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 ELECTRONIC AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Shaheda Niloufer
Course Name & Code : Environmental Science & 20MC03
L-T-P Structure : 2-0-0 Credits : 0
Program/Sem/Sec : B.Tech., ECE-A., IV-Sem., SEC-A A.Y : 2023-24

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs): The purpose of this course is to provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities and how human activities influence our air, water and soil. It also helps in developing an understanding about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO 1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO 2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO 3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 4	Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.

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

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

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

TEXT BOOKS:

T1 Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, 5th Edition, Delhi, 2016.

T2 Mahua Basu, S. Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 1st Edition, Delhi, 2016.

REFERENCE BOOKS:

R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.

R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press, 2nd Edition, New Delhi, 2012.
R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.
R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.
R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

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 of course and course objectives. Introduction of components of Environment	1	04-01-2024		2	
2.	Population explosion and variations among Nations.	1	06-01-2024		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	11-01-2024		2	
4.	Environmental Hazards	1	18-01-2024		2	
5.	Role of Information Technology in environmental management and human health.	1	20-01-2024		2	
No. of classes required to complete UNIT-I: 5				No. of classes taken:		

UNIT-II: NATURAL RESOURCES AND CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and classification of Natural resources, Forest Resources,	1	25-01-2024		2	
2.	Water Resources	1	27-01-2024		2	
3.	Mineral Resources	1	01-02-2024		2	
4.	Food Resources	1	03-02-2024		2	
5.	Energy Resources	1	08-02-2024		2	
6.	Food Resources	1	15-02-2024		2	
No. of classes required to complete UNIT-II: 6				No. of classes taken:		

UNIT-III: ECOLOGY AND BIODIVERSITY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Definition, structure and functions of an ecosystem	1	17-02-2024		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids, Bio-geo-chemical cycles	1	22-02-2024		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological	1	24-02-2024		2	

	Niche and Keystone Species, Bio-geographical classification of India. India as a mega diversity nation					
4.	**I MID EXAMINATION**	1	29-02-2024			
5.	**I MID EXAMINATION**	1	02-03-2024			
6.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Assignment in Unit II	1	07-03-2024		2	
7.	Man and wild life conflicts. Endangered and endemic species of India	1	14-03-2024		2,3	
8.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	16-03-2024		2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV : ENVIRONMENTAL POLLUTION

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.	Air Pollution	1	21-03-2024		2	
2.	Causes, effects and control measures of: Water Pollution	1	23-03-2024		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	28-03-2024			
4.	Noise Pollution		30-03-2024			
5.	Solid Waste Management	1	04-04-2024		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	06-04-2024		2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V : ENVIRONMENTAL MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sustainable Development	1	18-04-2024		2	
2.	Climate disruption-Greenhouse effect, ozone layer depletion and acid rain. Stockholm conference	1	20-04-2024		2,3	
3.	Environmental Impact Assessment (EIA), Green building	1	25-04-2024		2	
4.	Environmental Law		27-04-2024		2	
5.	II MID EXAMINATIONS	1	02-05-2024		2	
6.	II MID EXAMINATIONS	1	04-05-2024		2	
No. of classes required to complete UNIT-V: 04				No. of classes taken:		

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

TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	Dr. A. Rami Reddy
Signature				

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COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. M K Linga Murthy
Course Name & Code : Analog Communications & 20EC07
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- A A.Y : 2023-24

PRE-REQUISITE: Signals & Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on various analog modulation techniques in both time and frequency domains. The course will give an idea about generation and demodulation methods of various analog modulation techniques. It also gives complete information regarding the transmitters and receivers types and performance evaluation of continuous wave modulation.

COURSE OUTCOMES (CO): At the end of the course, students will be able to

CO1:	Understand the fundamental concepts of various analog modulation schemes with relevant time and frequency domain representations.**(Understand – L2)**
CO2:	Interpret the generation, detection of continuous wave and pulse analog modulation techniques. **(Understand – L2)**
CO3:	Apply the concepts of analog modulation and demodulation techniques for calculating communication system related parameters.**(Apply – L3)**
CO4:	Analyze the performance of continuous wave modulation schemes in the presence of channel noise.**(Analyze – L4)**

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	1	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Simon Haykin, *"Communication Systems"*, John Wiley & Sons, 2nd Edition, 1983
T2 George Kennedy ,Davis, *"Electronic Communication Systems"*, Tata McGraw Hill Education, 4th edition, 1999.

BOS APPROVED REFERENCE BOOKS:

R1 G.K.Mithal, "*Radio Engineering*", Khanna Publishers,20th Edition,2000
R2 Sanjay Sharma, *"Analog Communication Systems",*S.K.Katariya& Sons,2nd Edition, 2007

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Introduction to Communication System, Amplitude modulation, Double Side band Suppressed Carrier Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course & Course Outcomes	1	03.01.2024		TLM1	
2.	Review of Fourier Transform	1	04.01.2024		TLM1	
3.	Elements of a communication system	1	05.01.2024		TLM1	
4.	Need for modulation, Classification of Modulation	1	08.01.2024		TLM1	
5.	Amplitude Modulation: Definition, Time and Frequency Domain Representation	1	10.01.2024		TLM1	
6.	Power relations in AM wave, Generation of AM waves using square law modulator, Switching modulator.	1	11.01.2024		TLM1	
7.	Demodulation of AM waves using square law Demodulator, Envelop Detector	1	12.01.2024		TLM1	
8.	Introduction to DSBSC -AM, Time and Frequency domain Representation	1	18.01.2024		TLM1	
9.	Generation of DSBSC wave using Balanced Modulator	1	19.01.2024		TLM1	
10.	Generation of DSBSC using Ring Modulator, Coherent Detection of DSBSC wave	1	22.01.2024		TLM1	
11.	Effect of Phase and frequency Errors, Costas Loop	1	24.01.2024		TLM1	
12.	Problem Solving	1	25.01.2024		TLM3	
No. of classes required to complete UNIT-I		12	No. of classes taken:			

