I MID EXAMS	28-08-2023	TO 02-09-202	23		
26.	Counter type, successive approximation ADC	1	05-09-2023		TLM2	
27.	Dual slop ADC,	1	11-09-2023		TLM3	
28.	specifications of DAC and ADC	1	12-09-2023		TLM2	
29.	Assignment/Quiz-III	1	13-09-2023		TLM6	
No. of	classes required to com		No. of classes	s taken:		

# UNIT-IV: Logic Families and Combinational Circuits

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

31.	Comparision of various logic families	1	13-09-2023	TLM2
32.	Standard TTL NAND gate, analysis & Charecteristics	1	19-09-2023	TLM2
33.	TTL open collector O/Ps, tristate TTL,	1	20-09-2023	TLM2
34.	IC interfacing-TTL driving CMOS	1	23-09-2023	TLM2
35.	CMOS driving TTL	1	25-09-2023	TLM3
36.	MOS and CMOS open drain and tristate outputs, CMOS transmission gate	1	26-09-2023	TLM2
37.	Design using TTL- 74XX decoders, demux, Decoders & drivers for LED & LCD display, encoder	1	27-09-2023	TLM2
38.	Priority encoder, multiplexers & their applications Parity generator /checker circuits	1	30-09-2023	TLM2
39.	Parallel binary adder/subtractor circuit using 2's complement system and Digital comparator circuit	1	03-10-2023	TLM2

## UNIT-V: Sequential Circuits and Memories

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	74XX series of counters	1	04-10-2023		TLM2	
41.	ROM architecture	1	05-10-2023		TLM2	
42.	ROM TYPES	1	07-10-2023		TLM2	
43.	ROM Applications	1	09-10-2023		TLM2	
44.	RAM architecture	1	10-10-2023		TLM2	
45.	Static & Dynamic RAM	1	11-10-2023		TLM2	

46.	Synchronous DRAMs	1	16-10-2023	Т	LM2			
BEYOND THE SYLLABUS								
47.	Stability of op-amp	1	17-10-2023	Т	LM2			
48.	Projects with ICs	1	18-10-2023	T	LM2			
49.	REVISION	1	21-10-2023					
	31-10-2023 TO 04-11-2023 II MID EXAMS							
No. of c	No. of classes required to complete : 09 No. of classes taken:							

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

# 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))					
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)					
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	<mark>M=30</mark>				
Cumulative Internal Examination (CIE): M	<mark>30</mark>				
Semester End Examination (SEE)	70				
Total Marks = CIE + SEE	100				

## PART-D

P0 1Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.P0 2Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.P0 3Design/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.P0 4Conduct 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.P0 4Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.P0 6Environment 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.P0 70Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.P0 10Communication: Communicate effectively on complex engineering activities with the engineering roctive dasign documentation, make effective presentations, and give and receive clear inst	PRO	GRAMME OUTCOMES (POs):
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1 ~ ~ - I independent and life-long learning in the broadest context of technological change	PO 12	independent and life-long learning in the broadest context of technological change

# **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department	
Name of the Faculty	Mr. B.Pangedaiah	Mr. B.Pangedaiah	Dr. G.Nageswararao	Dr.J.S.V.PRASAD	
Signature					

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)



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**DEPARTMENT OF INFORMATION TECHNOLOGY** 

# **COURSE HANDOUT**

# PART-A

Name of Course Instructor	: Mrs M. Hema latha	
Course Name & Code :	OOP Through JAVA, 20IT81	
L-T-P Structure :	3-0-0	Credits: 03
Program/Sem/Sec :	B.Tech-EEE / V SEM / A	
A.Y. :	2023-24	
PREREQUISITE :	Programming for Problem solving using C	

**COURSE OBJECTIVE**: Concentrates on the methodological and technical aspects of software design and programming based on Object Oriented Programming (OOP). Acquire the basic knowledge and skills necessary to implement Object-Oriented Programming Techniques in software development through JAVA.

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

CO 1	Understand Object Oriented Programming Concepts through constructs of JAVA. (Understand- L2)
CO 2	Apply the concept of inheritance and polymorphism on real-world applications. (Apply-L3)
CO 3	Implement reusability using interface and packages. (Understand- L2)
CO 4	Construct robust applications using exception handling. (Apply – L3)
CO 5	Understand multi-threading concepts. (Understand- L2)

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

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

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

#### **TEXTBOOKS**:

1. Java Fundamentals–A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

#### **<u>REFERENCE BOOKS</u>**:

- 1. The Java<sup>TM</sup> Programming Language: Ken Arnold, James Gosling, Pearson.
- 2. Introduction to Java Programming 7/e, Brief version, Y.Daniel Liang, Pearson
- 3. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI

#### COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Learning Outcome on Methods COs		HOD Sign Weekly
1.	Introduction : History Of JAVA, Advantages	1	11-07-23		TLM1		
2.	JAVA buzz words/features	1	12-07-23		TLM1		
3.	OOP Concepts	1	13-07-23		TLM1		
4.	Data types, variables and Keywords	1	15-07-23		TLM1		
5.	Operators	2	18-07-23		TLM1		
6.	Expressions	1	19-07-23		TLM1		
7.	Control Statements	2	20-07-23		TLM1		
8.	Methods & Recursion	1	22-07-23		TLM1		
9.	sample programs	1	25-07-23		TLM4		
10.	Java Objects and references	1	26-07-23		TLM1		
11.	Constructors , this keyword	1	27-07-23		TLM1		
12.	Arrays	2	01-08-23		TLM1		
13.	String	1	02-08-23		TLM1		
14.	StringBuffer, String Tokenizer	1	03-08-23		TLM1		
15.	Rivision & Assignment Unit-I	1	05-08-23		TLM3		
No. of classes required to complete UNIT-I			18	No. o	f classes tak	ken:	