UNIT-II: Single Side band Modulation & Vestigial Side band Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Single Side band Modulation: Definition, Time and Frequency domain representation	1	29.01.2024		TLM1	
14.	Generation of SSB wave: Filter Method, Phase Discrimination	1	31.01.2024		TLM3	
15.	Coherent detection of SSB wave	1	01.02.2024		TLM1	

16.	Effect of Phase and Frequency Error in the detection	1	02.02.2024		TLM1	
17.	Vestigial Side band Modulation: Definition, Time and frequency domain representation	1	05.02.2024		TLM1	
18.	Generation of VSB wave	1	07.02.2024		TLM1	
19.	Envelope detection of VSB wave plus carrier	1	08.02.2024		TLM1	
20.	Comparisons of amplitude modulation techniques, Applications of different AM systems	1	09.02.2024		TLM1	
21.	Problem Solving	1	12.02.2024		TLM3	
No. of classes required to complete UNIT-II		9	No. of classes taken:			

UNIT-III : Angle Modulation, Demodulation of FM Wave

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Types of Angle Modulation Frequency Modulation: Time domain representation, Single tone Frequency Modulation	1	14.02.2024		TLM1	
23.	Narrow Band Frequency Modulation: Time and Frequency domain representation	1	15.02.2024		TLM1	
24.	Wide band Frequency Modulation Time and Frequency Domain representation	1	16.02.2024		TLM3	
25.	Transmission power and Band width of FM wave	1	19.02.2024		TLM1	
26.	Problem Solving	1	21.02.2024		TLM1	
27.	Generation of FM wave: Direct method & Indirect method	1	22.02.2024		TLM1	
28.	Demodulation of FM – frequency Discrimination methods: simple slope detector, Balanced slope detector	1	23.02.2024		TLM1	
29.	Phase Discrimination methods: Foster Seeley Discrimination method	1	04.03.2024		TLM1	
30.	Ratio Detector, PLL	1	06.03.2024		TLM1	
31.	Problem Solving	1	07.03.2024		TLM3	
No. of classes required to complete UNIT-III		10	No. of classes taken:			

UNIT-IV:: Radio Transmitters and Receivers

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.	Radio transmitter introduction and classification AM transmitters - low level and high level	1	11.03.2024		TLM1	
33.	FM Transmitter: Reactance tube method, Armstrong method	1	13.03.2024		TLM1	
34.	Radio Receiver introduction and classification	1	14.03.2024		TLM1	
35.	Problem Solving	1	15.03.2024		TLM3	
36.	Tuned Radio Frequency receiver and its limitations	1	18.03.2024		TLM1	
37.	Need of heterodyning AM Super heterodyne Receiver, Frequency Changing and Tracking Concept of IF	1	20.03.2024		TLM1	
38.	Significance of AGC in AM Radio Receivers, Simple AGC, Delayed AGC	1	21.03.2024		TLM1	
39.	FM receiver	1	22.03.2024		TLM1	
No. of classes required to complete UNIT-IV		8	No. of classes taken:			

UNIT-V : Noise in Analog Communication Systems, Analog Pulse modulation& Multiplexing

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.	Definition of Noise in communication system Signal to Noise ratio calculations in AM	1	27.03.2024		TLM1	
41.	Signal to Noise ratio calculations in DSBSC, SSBSC and FM receivers	3	28.03.2024 01.04.2024 03.04.2024		TLM1	
44.	Threshold Effect, Pre-Emphasis and De Emphasis circuits	1	04.04.2024		TLM1	
45.	Introduction to Carrier to Noise Ratio Signal to Interference plus Noise Ratio	1	08.04.2024		TLM1	
46.	Pulse Amplitude Modulation Generation and Demodulation.	1	11.04.2024		TLM1	
47.	Analog Pulse Modulation: Need for Pulse Modulation Types of Pulse analog Modulation,	1	12.04.2024		TLM1	
48.	Pulse Width Modulation Generation	1	15.04.2024		TLM1	
49.	Pulse Width Modulation Demodulation Pulse Position Modulation &Demodulation	2	18.04.2024 19.04.2024		TLM1	
51.	Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing	2	22.04.2024 24.04.2024		TLM1	
53.	Problem Solving	1	25.04.2024		TLM3	
No. of classes required to complete UNIT-V:		14	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
54.	Recent Trends in Communication	1	26.04.2024		TLM2	

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

PART-C

EVALUATION PROCESS:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M K Linga Murthy	Dr. G.L.N.Murthy	Dr. M.V.Sudhakar	Dr. Y.Amar Babu

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COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K.Ravi Kumar, Assoc. Professor

Course Name & Code : Control Systems-20EE09 **Regulation**: R20
L-T-P Structure : 2-1-0 **Credits:** 03
Program/Sem/Sec : B. Tech. IV-Sem., ECE-A Sec **A.Y.:** 2023-24

PRE REQUISITE: Electrical Circuit Analysis and Applied Physics.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

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

CO1	Develop mathematical models of systems in terms of transfer function and state-space. **(Apply-L3)**
CO2	Analyze control systems in time domain **(Apply-L3)**
CO3	Analyze control systems in frequency domain**(Apply-L3)**
CO4	Understand the concepts of controllers and compensators. **(Understand-L2)**

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

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

TEXTBOOKS:

T1 B. C. Kuo , "Automatic Control Systems" John Wiley and Sons ,9th edition,2014.