#### **UNIT-I: Introduction to OOP and JAVA**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
16.	Inheritance introduction, derived Classes	1	08-08-23	-	TLM1	CO2	
17.	Types Of Inheritance	1	09-08-23		TLM1	CO2	
18.	Member Accessibility	1	10-08-23		TLM1	CO2	
19.	Overriding, super keyword	1	12-08-23		TLM4	CO2	
20.	Abstract Classes and Methods	1	16-08-23		TLM1	CO2	
21.	Final Keyword, Final Method, Final Classes	1	17-08-23		TLM1	CO2	
22.	Dynamic Binding	1	19-08-23		TLM2	CO2	
23.	Polymorphism	1	22-08-23		TLM1	CO2	
24.	Rivision & Assignment Unit-II	1	23-08-23		TLM3		
No. of comple	classes required to ete UNIT-II	9		No. of classe	s taken:		

#### UNIT-II: Extending Classes and Reusability

#### **UNIT-III: Interfaces & Packages**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
25.	Difference between classes and interfaces	1	24-08-23		TLM1	CO3	
26.	Defining an Interface	1	26-08-23		TLM1	CO3	
27.	implementing an Interface	1	05-09-23		TLM4		
28.	Variables in interfaces	1	07-09-23		TLM1		
29.	Extending Interfaces	1	09-09-23		TLM1		
30.	Packages : Built-in and user-defined	1	12-09-23		TLM1	CO3	
31.	Creating and Accessing Packages	1	13-09-23		TLM4	CO3	
32.	Importing Packages	1	14-09-23		TLM1	CO3	
33.	Access Controls in packages	1	16-09-23		TLM1	CO3	
34.	Wrapper Classes	1	20-09-23		TLM1	CO3	
35.	Rivision & Assignment Unit-III	1	21-09-23		TLM3	CO3	
No. of compl	classes required to ete UNIT-III	11		No. of classe	s taken:		

		No. of	Tentative	Actual	Teaching	Learning	HOD
S.No.	Topics to be covered	Classes Required	Date of Completion	Date of Completion	Learning Methods	Outcome COs	Sign Weekly
36.	Concepts of Exception Handling	1	23-09-23		TLM1	CO4	
37.	Benefits of Exception Handling	1	26-09-23		TLM1	CO4	
38.	Usage of try, catch, throw, throws, finally	2	27,28-09-23		TLM1	CO4	
39.	Built in exceptions	1	30-09-23		TLM2	CO4	
40.	Creating own exception	1	03-10-23		TLM4	CO4	
41.	Rivision & Assignment Unit-IV	1	04-10-23		TLM3	CO4	
No. of comple	classes required to ete UNIT-IV	7		No. of classes	taken:		

#### **UNIT-IV: Exception Handling**

# UNIT-V: Multithreading

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
42.	Thread Life Cycle	2	05,07-10-23		TLM2	CO5	
43.	Creating Threads	2	10,11-10-23		TLM1	CO5	
44.	Synchronizing	1	12-10-23		TLM1	CO5	
45.	Intercommunication of threads	2	14,17-10-23		TLM4	CO5	
46.	Rivision & Assignment Unit-V	1	18-10-23		TLM3	CO5	
No. of classes required to complete UNIT-V		8		No. of classes	taken:		

## **Contents beyond the Syllabus**

		No. of	Tentative	Actual	Teaching	Learning	HOD
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Outcome	Sign
		Required	Completion	Completion	Methods	COs	Weekly
47.	Introduction to AWT	2	25,26-10-23		TLM2	CO5	

## **Teaching Learning Methods**

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

#### ACADEMIC CALENDAR:

Description	From	То	Weeks
I Phase of Instructions	03-07-2023	26-08-2023	8 W
I Mid Examinations	08-08-2023	02-09-2023	1 W
II Phase of Instructions	04-09-2023	28-10-2023	8 W
II Mid Examinations	30-10-2023	04-11-2023	1W
Preparation and Practicals	06-11-2023	11-11-2023	1 W
Semester End Examinations	13-11-2023	25-11-2023	2 W

# 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)		
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	<mark>M=30</mark>	
Cumulative Internal Examination (CIE): M	<mark>30</mark>	
Semester End Examination (SEE)	<mark>70</mark>	
Total Marks = CIE + SEE	100	

## PART-D

PRO	GRAMME OUTCOMES (POs):
	Engineering knowledge: Apply the knowledge of mathematics, science, engineering
PO 1	fundamentals, and an engineering specialization to the solution of complex engineering
	problems.
	Problem analysis: Identify, formulate, review research literature, and analyze complex
PO 2	engineering problems reaching substantiated conclusions using first principles of
	mathematics, natural sciences, and engineering sciences.
	Design/development of solutions: Design solutions for complex engineering problems
PO 3	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.
<b>DO</b> 4	Conduct investigations of complex problems: Use research-based knowledge and
PO 4	research methods including design of experiments, analysis and interpretation of data,
	and synthesis of the information to provide valid conclusions.
	modern engineering and IT tools including prediction and modeling to complex
103	engineering activities with an understanding of the limitations
	The engineer and society: Apply reasoning informed by the contextual knowledge to
PO 6	assess societal health safety legal and cultural issues and the consequent
	responsibilities relevant to the professional engineering practice.
	<b>Environment and sustainability</b> : Understand the impact of the professional engineering
PO 7	solutions in societal and environmental contexts, and demonstrate the knowledge of, and
	need for sustainable development
<b>DO 0</b>	Ethics: Apply ethical principles and commit to professional ethics and responsibilities
FUO	and norms of the engineering practice.
<b>D</b> O 0	Individual and team work: Function effectively as an individual, and as a member or
PO 9	leader in diverse teams, and in multidisciplinary settings.
	Communication: Communicate effectively on complex engineering activities with the
DO 10	engineering community and with society at large, such as, being able to comprehend and
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	and receive clear instructions.
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	member and leader in a team, to manage projects and in multidisciplinary environments
	Life-long learning: Recognize the need for and have the preparation and ability to
PO 12	engage in independent and life-long learning in the broadest context of technological
	change.

## **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

<b>PSO 1</b>	Organize, Analyze and Interpret the data to extract meaningful conclusions.
<b>PSO 2</b>	Design, Implement and Evaluate a computer-based system to meet desired needs.
<b>PSO 3</b>	Develop IT application services with the help of different current engineering tools.