T2 I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P)Limited Publishers,6th edition,2018

REFERENCE BOOKS:

R1 Katsuhiko Ogata , "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 5thedition,2009

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: MATHEMATICAL MODELLING OF CONTROL SYSTEMS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	2	02-01-24 04-01-24		TLM 1,2	
2.	Concept of Control systems, Open loop and Closed loop control systems	2	05-01-24 06-01-24		TLM 1,2	
3.	Modeling of Electrical systems	1	09-01-24		TLM 1,2	
4.	Modeling of Mechanical systems	1	11-01-24		TLM 1,2	
5.	**Tutorial-1**	1	12-01-24		TLM 3	
6.	Electrical analogy of Mechanical systems	1	13-01-24		TLM 1	
7.	Block Diagram Reduction rules	1	18-01-24		TLM 1,2	
8.	Signal Flow Graph Terminology	1	19-01-24		TLM 1,2	
9.	**Tutorial-2**	1	20-01-24		TLM 3	
10.	SFG Reduction using Masons Gain Formula	1	23-01-24		TLM 1,2	
11.	Feedback Control System Characteristics	1	25-01-24		TLM 1,2	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: TIME RESPONSE ANALYSIS-I

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Standard test signals	1	27-01-24		TLM 1	
13.	Time response of first order systems	1	30-01-24		TLM 1,2	
14.	Response of second order system	1	01-02-24		TLM 1,2	
15.	Response of second order for different damping values	1	02-02-24		TLM 1,2	
16.	**Tutorial-3**	1	03-02-24		TLM 3	

17.	Time domain specifications	1	06-02-24		TLM 1,2	
18.	Steady state errors and error constants.	1	08-02-24		TLM 1	
19.	**Tutorial-4**	1	09-02-24		TLM 3	
20.	Introduction to PI, PD	1	10-02-24		TLM 1,2	
21.	PID Controllers	1	13-02-24		TLM 1,2	
22.	Revision	1	15-02-24		TLM 3	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: **TIME RESPONSE ANALYSIS-II**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Concepts of stability	1	16-02-24		TLM 1,2	
24.	Necessary conditions for Stability	1	17-02-24		TLM 1,2	
25.	Routh stability criterion	1	20-02-24		TLM 1,2	
26.	**Tutorial-5**	1	22-02-24		TLM 3	
27.	Relative stability analysis	1	23-02-24		TLM 1,2	
28.	Root Locus Technique	1	24-02-24		TLM 1,2	
29.	Construction of root loci	2	05-03-24 07-03-24		TLM 1,2	
30.	**Tutorial-6**	1	09-03-24		TLM 3	
31.	Effects of adding poles and zeros to G(s) H(s) on the root loci.	1	12-03-24		TLM 1,2	
32.	Problems Practice	1	14-03-24		TLM 3	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: FREQUENCY RESPONSE ANALYSIS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Frequency domain specifications	1	15-03-24		TLM 1,2	
34.	Frequency response of standard second order system	1	16-03-24		TLM 1,2	
35.	Bode Plot - Frequency domain specifications	2	19-03-24 21-03-24		TLM 1,2	
36.	**Tutorial-7**	1	22-03-24		TLM 3	
37.	Transfer function from the Bode Plot	1	23-03-24		TLM 1,2	
38.	Polar Plot	1	26-03-24		TLM 1,2	
39.	**Tutorial-8**	1	28-03-24		TLM 3	
40.	Nyquist plot-Nyquist Stability criteria	2	30-03-24 02-04-24		TLM 1,2	

41.	Introduction to Lag, Lead Compensators, Lead-Lag Compensator	1	04-04-24			
42.	**Tutorial-9**	1	06-04-24		TLM 3	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: STATE SPACE ANALYSIS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Concept of state variables	1	12-04-24		TLM 1,2	
44.	State models for linear and time invariant Systems	1	13-04-24		TLM 1,2	
45.	The Transfer Function from the State Equation	1	16-04-24		TLM 1,2	
46.	Solution of state equation	1	18-04-24		TLM 1,2	
47.	**Tutorial-10**	1	19-04-24		TLM 3	
48.	State transition matrix and it's properties	1	20-04-24		TLM 1,2	
49.	Computation of state transition matrix using Laplace transformation method	1	23-04-24		TLM 1,2	
50.	Concepts of controllability and observability	1	25-04-24		TLM 1,2	
51.	**Tutorial-11**	1	27-04-24		TLM 3	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
52.	Root Locus Construction using MatLab	1	26-04-24		TLM 1,2	

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.K.Ravi Kumar**	**Dr.B.Rambabu**	**Dr. G. L N Murthy**	**Dr. Y. Amar Babu**
Signature				

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L B Reddy Nagar, Mylavaram-521 230, NTR District, Andhra Pradesh.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor : Dr E V Krishna Rao
Course Name & Code : Digital Signal Processing – 20EC06

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- A A.Y : 2023-24

Pre-Requisites: Signals and Systems.

Course Objectives:

This course introduces discrete time signals and systems and operations performed on them. It introduces Discrete time Fourier Transform, Discrete Fourier transform and Z transform meant for spectral analysis of discrete time signals and systems. Fast Fourier Transform that is an efficient way of implementing DFT is also introduced. It also provides the basic knowledge about the design of both IIR and FIR filters.

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

CO1	Interpret the basics of discrete time signal processing techniques.**(Understand – L2)**
CO2	Examine Discrete Time Signals in time and frequency domain using DTFT, DFT, FFTand Z-transforms **(Apply – L3)**
CO3	Apply DFT, FFT and Z-Transform techniques to solve and realize discrete systems **(Apply – L3)**
CO4	Construct the IIR Filters using Butterworth, Chebyshev Approximation techniques andFIR Filters using Fourier series method and windowing Techniques **(Apply – L3)**

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	-	-	1
CO2	2	1	1	-	-	-	-	-	-	-	-	2	-	-	2
CO3	3	3	1	1	-	-	-	-	-	-	-	2	-	-	2
CO4	3	3	2	1	-	-	-	-	-	-	-	3	-	-	2

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

TEXT BOOK(S):

T1 John G. Proakis, Dimitris G. Manolakis ***"Digital Signal Processing, Principles, Algorithms& Applications"***, Pearson education, 4th edition, 2008

T2 Alan V Openheim, Ronald W. Schafer, ***"Digital Signal Processing"***, PHI learning, 1st edition, 2010.

REFERENCE BOOK(S):

R1 P.RameshBabu, ***"Digital Signal Processing"***, Scitech Publications, 4th edition, 2012Pvt Ltd.

R2 A.NagoorKani, ***"Digital Signal Processing"***, RBA Publications,1st edition, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Discrete Time Signals, Discrete Time Systems & DTFT

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course, CEO, COs, POs and PSOs	1	02-01-2024		**TLM1**	
2.	Introduction - Block diagram of DSP System, Advantages , Limitations and Applications of DSP	1	03-01-2024		**TLM1**	
3.	Elementary Discrete Time Signals, Representation of Discrete Time Signals	1	05-01-2024		**TLM1**	
4.	Operations on Discrete Time Signals	1	06-01-2024		**TLM1**	
5.	Properties or classifications of Discrete Time Systems	1	09-01-2024		**TLM1**	
6.	Analysis of LTI Systems through LCCDE	1	10-01-2024		**TLM1**	
7.	Analysis of LTI Systems through LCCDE	1	12-01-2024		**TLM1**	
8.	Linear Convolution	1	19-01-2024		**TLM1**	
9.	Linear Convolution	1	20-01-2024		**TLM1**	
10.	DTFT of a Sequence and System	1	23-01-2024		**TLM1**	
11.	Properties of DTFT	1	24-01-2024		**TLM1**	
12.	Properties of DTFT	1	27-01-2024		**TLM1**	
No. of classes required to complete UNIT-I		**12**	No. of classes taken			

UNIT-II: Z-Transforms

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Z-Transform of a sequence and ROC – its properties	1	30-01-2024		**TLM1**	
2.	Properties of Z-Transforms	1	31-01-2024		**TLM1**	
3.	Inverse Z-Transform	1	02-02-2024		**TLM1**	
4.	Problems on Z-Transforms	1	03-02-2024		**TLM1**	
5.	Problems on Inverse Z-Transforms	1	06-02-2024		**TLM1**	
6.	Analysis of LTI system using Z-transforms	1	07-02-2024		**TLM1**	
7.	Analysis of LTI system using Z-transforms	1	09-02-2024		**TLM1**	
8.	Direct Form-I, Direct Form-II,	1	13-02-2024		**TLM1**	
9.	Cascade Form and Parallel Form for IIR systems	1	14-02-2024		**TLM1**	
10.	Direct Form, Cascade Form and Parallel Form, Linear Phase Realization for FIR systems	1	16-02-2024		**TLM1**	
No. of classes required to complete UNIT-II		**10**	No. of classes taken			

UNIT-III: Discrete Fourier Transform (DFT) and Fast Fourier Transforms

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction - DFT, Computation of DFT, IDFT, Relation between DTFT and DFT, Twiddle factor – Properties, Problems	1	17-02-2024		**TLM1**	
2.	Properties of DFT	1	20-02-2024		**TLM1**	
3.	Properties of DFT, Problems	1	21-02-2024		**TLM1**	
4.	Linear Convolution through Circular Convolution	1	23-02-2024		**TLM1**	
5.	Circular Convolution through DFT & IDFT, Linear Convolution through DFT & IDFT	1	24-02-2024		**TLM1**	
	I Mid Exam		26-02-2023 02-03-2023			
6.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	05-03-2024		**TLM1**	
7.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	06-03-2024		**TLM1**	
8.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	12-03-2024		**TLM1**	
9.	Radix – 2 DIT-FFT Algorithm for IDFT computation.	1	13-03-2024		**TLM1**	
10.	Radix – 2 DIF-FFT Algorithm for IDFT computation	1	15-03-2024		**TLM1**	
No. of classes required to complete UNIT-III			**11**	No. of classes taken		

UNIT-IV: IIR Filter Design

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction - Characteristics and Classification of Filters	1	16-03-2024		**TLM1**	
2.	Design of IIR Digital Filter – Impulse Invariant Transformation – Aliasing effect	1	19-03-2024		**TLM1**	
3.	Design of IIR Digital Filter – Bilinear Transformation – Frequency warping	1	20-03-2024		**TLM1**	
4.	Problems on Impulse Invariance and Bilinear Transformation	1	22-03-2024		**TLM1**	
5.	Specifications of Low pass filters , Design of IIR Analog filter using Butterworth Approximations	1	23-03-2024		**TLM1**	
6.	Problems on Butterworth Filter	1	26-03-2024		**TLM1**	
7.	Design of IIR Analog filter using Chebyshev Approximations	1	27-03-2024		**TLM1**	
8.	Problems on Chebyshev Filter	1	30-03-2024		**TLM1**	
9.	Problems on Chebyshev Filter	1	02-04-2024		**TLM1**	
10.	Analog Frequency Transformation	1	03-04-2024		**TLM1**	
11.	Problems on Frequency Transformations	1	06-04-2024		**TLM1**	
No. of classes required to complete UNIT-IV			**11**	No. of classes taken		

UNIT-V: FIR filters Design

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Comparisons between IIR and FIR filters, Characteristics of FIR filters with linear phase.	1	10-04-2024		**TLM1**	
2.	Frequency Response Linear Phase FIR filters	1	12-04-2024		**TLM1**	
3.	Design of FIR filters using Fourier series method	1	16-04-2024		**TLM1**	
4.	Problems	1	19-04-2024		**TLM1**	
5.	Design of FIR filters using window method and various window(s) characteristics	1	20-04-2024		**TLM1**	
6.	Design of FIR filters using window method and various window(s) characteristics	1	23-04-2024		**TLM1**	
7.	Problems	1	24-04-2024		**TLM1**	
8.	Revision	1	26-04-2024		**TLM1**	
No. of classes required to complete UNIT-V		**8**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Multirate Signal Processing	**1**	27-04-2024		**TLM1**	

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr E V Krishna Rao	Mr T Anil Kumar	Dr. G L N Murthy	Dr. Y. Amar Babu

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India.
Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.B.Ramesh Reddy

Course Name & Code : Electromagnetic Waves & Transmission Lines - 20EC08

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- A A.Y : 2023-24

Pre-Requisites: Vector Algebra, Coordinate Systems, Vector Calculus.