	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Signature				
Name of the Faculty	Mrs M HemaLatha	Dr. S Naganjaneyulu	Mr K Phaneendra	Dr. B.Srinivasa Rao

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)



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**DEPARTMENT OF INFORMATION TECHNOLOGY** 

# **COURSE HANDOUT**

# PART-A

Name of Course Instructor	: Mrs M. Hema latha	
Course Name & Code	: OOP Through JAVA, 20IT81	
L-T-P Structure	: 3-0-0	Credits: 03
Program/Sem/Sec	: B.Tech-EEE / V SEM / B	
A.Y.	: 2023-24	
PREREQUISITE	: Programming for Problem solving using C	

**COURSE OBJECTIVE**: Concentrates on the methodological and technical aspects of software design and programming based on Object Oriented Programming (OOP). Acquire the basic knowledge and skills necessary to implement Object-Oriented Programming Techniques in software development through JAVA.

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CO 2	Apply the concept of inheritance and polymorphism on real-world applications. (Apply-L3)
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#### COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Introduction : History Of JAVA, Advantages	1	11-07-23		TLM1		
2.	JAVA buzz words/features	1	12-07-23		TLM1		
3.	OOP Concepts	1	14-07-23		TLM1		
4.	Data types, variables and Keywords	1	15-07-23		TLM1		
5.	Operators	2	18-07-23		TLM1		
6.	Expressions	1	19-07-23		TLM1		
7.	Control Statements	2	21-07-23		TLM1		
8.	Methods & Recursion	1	22-07-23		TLM1		
9.	sample programs	1	25-07-23		TLM4		
10.	Java Objects and references	1	26-07-23		TLM1		
11.	Constructors , this keyword	1	28-07-23		TLM1		
12.	Arrays	2	01-08-23		TLM1		
13.	String	1	02-08-23		TLM1		
14.	StringBuffer, String Tokenizer	1	04-08-23		TLM1		
15.	Rivision & Assignment Unit-I	1	05-08-23		TLM3		
No. of classes required to complete UNIT-I		18	No. o	f classes tak	ken:		

#### **UNIT-I: Introduction to OOP and JAVA**

S.No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	Learning Outcome	HOD Sign
		Required	Completion	Completion	Methods	COs	Weekly
16.	Inheritance introduction, derived Classes	1	08-08-23		TLM1	CO2	
17.	Types Of Inheritance	1	09-08-23		TLM1	CO2	
18.	Member Accessibility	1	11-08-23		TLM1	CO2	
19.	Overriding, super keyword	1	12-08-23		TLM4	CO2	
20.	Abstract Classes and Methods	1	16-08-23		TLM1	CO2	
21.	Final Keyword, Final Method, Final Classes	1	18-08-23		TLM1	CO2	
22.	Dynamic Binding	1	19-08-23		TLM2	CO2	
23.	Polymorphism	1	22-08-23		TLM1	CO2	
24.	Rivision & Assignment Unit-II	1	23-08-23		TLM3		
No. of compl	classes required to ete UNIT-II	9		No. of classe	s taken:	•	

#### UNIT-II: Extending Classes and Reusability

#### **UNIT-III: Interfaces & Packages**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
25.	Difference between classes and interfaces	1	25-08-23		TLM1	CO3	
26.	Defining an Interface	1	26-08-23		TLM1	CO3	
27.	implementing an Interface	1	05-09-23		TLM4		
28.	Variables in interfaces	1	08-09-23		TLM1		
29.	Extending Interfaces	1	09-09-23		TLM1		
30.	Packages : Built-in and user-defined	1	12-09-23		TLM1	CO3	
31.	Creating and Accessing Packages	1	13-09-23		TLM4	CO3	
32.	Importing Packages	1	15-09-23		TLM1	CO3	
33.	Access Controls in packages	1	16-09-23		TLM1	CO3	
34.	Wrapper Classes	1	20-09-23		TLM1	CO3	
35.	Rivision & Assignment Unit-III	1	22-09-23		TLM3	CO3	
No. of compl	classes required to ete UNIT-III	11		No. of classe	s taken:		

C N		No. of	Tentative	Actual	Teaching	Learning	HOD
S.No.	Topics to be covered	Classes Required	Date of Completion	Date of Completion	Learning Methods	COs	Sign Weekly
36.	Concepts of Exception Handling	1	23-09-23		TLM1	CO4	
37.	Benefits of Exception Handling	1	26-09-23		TLM1	CO4	
38.	Usage of try, catch, throw, throws, finally	2	27,29-09-23		TLM1	CO4	
39.	Built in exceptions	1	30-09-23		TLM2	CO4	
40.	Creating own exception	1	03-10-23		TLM4	CO4	
41.	Rivision & Assignment Unit-IV	1	04-10-23		TLM3	CO4	
No. of comple	classes required to ete UNIT-IV	7		No. of classes	taken:		

#### **UNIT-IV: Exception Handling**

#### **UNIT-V: Multithreading**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
42.	Thread Life Cycle	2	06,07-10-23		TLM2	CO5	
43.	Creating Threads	2	10,11-10-23		TLM1	CO5	
44.	Synchronizing	1	13-10-23		TLM1	CO5	
45.	Intercommunication of threads	2	14,17-10-23		TLM4	CO5	
46.	Rivision & Assignment Unit-V	1	18-10-23		TLM3	CO5	
No. of classes required to complete UNIT-V		8		No. of classes	taken:		

## **Contents beyond the Syllabus**

		No. of	Tentative	Actual	Teaching	Learning	HOD
S.No.	Topics to be covered	Classes	Date of	Date of	Learning	Outcome	Sign
		Required	Completion	Completion	Methods	COs	Weekly
47.	Introduction to AWT	2	20,21-10-23		TLM2	CO5	

## **Teaching Learning Methods**

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

#### ACADEMIC CALENDAR:

Description	From	То	Weeks
I Phase of Instructions	03-07-2023	26-08-2023	8 W
I Mid Examinations	08-08-2023	02-09-2023	1 W
II Phase of Instructions	04-09-2023	28-10-2023	8 W
II Mid Examinations	30-10-2023	04-11-2023	1W
Preparation and Practicals	06-11-2023	11-11-2023	1 W
Semester End Examinations	13-11-2023	25-11-2023	2 W