Course Objectives: This course is useful to impart knowledge on electric and magnetic fields in both static and dynamic domains. The course will introduce the application of Maxwell's equations. The course gives the complete information regarding the Electromagnetic wave propagation in different mediums.This course will help in the analysis of transmission line using circuit theory and use the Smith chart to find reflection coefficient, VSWR, impedance in easy way.

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

CO1	Define the basic laws of Electrostatic and Magnetostatic Fields (Remember Level – L1).
CO2	Understand the basic concepts of Electromagnetic fields in static and time varying conditions (Understand Level – L2).
CO3	Apply the Electromagnetic concepts to solve real time problems (Apply Level – L3).
CO4	Analyze the characteristics of EM wave propagation in different mediums (Analyze Level – L4).

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	2	2	-	-	1	-	-	-	-	-	1	3	-	-
CO3	3	2	2	-	-	1	-	-	-	-	-	1	3	-	-
CO4	3	2	2	1	1	-	1	-	-	-	-	1	3	-	-

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

TEXT BOOK(S):

T1 Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.

T2 William Hayt, J A Buck, M JallelAkhtar "Engineering Electromagnetics", TMH Publishers, 8th Edition.

REFERENCE BOOK(S):

R1 Jordan and Balmain, "Electromagnetic fields and Radiating systems", Pearson education.

R2 K.Shevgaonkar, "Electromagnetic waves"TMH Publishers.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN) - Section-A

UNIT-I:Electrostatics

S.No.	Topic/s	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	3-1-2024			
2.	Introduction to Unit-I	1	5-1-2024			
3.	Vector Algebra, Coordinate System	1	6-1-2024			
4.	Vector Calculus	1	8-1-2024			
5.	Coulombs Law &Electric Field Intensity	1	10-1-2024			
6.	Electric Field due to continuous charge distributions	1	12-1-2024			
7.	Electric Flux & Electric Flux Density	1	17-1-2024			
8.	Gauss's Law and Applications	1	19-1-2024			
9.	Electric Potential and Potential Gradient	1	20-1-2024			
10.	Maxwell's two equations for Electrostatic Fields	1	22-1-2024			
11.	Electric Dipole and Dipole Moment Electrostatic Energy and Energy Density	1	24-1-2024			
12.	Poisson's and Laplace's Equations	1	27-1-2024			
13.	Capacitance and Different Capacitors	1	29-1-2024			
14.	Problem Solving	1	31-1-2024			
No. of classes required to complete UNIT-I		14	No. of classes taken			

UNIT-II:Magnetostatics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Magnetic Field Intensity &Biot-Savart's Law	1	02-2-2024			
16.	Ampere's Circuit Law & Applications	1	03-2-2024			
17.	Magnetic Flux & Magnetic Flux Density	1	05-2-2024			
18.	Maxwell's two equations for Magnetostatic Fields	1	07-2-2024			
19.	Magnetic Scalar & Vector Potentials	1	09-2-2024			
20.	Force on a charged particle	1	12-2-2024			
21.	Magnetic Energy and Energy Density, Concept of Inductance	1	14-2-2024			
22.	Problem Solving	1	16-2-2024			
23.	Problem Solving	1	17-2-2024			
No. of classes required to complete UNIT-II		9	No. of classes taken			

UNIT-III (First Half Unit): Maxwell's Equations

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Time varying Fields, Faradays Law, Continuity Equation	1	19-2-2024			
25.	Inconsistency of Ampere's Law, Displacement Current Density	1	21-2-2024			
26.	Time Varying Four Maxwell's Equations	1	23-2-2024			
27.	Boundary Conditions	1	24-2-2024			
No. of classes required for UNIT-III(First 50%)		4	No. of classes taken			

UNIT-III (Second Half Unit):Electromagnetic Waves-I

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Introduction to EM Waves-Scalar, Vector Form, Solution of EM Wave Equations	1	04-3-2024			
29.	Intrinsic Impedance, Attenuation and Phase Constants, Loss Tangent, Velocity and Wavelength of EM Wave	1	06-3-2024			
30.	Wave Propagation in Lossy Dielectrics	1	11-3-2024			
31.	Wave Propagation in Lossless Dielectrics	1	13-3-2024			
32.	Wave Propagation in Free Space	1	15-3-2024			
33.	Wave Propagation in Good Conductors	1	16-3-2024			
34.	Polarization-Linear, Circular & Elliptical	1	18-3-2024			
35.	Problem Solving	1	20-3-2024			
No. of classes required to completeUNIT-III. (Second Half - 50%)		10	No. of classes taken			

UNIT-IV:Electromagnetic Waves-II

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Poynting Vector-Time Average Power, Power Loss in a Plane Conductor	1	22-3-2024			
37.	Poynting Theorem	1	23-3-2024			
38.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Dielectric	1	27-3-2024			
39.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Conductor	1	30-3-2024			
40.	Reflection of a Plane Wave at Oblique Incidence– Parallel Polarization	1	01-4-2024			
41.	Reflection of a Plane Wave at Oblique Incidence–Perpendicular Polarization	1	03-4-2024			
42.	Brewster Angle, Critical Angle and Total Internal reflection, Surface Impedance	1	06-4-2024			
43.	Problem Solving	1	08-4-2024			
No. of classes required to complete UNIT-IV		10	No. of classes taken			

UNIT-V:Transmission Lines

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Types of Transmission Lines, Transmission LinesEquations	1	10-4-2024			
45.	Primary and Secondary Constants of a Transmission Line	1	12-4-2024			
46.	Lossless, Distortion less, Low loss Transmission lines, Concept of Loading	1	15-4-2024			
47.	Input Impedance of a Transmission Line, Reflection Coefficient, VSWR	1	19-4-2024			
48.	Short Circuit, Open Circuit and Matched Lines	1	20-4-2024			
49.	Smith Chart and Applications	1	22-4-2024			
50.	Problem Solving	1	24-4-2024			
No. of classes required to complete UNIT-V		**9**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Introduction to Antennas	1	26-4-2024			
52.	Introduction to Microwaves	1	27-4-2024			

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:

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**
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	**30**
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	**70**
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools.

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.B.Ramesh Reddy	Dr.B.Ramesh Reddy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. T. Satyanarayana
Course Name & Code : Universal Human Values 2: Understanding Harmony – 20HS01
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section-A A.Y : 2023-24

PRE-REQUISITES: Nil.

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

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

CO 1	Apply the value inputs in life and profession **(Apply – L3)**
CO 2	Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body **(Understand – L2)**
CO 3	Understand the role of a human being in ensuring harmony in society **(Understand – L2)**
CO 4	Understand the role of a human being in ensuring harmony in the nature and existence. **(Understand – L2)**
CO 5	Distinguish between ethical and unethical practices (**Apply – L3**)

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

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

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

TEXT BOOKS:

T1 Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE BOOKS:

R1 Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999
R2 Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
R3 The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: Need, Basic Guidelines, Content and Process for Value Education:

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course objective and Course Outcomes	1	04-01-24		**TLM1**	
2.	Need, Basic Guidelines, Content and Process for Value Education	1	05-01-24		**TLM1**	
3.	Need, Basic Guidelines, Content and Process for Value Education	1	06-01-24		**TLM2**	
4.	Need, Basic Guidelines, Content and Process for Value Education	1	08-01-24		**TLM2**	
5.	Need, Basic Guidelines, Content and Process for Value Education	1	09-01-24		**TLM2**	
6.	Natural Acceptance' and Experiential Validation- as the process for self-exploration	1	10-01-24		**TLM2**	
7.	Natural Acceptance' and Experiential Validation- as the process for self-exploration	1	11-01-24		**TLM2**	
8.	Natural Acceptance' and Experiential Validation- as the process for self-exploration	1	12-01-24		**TLM2**	
9.	Continuous Happiness and Prosperity	1	18-01-24		**TLM2**	
10.	Basic Human Aspirations	1	19-01-24		**TLM2**	
11.	Right understanding	1	20-01-24		**TLM2**	
12.	Relationship and Physical Facility	1	22-01-24		**TLM2**	
13.	Understanding Happiness and Prosperity	1	25-01-24		**TLM2**	
No. of classes required to complete UNIT-I:		**13**	No. of classes taken:			

UNIT-II: Understanding Harmony in the Human Being - Harmony in Myself:

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 Understanding Harmony in the Human Being - Harmony in Myself	1	27-01-24		**TLM2**	
2.	Understanding human being as a co-existence of the sentient 'I' and the material 'Body'	1	29-01-24		**TLM2**	
3.	Understanding human being as a co-existence of the sentient 'I' and the material 'Body'	1	01-02-24		**TLM2**	
4.	Understanding the needs of Self ('I') and 'Body' - happiness and physical facility	1	02-02-24		**TLM2**	
5.	Understanding the needs of Self ('I') and 'Body' - happiness and physical facility	1	03-02-24		**TLM2**	
6.	Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)	1	05-02-24		**TLM2**	
7.	Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)	1	08-02-24		**TLM2**	
8.	Understanding the characteristics and activities of 'I' and harmony in 'I	1	09-02-24		**TLM2**	

9.	Understanding the characteristics and activities of 'I' and harmony in 'I	1	10-02-24		**TLM2**	
10.	Understanding the harmony of I with the Body: Sanyam and Health	1	12-02-24		**TLM2**	
11.	Correct appraisal of Physical needs, meaning of Prosperity in detail	1	15-02-24		**TLM2**	
No. of classes required to complete UNIT-II:		**11**	No. of classes taken:			

UNIT-III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship:

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.	Understanding values in human-human relationship	1	16-02-24		**TLM2**	
2.	Meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness	1	17-02-24		**TLM2**	
3.	Trust and Respect as the foundational values of relationship	1	19-02-24		**TLM2**	
4.	Understanding the harmony in the society: Resolution, Prosperity	1	22-02-24			
5.	Understanding the harmony in the society: Resolution, Prosperity	1	23-02-24		**TLM2**	
6.	Understanding the harmony in the society: fearlessness and co-existence as comprehensive Human Goals	1	24-02-24		**TLM2**	
7.	Understanding the harmony in the society: fearlessness and co-existence as comprehensive Human Goals	1	04-03-24		**TLM2**	
8.	Visualizing a universal harmonious order in society- Undivided Society	1	07-03-24		**TLM2**	
9.	Visualizing a universal harmonious order in society- Undivided Society	1	09-03-24		**TLM2**	
10.	Visualizing a universal harmonious order in society- Undivided Society	1	11-03-24			
11.	Universal Order- from family to world family, Gratitude as a universal value in relationships	1	14-03-24		**TLM2**	
12.	Universal Order- from family to world family, Gratitude as a universal value in relationships	1	15-03-24			
13.	Universal Order- from family to world family, Gratitude as a universal value in relationships	1	16-03-24		**TLM2**	
No. of classes required to complete UNIT-III:		**13**	No. of classes taken:			