# 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+A2))	<mark>M=30</mark>
Cumulative Internal Examination (CIE): M	<mark>30</mark>
Semester End Examination (SEE)	<mark>70</mark>
Total Marks = CIE + SEE	100

# PART-D

<ul> <li>Findingering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</li> <li>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.</li> <li>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.</li> <li>PO 4</li> <li>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.</li> <li>Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and TT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.</li> <li>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.</li> <li>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</li> <li>P0 8</li> <li>Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</li> <li>P0 10</li> <li>P0 11</li> <li>P0 12</li> <li>P0 12</li> <li>P0 12</li> <li>P0 12</li> <li>P1 12</li> <li>P1 12</li> <li>P1 12</li> <li>P1 12</li> </ul>	PRO	GRAMME OUTCOMES (POs):
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P0 7solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable developmentP0 8Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.P0 9Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.P0 10Communication: 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.P0 11Project 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 environmentsP0 12Life-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		Environment and sustainability: Understand the impact of the professional engineering
need for sustainable development         P08       Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.         P09       Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.         P010       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.         P011       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         P012       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	PO 7	solutions in societal and environmental contexts, and demonstrate the knowledge of, and
P0 8Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.P0 9Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.P0 10Communication: 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.P0 11Project 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 environmentsP0 12Life-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		need for sustainable development
PO 9Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.PO 10Communication: 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 11Project 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 environmentsPO 12Life-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	PO 8	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities
PO 9Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.PO 10Communication: 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 11Project 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 environmentsPO 12Life-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		and norms of the engineering practice.
PO 10leader in diverse teams, and in multidisciplinary settings.PO 10Communication: 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 11Project 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 environmentsPO 12Life-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	PO 9	Individual and team work: Function effectively as an individual, and as a member or
P0 10Communication: 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.P0 11Project 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 environmentsP0 12Life-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	10,	leader in diverse teams, and in multidisciplinary settings.
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<ul> <li>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</li> <li>Project management and life-long learning in the broadest context of technological change</li> </ul>	PO 10	engineering community and with society at large, such as, being able to comprehend and
and receive clear instructions.PO 11Project 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 environmentsPO 12Life-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	1010	write effective reports and design documentation, make effective presentations, and give
<ul> <li>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</li> <li>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</li> </ul>		and receive clear instructions.
PO11engineering 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 environmentsLife-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	DO 11	Project management and finance: Demonstrate knowledge and understanding of the
<ul> <li>PO 12 In a number and leader in a team, to manage projects and in multidisciplinary environments</li> <li>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</li> </ul>	PO 11	engineering and management principles and apply these to one's own work, as a
PO 12 engage in independent and life-long learning in the broadest context of technological change		<b>Life long learning:</b> Decognize the need for and have the properties and shility to
change	DO 12	engage in independent and life-long learning in the broadest context of technological
	1012	change

## **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

<b>PSO 1</b>	Organize, Analyze and Interpret the data to extract meaningful conclusions.
<b>PSO 2</b>	Design, Implement and Evaluate a computer-based system to meet desired needs.
<b>PSO 3</b>	Develop IT application services with the help of different current engineering tools.

	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Signature				
Name of the Faculty	Mrs M HemaLatha	Dr. S Naganjaneyulu	Mr K Phaneendra	Dr. B.Srinivasa Rao

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING** 

# **COURSE HANDOUT**

#### Part - A

PROGRAM	: B.Tech., V-Sem., EEE - B
ACADEMIC YEAR	: 2022-23
COURSE NAME & CODE	: Control Systems Lab – 20EE58
L-T-P STRUCTURE	:0-0-2
COURSE CREDITS	:1

COURSE INSTRUCTOR :Mr.A.Imran/Mr.R.A.Naik/Mr.P. Deepak Reddy

**COURSE COORDINATOR : Dr.P.Sobha Rani** 

Prerequisite: Control Systems

#### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

**Course Educational Objective:** This laboratory course enables the student to implement the mathematical techniques used in linear control systems to solve real world problems through experimentation and simulation tools.

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

CO1. Simulate the physical control system for stability studies (Apply-L3)

CO2. Demonstrate feedback controllers (Understand-L2)

CO3. Develop logic gates using PLC (Apply-L3)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2		2	2			2	2	2						
CO2	2	2		2				2	2	2						2
CO3	2	2	2	2	2			2	2	2					2	2

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

#### Part - B COURSE DELIVERY PLAN (LESSON PLAN): <u>SECTION-A SCHEDUL</u>

y: Mo	nday Batches :	20761A	0231,2	1761A	0201-	230							
	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
B.NO.	Tentative date	03/7/ 23	10/7/ 23	17/7/ 23	24/7/ 23	07/8/ 23	14/8/ 23	21/8/ 23	04/9/ 23	11/9/ 23	25/9/ 23	9/10/ 23	16/ 10/23
	Actual date												
	20761A0231												
B-1	21761A0201	DEMO	1	2	3	4	5	6	7	8	9	10	
21	21761A0211			-	5	•	5	0					
	21761A0221												
l	21761A0202												
B-2	21761A0212	DEMO	2	3	4	5	1	7	8	9	10	6	
	21761A0222												
	21761A0203												
B-3	21761A0213	DEMO	3	4	5	1	2	8	9	10	6	7	
	21761A0223												
	21761A0204											8	7
B-4	21761A0214	DEMO	4	5	1	2	3	9	10	6	7		RI
	21761A0224												EVI
	21761A0205		5					4 10	6			9	<b>N</b> ISI
B-5	21761A0215	DEMO		1	2	3	4			7	8		E 9
	21761A0225												EF
	21761A0206			2	3	4	5	6	7	8	9	10	ΖŦ
B-6	21761A0216	DEMO	1										
	21761A0226												PE F
	21761A0207												EX RII
B-7	21761A0217	DEMO	2	3	4	5	1	7	8	9	10	6	
	21761A0227												<b>Z</b> Z
	21761A0208												SJ
B-8	21761A0218	DEMO	3	4	5	1	2	8	9	10	6	7	
	21761A0228												
	21761A0209												
B-9	21761A0219	DEMO	4	5	1	2	3	9	10	6	7	8	
	21761A0229				1				10				
	21761A0210												
B-10	21761A0220	DEMO	5	1	2	3	4	10	6	7	8	9	
	21761A0230												

DAY	: Thursday				
Batc	hes: 21761A0231-	248,2	2765	A020	1-214

	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
B.NO.	Tentative date	13/7/ 23	20/7/ 23	27/7/ 23	03/8/ 23	10/8/ 23	17/8/ 23	24/8/ 23	07/9/ 23	14/9/ 23	21/9/ 23	5/10/ 23	12/1 0/23	19/1 0/23	26/1 0/23
	Actual date														
	21761A0231														
D 1	21761A0241	DEMO	1	2	2	4	5	6	7	0	0	10			
B-1	22765A0201	DEMO	1	2	3	4	5	0	/	8	9	10			
	22765A0211														
	21761A0232														
B-2	21761A0242	DEMO	2	3	4	5	1	7	8	9	10	6			
	22765A0202														
	21761A0233														
B-3	21761A0243	DEMO	3	4	5	1	2	8	9	10	6	7			
	22765A0203														
	21761A0234														
B-4	21761A0244	DEMO	4	5	1	2	3	9	10	6	7	8	RE	RE	
	22765A0204												ΙVΞ	EVISIC	Π
	21761A0235												SI		Z
B-5	22765A0205	DEMO	5	1	2	3	4	10	6	7	8	9	NO	NO	ſΕ
	22765A0212												0	0	R
	21761A0236												FΕ	FΕ	NA
B-6	21761A0246	DEMO	1	2	3	4	5	6	7	8	9	10	XF	XF	L
	22765A0206												۶EF	ΡEF	E
	21761A0237												RIN	RIN	XA
B-7	21761A0247	DEMO	2	3	4	5	1	7	8	9	10	6	ЛE	ΛE	Ā
	22765A0207												TN	TN	
	21761A0238												S	Š	
B-8	21761A0248	DEMO	3	4	5	1	2	8	9	10	6	7			
	22765A0208														
	21761A0239		л												
B-9	22765A0209	DEMO	4	5	1	2	3	9	10	6	7	8			
	22765A0213														
	21761A0240														
B-10	22765A0210	DEMO	5	1	2	3	4	10	6	7	8	9			
	22765A0214														

# **<u>PART-C</u>** EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Day – Day Evaluation	A=05
Record	B=05
Internal Exam	C=05
Cumulative Internal Examination (CIE) : A+B+C	15
Semester End Examination (SEE)	35
Total Marks = $CIE + SEE$	50

# PART-D PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

#### **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an
101	engineering specialization to the solution of complex engineering problems.
	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering
<b>PO 2</b>	problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and
	engineering sciences.
	Design/development of solutions: Design solutions for complex engineering problems and design system
<b>PO 3</b>	components or processes that meet the specified needs with appropriate consideration for the public health
	and safety, and the cultural, societal, and environmental considerations.
	Conduct investigations of complex problems: Use research-based knowledge and research methods
<b>PO 4</b>	including design of experiments, analysis and interpretation of data, and synthesis of the information to
	provide valid conclusions.
	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering
PO 5	and IT tools including prediction and modelling to complex engineering activities with an understanding of
	the limitations
	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal,
<b>PO 6</b>	health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional
	engineering practice
	Environment and sustainability: Understand the impact of the professional engineering solutions in
PO 7	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
100	engineering practice.
PO 9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse
107	teams, and in multidisciplinary settings.
	Communication: Communicate effectively on complex engineering activities with the engineering
PO 10	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.
	Project management and finance: Demonstrate knowledge and understanding of the engineering and
PO 11	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
1012	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.

A.Imran/R.A.Naik/P. Deepak Reddy	Dr.P.SOBHA RANI	Mr.P.DEEPAK REDDY	Dr.J.SIVAVARA PRASAD
Course Instructor	Course Coordinator	Module Coordinator	HOD

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING** 

# **COURSE HANDOUT**

PART-A

Name of Course Instructor: Mr. Mr Ch.Rajesh, Dr P Sobha Rani, Mr V Prabakar Reddy

Course Name & Code: ELECTRICAL MACHINES-II LAB & 20EE59L-T-P Structure: 0-0-3Credits: 1.5Program/Sem/Sec: B.Tech/III/BA.Y.: 2023-24PRE-REQUISITES : CONTROL SYSTEMSStructureStructure

#### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

**Course Educational Objective:** This laboratory course enables the student to implement the mathematical techniques used in linear control systems to solve real world problems through experimentation and simulation tools.

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

CO1. Simulate the physical control system for stability studies (Apply-L3)

CO2. Demonstrate feedback controllers (Understand-L2)

CO3. Develop logic gates using PLC(Apply-L3)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2		2	2			2	2	2						
CO2	2	2		2				2	2	2						2
CO3	2	2	2	2	2			2	2	2					2	2

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

#### LIST OF EXPERIMENTS

- 1. Modeling of Physical Systems (Mechanical and Electrical systems).
- 2. Block Diagram Reduction of Linear Systems
- 3. Time response analysis of Linear Systems for impulse and step inputs
- 4. Frequency response analysis of Linear Systems
- 5. Stability and relative stability analysis of Linear Systems Using (Root Locus, Bode and Nyquist plot).
- 6. Time Response analysis of Second Order System.
- 7. Study the effect of P, PD, PI, PID controllers on second order systems.
- 8. Magnitude and phase plot of Lag and lead compensators.
- 9. Determination of transfer function and effect of feedback on DC servo motor.
- 10. Study of logic gates using PLC

#### Part - B COURSE DELIVERY PLAN (LESSON PLAN): <u>SECTION-B SCHEDULE</u>

#### DAY : TUESDAY

Batches : 20761A0279,20H71A0211,21761A0249-279

	, , ,														
	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 Wee
B.NO.	Tentative date	12/7/	19/7/	26/7/	02/8/	09/8/	16/8/	23/8/	13/9/	20/9/	27/9/	04/	11/	18/1 0/23	25/1 0/23
	Actual date	23	23	25	20	20	20	20	23	20	25	10/25	10/25	0/25	0,23
	21761A0250								7		9	10			
B-1	21761A0260	DEMO	1	2	3	4	5	6		8					
	21761A0270														
	21761A0251														
B-2	21761A0261	DEMO	2	3	4	5	1	7	8	9	10	6			
	20761A0279														
	21761A0252														
B-3	21761A0262	DEMO	3	4	5	1	2	8	9	10	6	7			
	21761A0272														
	21761A0253														
B-4	21761A0263	DEMO	4	5	1	2	3	9	10	6	7	8			
	21761A0273												RΕ	RE	
	21761A0254												SIA	SIA	Ħ
B-5	21761A0264	DEMO	5	1	2	3	4	10	6	7	8	9	510	010	T
	21761A0274												Ž	ž	EF
	21761A0255												OF	OF	Ĩ
B-6	21761A0265	DEMO	1	2	3	4	5	6	7	8	9	10	EX	E	A
	21761A0275												<b>K</b> PI	<b>K</b> PI	
	21761A0256												ER	ER	EX
B-7	21761A0276	DEMO	2	3	4	5	1	7	8	9	10	6	IM	IM	A
	20H71A0211												EN	EN	Ν
	21761A0257												ITS	ITS	
B-8	21761A0267	DEMO	3	4	5	1	2	8	9	10	6	7	•	•.	
	21761A0277														
	21761A0258		4												
B-9	21761A0268	DEMO	4	5	1	2	3	9	10	6	7	8			
	21761A0278														
	21761A0249														
B-10	21761A0269	DEMO	5	1	2	3	4	10	6	7	8	9			
	21761A0279														

#### DAY : WEDNESDAY Batches :21761A0280-294,22765A0215-228

	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
B.NO.	Tentative date	11/7/ 23	18/7/ 23	25/7/ 23	01/8/ 23	08/8/ 23	22/8/ 23	05/9/ 23	12/9/ 23	19/9/ 23	26/9/ 23	3/10/ 23	10/1 0/23	17/1 0/23	24/1 0/23
	Actual date								-		-				
B-1	21761A0280 21761A0290 22765A0215	DEMO	1	2	3	4	5	6	7	8	9	10			
В-2	21761A0281 21761A0291 22765A0216	DEMO	2	3	4	5	1	7	8	9	10	6			
В-3	21761A0282 21761A0292 22765A0217	DEMO	3	4	5	1	2	8	9	10	6	7			
B-4	21761A0283 21761A0293 22765A0218	DEMO	4	5	1	2	3	9	10	6	7	8	REV	REV	
B-5	21761A0284 21761A0294 22765A0219	DEMO	5	1	2	3	4	10	6	7	8	9	ISION C	ISION C	INTER
B-6	21761A0285 22765A0220 22765A0221	DEMO	1	2	3	4	5	6	7	8	9	10	F EXPE	F EXPE	NAL E
B-7	21761A0286 22765A0222 22765A0223	DEMO	2	3	4	5	1	7	8	9	10	6	RIMEN	RIMEN	XAM
B-8	21761A0287 22765A0224 22765A0225	DEMO	3	4	5	1	2	8	9	10	6	7	ΓS	ΓS	
B-9	21761A0288 22765A0226 22765A0227	DEMO	4	5	1	2	3	9	10	6	7	8			
B-10	21761A0289 22765A0228	DEMO	5	1	2	3	4	10	6	7	8	9			

# PART-C

# EVALUATION PROCESS (R20 Regulations):Evaluation TaskMarksDay – Day EvaluationA=05RecordB=05Internal ExamC=05Cumulative Internal Examination (CIE) : A+B+C15Semester End Examination (SEE)35Total Marks = CIE + SEE50

PART-D

#### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

#### **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis</b> : 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	<b>Design/development of solutions</b> : 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	<b>Conduct investigations of complex problems</b> : 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	<b>Modern tool usage</b> : 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	<b>Environment and sustainability</b> : 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	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and teamwork</b> : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication</b> : 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	<b>Project management and finance</b> : 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	<b>Life-long learning</b> : 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.

Mr Ch.Rajesh,			
Dr P Sobha Rani,	Dr P Sobha Rani,	Dr.K.R.L.Prasad	Dr.J.SIVAVARA PRASAD
Mr V Prabakar Reddy			
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)



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#### **DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

# **COURSE HANDOUT**

# PART-A

Name of Course Instructor:Smt.G.Tabita / Dr.T.Naga DurgaCourse Name & Code: ELECTRICAL MACHINES-II LAB & 20EE59L-T-P Structure: 0-0-3Credits: 1.5Program/Sem/Sec: B.Tech/III/AA.Y.: 2022-23PRE-REQUISITES :Electrical Machines-IICOURSE EDUCATIONAL OBJECTIVES (CEOs):This course enables the student to know the

operation of various ac machines and give practical exposure on the performance of

various AC machines like induction motors and synchronous machines.

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

C01	Analyze the performance of single phase transformer and induction motor <b>(Apply-L3)</b>
CO2	Examine the performance of three phase induction motor (Apply-L3)
CO3	Evaluate the performance parameters of synchronous machines (Apply-L3)
CO4	Analyze the performance of AC machines using simulation tools (Apply-L3)

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

COs	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PSO3	PSO4
CO1	3	2		2				2	2	2				2		
CO2	3	2		2				2	2	2				2		
CO3	3	2		2				2	2	2				2		
CO4	3	2		2	2			2	2	2				2		
<b>1</b> - Low							<b>2</b> – N	Лediu	m	<b>3</b> - High						

#### Part - B COURSE DELIVERY PLAN (LESSON PLAN): <u>SECTION-A SCHEDULE</u>

	Datelles.	<u></u>	11102		0,227	05110							
	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
B.NO.	Tentative date	03/7/ 23	10/7/ 23	17/7/ 23	24/7/ 23	07/8/ 23	14/8/ 23	21/8/ 23	04/9/ 23	11/9/ 23	25/9/ 23	9/10/ 23	16/ 10/23
	Actual date												
	21761A0231												
D 1	21761A0241	DEMO	1	2	2	4	5	6	7	0	0	10	
B-1	22765A0201	DEMO	1	2	3	4	5	6	/	8	9	10	
	22765A0211												
	21761A0232												
B-2	21761A0242	DEMO	2	3	4	5	1	7	8	9	10	6	
	22765A0202												
	21761A0233												
B-3	21761A0243	DEMO	3	4	5	1	2	8	9	10	6	7	
	22765A0203												
	21761A0234												
B-4	21761A0244	DEMO	4	5	1	2	3	9	10	6	7	8	RI
	22765A0204												8 V1
	21761A0235												<b>N</b> ISI
B-5	22765A0205	DEMO	5	1	2	3	4	10	6	7	8	9	NC E
	22765A0212												E R
	21761A0236												ΖŦ
B-6	21761A0246	DEMO	1	2	3	4	5	6	7	8	9	10	
	22765A0206												E
	21761A0237												RIN
B-7	21761A0247	DEMO	2	3	4	5	1	7	8	9	10	6	A E
	22765A0207												Σ Ŋ
	21761A0238												Š
B-8	21761A0248	DEMO	3	4	5	1	2	8	9	10	6	7	
	22765A0208												
	21761A0239		4										
B-9	22765A0209	DEMO	4	5	1	2	3	9	10	6	7	8	
	22765A0213												
	21761A0240												
B-10	22765A0210	DEMO	5	1	2	3	4	10	6	7	8	9	
	22765A0214												

#### DAY : Monday Batches : 21761A0231-248,22765A0201-214

	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
B.NO.	Tentative date	13/7/ 23	20/7/	27/7/	03/8/	10/8/	17/8/ 23	24/8/	07/9/	14/9/ 23	21/9/	5/10/ 23	12/1 0/23	19/1 0/23	26/1 0/23
	Actual date	25	25	25	23	23	23	25	25	23	25	25	0/25	0/25	0/25
	20761A0231							6	7						
D 1	21761A0201	DEMO	1	2	2	4	-					10			
B-1	21761A0211	DEMO	1	2	3	4	Э		/	8	9	10			
	21761A0221														
	21761A0202														
B-2	21761A0212	DEMO	2	3	4	5	1	7	8	9	10	6			
	21761A0222														
	21761A0203														
B-3	21761A0213	DEMO	3	4	5	1	2	8	9	10	6	7			
	21761A0223														
	21761A0204														
B-4	21761A0214	DEMO	4	5	1	2	3	9	10	6	7	8	RE	RE	
	21761A0224												IVE	IVE	Ξ
	21761A0205												SIO	SIO	Z
B-5	21761A0215	DEMO	5	1	2	3	4	10	6	7	8	9	NC	NC	E
	21761A0225												0	0	R
	21761A0206												н Н	н Е	IA
B-6	21761A0216	DEMO	1	2	3	4	5	6	7	8	9	10	XP	XP	L
	21761A0226												ĒF	EF	E
	21761A0207												٩I٧	٩I	KA
B-7	21761A0217	DEMO	2	3	4	5	1	7	8	9	10	6	1E	1E	Ž
	21761A0227												T	TN	, ,
	21761A0208												S	S	
B-8	21761A0218	DEMO	3	4	5	1	2	8	9	10	6	7			
	21761A0228														
	21761A0209		Δ												
B-9	21761A0219	DEMO	-	5	1	2	3	9	10	6	7	8			
	21761A0229														
	21761A0210														
B-10	21761A0220	DEMO	5	1	2	3	4	10	6	7	8	9			
	21761A0230														

# DAY : Thursday Batches : 20761A0231,21761A0201-230

# PART-C EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Day – Day Evaluation	A=05
Record	B=05
Internal Exam	C=05
Cumulative Internal Examination (CIE) : A+B+C	15
Semester End Examination (SEE)	35
Total Marks = $CIE + SEE$	50

PART-D

#### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

#### **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
	<b>Problem analysis</b> : Identify, formulate, review research literature, and analyze complex engineering
PO 2	problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and
	engineering sciences.
	Design/development of solutions: Design solutions for complex engineering problems and design system
PO 3	components or processes that meet the specified needs with appropriate consideration for the public health
	and safety, and the cultural, societal, and environmental considerations.
	Conduct investigations of complex problems: Use research-based knowledge and research methods
PO 4	including design of experiments, analysis and interpretation of data, and synthesis of the information to
	provide valid conclusions.
<b>DO F</b>	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering
PO 5	and 11 tools including prediction and modelling to complex engineering activities with an understanding of
DOC	<b>The engineer and society</b> : Apply reasoning informed by the contextual knowledge to assess societal,
PUO	anginagering practice
	Environment and sustainability: Understand the impact of the professional engineering solutions in
PO 7	societal and environmental contexts and demonstrate the knowledge of and need for sustainable
107	development
	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the
PO 8	engineering practice.
DO 0	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse
PO 9	teams, and in multidisciplinary settings.
	Communication: Communicate effectively on complex engineering activities with the engineering
PO 10	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.
	Project management and finance: Demonstrate knowledge and understanding of the engineering and
PO 11	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
1012	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.

Smt.G.Tabita Dr.T.Naga Durga	Dr.T.Naga Durga	Mr.P.DEEPAK REDDY	Dr.J.SIVAVARA PRASAD
Course Instructor	Course Coordinator	Module Coordinator	HOD

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#### **DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

# **COURSE HANDOUT**

# PART-A

Name of Course Instructor:Mr.K.NAGALINGA CHARY /Smt.G.Tabita / Mr.Imran abdulCourse Name & Code: ELECTRICAL MACHINES-II LAB & 20EE59L-T-P Structure: 0-0-3Credits: 1.5Program/Sem/Sec: B.Tech/III/BA.Y.: 2022-23

**PRE-REQUISITES :** Electrical Machines-II

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course enables the student to know the

operation of various ac machines and give practical exposure on the performance of

various AC machines like induction motors and synchronous machines.

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

C01	Analyze the performance of single phase transformer and induction motor <b>(Apply-L3)</b>
CO2	Examine the performance of three phase induction motor (Apply-L3)
CO3	Evaluate the performance parameters of synchronous machines (Apply-L3)
CO4	Analyze the performance of AC machines using simulation tools (Apply-L3)

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

COs	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PSO3	PSO4
CO1	3	2		2				2	2	2				2		
CO2	3	2		2				2	2	2				2		
CO3	3	2		2				2	2	2				2		
<b>CO4</b>	3	2		2	2			2	2	2				2		
<b>1</b> - Low <b>2</b> - Medium <b>3</b> - High																

#### Part - B COURSE DELIVERY PLAN (LESSON PLAN): <u>SECTION-B SCHEDULE</u>

# DAY : WEDNESDAY

Batches : 20761A0279,20H71A0211,21761A0249-279

	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 Weel
B.NO.	Tentative date	12/7/	19/7/ 23	26/7/ 23	02/8/	09/8/	16/8/ 23	23/8/	13/9/ 23	20/9/	27/9/	04/ 10/23	11/ 10/23	18/1 0/23	25/1 0/23
	Actual date	25	23	25	23	23	23	23	23	23	23	10/25	10/25	0,23	0,23
	21761A0250														
B-1	21761A0260	DEMO	1	2	3	4	5	6	7	8	9	10			
	21761A0270														
	21761A0251														
В-2	21761A0261	DEMO	2	3	4	5	1	7	8	9	10	6			
	20761A0279														
	21761A0252														
B-3	21761A0262	DEMO	3	4	5	1	2	8	9	10	6	7			
	21761A0272														
	21761A0253														
B-4	21761A0263	DEMO	4	5	1	2	3	9	10	6	7	8	_	_	
	21761A0273												RE	RE	
	21761A0254												SIA	VIS	Ĭ
B-5	21761A0264	DEMO	5	1	2	3	4	10	6	7	8	9	SIC	SIC	T
	21761A0274												ž	ž	EF
	21761A0255												OF	OF	Ĩ
B-6	21761A0265	DEMO	1	2	3	4	5	6	7	8	9	10	E	E	A
	21761A0275												XP	XP	
	21761A0256												ER	ER	ΕX
B-7	21761A0276	DEMO	2	3	4	5	1	7	8	9	10	6	IM	IM	
	20H71A0211												EN	EN	Μ
	21761A0257												T	T	
B-8	21761A0267	DEMO	3	4	5	1	2	8	9	10	6	7		0,	
	21761A0277														
	21761A0258														
B-9	21761A0268	DEMO	4	5	1	2	3	9	10	6	7	8			
	21761A0278														
	21761A0249														
B-10	21761A0269	DEMO	5	1	2	3	4	10	6	7	8	9			
	21761A0279														

#### DAY : TUESDAY Batches :21761A0280-294,22765A0215-228

	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
B.NO.	Tentative date	11/7/ 23	18/7/ 23	25/7/ 23	01/8/	08/8/	22/8/	05/9/	12/9/	19/9/ 23	26/9/ 23	3/10/	10/1 0/23	17/1 0/23	24/1 0/23
	Actual date	23	25	23	23	25	25	25	25	25	23	23	0/25	0/23	0/23
	21761A0280														
B-1	21761A0290	DEMO	1	2	3	4	5	6	7	8	9	10			
	22765A0215														
	21761A0281														
B-2	21761A0291	DEMO	2	3	4	5	1	7	8	9	10	6			
	22765A0216														
	21761A0282														
B-3	21761A0292	DEMO	3	4	5	1	2	8	9	10	6	7			
	22765A0217														
	21761A0283														
B-4	21761A0293	DEMO	4	5	1	2	3	9	10	6	7	8	RE	RE	
	22765A0218												IV	IV	Π
	21761A0284		_					10		-			SIC	SIC	TN
B-5	21761A0294	DEMO	5	1	2	3	4	10	6	7	8	9	NC	Ň	E]
	22765A0219												OF	OF	RN
D.(	21761A0285						-	-	-	0	0	10	Ē	Ē	A
B-6	22765A0220	DEMO	1	2	3	4	5	6	7	8	9	10	XP	XP	L
	22/65A0221												ER	ER	ΕX
D 7	21/61A0286	DEMO	2	2	4	-	1	-	0	0	10		ÎM	ÎM	A
В-/	22765A0222	DEMO	2	3	4	5	1	/	8	9	10	6	[E]	[E]	Μ
	22/05A0225												VTS	T	
ъν	21/01A028/	DEMO	2	4	5	1	2	0	0	10	6	7	0,	0,	
D-0	22703A0224	DEMO	5	4	5	1	2	0	9	10	0	/			
	22703A0223														
B.0	21701A0200	DEMO	4	5	1	2	3	g	10	6	7	8			
D-9	22705A0220	DEMO		5	1	2	5	5	10	0	/	0			
	21761 \ 0220														
B-10	21701A0209	DEMO	5	1	2	3	4	10	6	7	8	9			
	22703AU228														

PART-C EVALUATION PROCESS (R20 Regulations):								
Evaluation Task	Marks							
Day – Day Evaluation	A=05							
Record	B=05							
Internal Exam	C=05							
Cumulative Internal Examination (CIE) : A+B+C	15							
Semester End Examination (SEE)	35							
Total Marks = $CIE + SEE$	50							

# PART-D PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

#### **PROGRAMME OUTCOMES (POs):**

PO 1	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis</b> : 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	<b>Design/development of solutions</b> : 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	<b>Conduct investigations of complex problems</b> : 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	<b>Modern tool usage</b> : 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	<b>The engineer and society</b> : 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	<b>Environment and sustainability</b> : 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	<b>Ethics</b> : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and teamwork</b> : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication</b> : 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	<b>Project management and finance</b> : 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	<b>Life-long learning</b> : 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.

Mr.K.Nagalinga Chary Smt.G.Tabita Mr.Imran Abdul	Dr.T.Naga Durga	Mr.P.DEEPAK REDDY	Dr.J.SIVAVARA PRASAD
Course Instructor	Course Coordinator	Module Coordinator	HOD