UNIT-IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence:

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.	Understanding the harmony in the Nature	1	18-03-24		**TLM2**	
2.	Understanding the harmony in the Nature	1	21-03-24		**TLM2**	
3.	Understanding the harmony in the Nature	1	22-03-24		**TLM2**	
4.	Inter connectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature	1	23-03-24		**TLM2**	

5.	Inter connectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature	1	28-03-24		**TLM2**	
6.	Inter connectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature	1	30-03-24		**TLM2**	
7.	Understanding Existence as Co-existence of mutually interacting units in all-pervasive space	1	01-04-24		**TLM2**	
8.	Understanding Existence as Co-existence of mutually interacting units in all-pervasive space	1	04-04-24		**TLM2**	
9.	Holistic perception of harmony at all levels of existence	1	06-04-24		**TLM2**	
10.	Holistic perception of harmony at all levels of existence	1	08-04-24		**TLM2**	
No. of classes required to complete UNIT-IV:		**10**	No. of classes taken:			

UNIT-V: Implications of the above Holistic Understanding of Harmony on Professional Ethics:

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 acceptance of human values; Definitiveness of Ethical Human Conduct	1	12-04-24		**TLM2**	
2.	Natural acceptance of human values; Definitiveness of Ethical Human Conduct	1	13-04-24		**TLM2**	
3.	Natural acceptance of human values; Definitiveness of Ethical Human Conduct	1	15-04-24			
4.	Basis for Humanistic Education	1	18-04-24		**TLM2**	
5.	Basis for Humanistic Education	1	19-04-24			
6.	Humanistic Constitution and Humanistic Universal Order	1	20-04-24			
7.	Humanistic Constitution and Humanistic Universal Order	1	22-04-24		**TLM2**	
8.	Competence in professional ethics	1	25-04-24			
9.	Strategy for transition from the present state to Universal Human Order	1	26-04-24			
10.	Revision & Overview	1	27-04-24		**TLM2**	
No. of classes required to complete UNIT-V:		**10**	No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.						

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

PART-C

EVALUATION PROCESS (R20 Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date: 30-12-2023

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Dr. T. Satyanarayana	Dr. B. Srinivasa Rao	Dr. B. Srinivasa Rao	Dr. Y. Amar Babu
Professor, ECE	Prof. & HoD, IT	Prof. & HoD, IT	Prof. & HoD, ECE

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COURSE HANDOUT

PART-A

PROGRAM : B.Tech., IV-Sem., ECE-A

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : Analog Communications Lab – 20EC56

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR (s) : Mr. M. K. Linga Murthy / Dr. P Venkat Rao

COURSE OBJECTIVES: This course provides the practical exposure on analog communication schemes and gives the practical knowledge about pulse modulation techniques used in communication systems. It also gives the knowledge on implementation of continuous wave and pulse modulation schemes using MATLAB.

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

CO1	:	Demonstrate the practical aspects of continuous wave modulation schemes. **(Understand – L2)**
CO2	:	Construct the circuits for studying pulse modulation techniques. **(Apply – L3)**
CO3	:	Apply the programming aspects of MATLAB in simulation of continuous wave and pulse modulation techniques **(Apply – L3)**
CO4	:	Adapt effective communication, presentation and report writing skills**. (Apply – L3**)

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

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

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

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

PART-B

Batch-1 (Monday)

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	08.01.2024		-	TLM1	
2	Experiment - 1 & 2	3	22.01.2024		CO1, CO4	TLM4	
3	Experiment - 3 & 4	3	29.01.2024		CO1, CO4	TLM4	
4	Experiment - 5	3	05.02.2024		CO1, CO4	TLM4	
5	Experiment – 6	3	12.02.2024		CO2 CO4	TLM4	
6	Experiment - 7	3	19.02.2024		CO2, CO4	TLM4	
7	Experiment - 8	3	04.03.2024		CO1, CO3, CO4	TLM4	
8	Experiment - 9	3	11.03.2024		CO1, CO3, CO4	TLM4	
9	Experiment - 10	3	18.03.2024		CO2, CO3, CO4	TLM4	
10	Experiment - 11	3	01.04.2024		CO2, CO3, CO4	TLM4	
11	Experiment - 12	3	08.04.2024		CO2, CO3, CO4	TLM4	
12	Simulation in GNU Radio Content beyond syllabus	3	15.04.2024		-	TLM4	
13	Internal exam	3	22.04.2024		-	-	

Batch-2 (Thursday)

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	04.01.2024		-	TLM1	
2	Experiment -1	3	11.01.2024		CO1, CO4	TLM4	
3	Experiment - 2	3	18.04.2024		CO1, CO4	TLM4	
4	Experiment - 3	3	25.01.2024		CO1, CO4	TLM4	
5	Experiment - 4	3	01.02.2024		CO1, CO4	TLM4	
6	Experiment - 9	3	08.02.2024		CO1, CO3, CO4	TLM4	
7	Experiment -10	3	15.02.2024		CO1, CO3, CO4	TLM4	
8	Experiment - 5	3	22.02.2024		CO1, CO4	TLM4	
9	Experiment - 6	3	07.03.2024		CO2, CO4	TLM4	
10	Experiment - 7	3	14.03.2024		CO2, CO4	TLM4	
11	Experiment - 8	3	21.03.2024		CO2, CO4	TLM4	
12	Experiment - 11	3	28.03.2024		CO2, CO3, CO4	TLM4	
13	Experiment - 12	3	04.04.2024		CO2, CO3, CO4	TLM4	
14	Simulation in GNU Radio Content beyond syllabus	3	18.04.2024		-	TLM4	
15	Internal exam	3	25.04.2024		-	-	

List of Experiments:

Exp. No	Experiments to be conducted	Exp. No	Experiments to be conducted
CYCLE-1			**CYCLE-2**
1	Generate the Amplitude modulated (AM) signal for different modulation indices and reconstruct the original signal.	5.	Estimate the cutoff frequencies for Pre emphasis and De-emphasis circuits.
2	Demonstrate the generation of Frequency modulated signal and reconstruction of original signal.	6.	Generate the Pulse Amplitude Modulated signal and reconstruct the original signal using low pass filter
3	Use product modulator to generate double sideband suppressed carrier AM signal and demodulate the signal using Synchronous detector.	7.	Construct circuits for generating the Pulse width and Pulse position modulated signals using IC555 and perform demodulation to reconstruct the message signal
4	Apply phase shift method for generating the Single sideband modulated AM signal and demodulate using coherent detector.	8.	Generation of sampled signal for different sampling rates and verify sampling theorem for efficient reconstruction.
9.	Amplitude Modulation and Demodulation (Simulation Using MATLAB)	11.	Pulse Amplitude Modulation techniques (Simulation Using MATLAB)
10	Frequency Modulation and Demodulation (Simulation Using MATLAB)	12.	Frequency modulation and demodulation (Simulation Using MATLAB)

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:

Evaluation Task	Expt. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination: A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**50**

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M K Linga Murthy	Mr. M K Linga Murthy	Dr. M.V.Sudhakar	Dr. Y.Amar Babu

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COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K.Ravi Kumar /Ms.G.Asha

Course Name & Code	**:**Programming using Python Lab-20AD53	**Regulation**: R20
L-T-P Structure	**:**1-0-2	**Credits:**02
Program/Sem/Sec	:B.Tech. IV-Sem., ECE-A Sec	**A.Y.:**2023-24

PREREQUISITE:Programming Languages like C Language.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of python course is to lead the students from the basics of writing and running python scripts in problem solving and also to design and implement the modules and understands the working of classes and objects in python.

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

CO1	**Identify** various programming constructs available in Python and **apply** them in solving computational problems **(Apply- L3)**
CO2	**Demonstrate** data structures available in Python and **apply** them in solving computational problems **(Apply- L3)**
CO3	**Implement** modular programming, string manipulations and Python Libraries **(Apply- L3)**
CO4	**Improve** individual / teamwork skills, communication & report writing skills with ethical values

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

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

TEXTBOOKS:

T1 Reema Thareja,"Python Programming Using Problem Solving Approach ", Oxford Publications

T2 Python for Everybody: Exploring Data In Python 3by Dr. Charles Russell Severance, Sue Blumenberg

REFERENCE BOOKS:

R1 Gowri Shankar, Sand Veena,"Introduction to Python Programming", CRC Press, Taylor, and Francis Group–Achapman & Hallbook.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Batch 1

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: Language Basics and Example Problems	6	08-01-24 22-01-24		TLM1	
2.	Introduction: Language Basics and Example Problems	3	29-01-24		TLM4	
3.	Module 1: Exercise Programs on Lists	3	05-02-24		TLM4	
4.	Module 2: Exercise Programs on Tuples	3	12-02-24		TLM4	
5.	Module 3: Exercise Programs on Sets	3	19-02-24		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	3	04-03-24		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	3	11-03-24		TLM4	
8.	Module 6: Exercise Programs on Strings	3	18-03-24		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	3	01-04-24		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	08-04-24		TLM4	
11.	Internal Lab Exam	3	22-04-24		-	
No. of classes required to complete - 36				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Applications in science and Engineering	1	15-04-24		TLM4, 6	
13.	Competitive Exam Problems	2	15-04-24		TLM4, 6	

COURSE DELIVERY PLAN (LESSON PLAN): Batch 2

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: Language Basics and Example Problems	6	04-01-24 11-01-24		TLM1	
2.	Introduction: Language Basics and Example Problems	6	18-01-24 25-01-24		TLM4	
3.	Module 1: Exercise Programs on Lists	6	01-02-24 08-02-24		TLM4	
4.	Module 2: Exercise Programs on Tuples	3	15-02-24		TLM4	
5.	Module 3: Exercise Programs on Sets	3	22-02-24		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	3	07-03-24		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	3	14-03-24		TLM4	
8.	Module 6: Exercise Programs on Strings	3	21-03-24		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	3	28-03-24		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	04-03-24		TLM4	
11.	Internal Lab Exam	3	25-03-24		-	
No. of classes required to complete - 42				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Applications in science and Engineering	1	18-03-24		TLM4, 6	
13.	Competitive Exam Problems	2	18-03-24		TLM4, 6	

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

PART-C

EVALUATION PROCESS:

Evaluation Task	Exp no's	Marks
Day to Day work=**A**	1,2,3,4,5,6,7,8…	A=05
Record= **B**	1,2,3,4,5,6,7,8…	B=05
Internal Test= **C**	1,2,3,4,5,6,7,8…	C=05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D=35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**50**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources,

	and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
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PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
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PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.K.Ravi Kumar**	**Dr.K.Ravi Kumar**	**Dr. B.Poornaiah**	**Dr. Y. Amar Babu**
Signature				

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr P. Rakesh Kumar

Course Name & Code : MODELING, DESIGN AND PROTOTYPING – 20ECS2

L-T-P Structure : 1-0-2 Credits : 2

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- A A.Y : 2023-24

Pre-requisites: C-Programming, Pulse and Digital Circuits.

Course Educational Objectives: In this course, student will learn about how to build an engineering application with LabVIEW software and associated hardware.

Course Outcomes (Cos): At the end of the course, students are able to

CO1	Understand the programming concept of virtual instruments. (**Understand – L2**)
CO2	Develop real time applications using loops, formula nodes, array, clusters and DAQ. (**Apply – L3**)
CO3	Adopt Communication, Presentation and Report writing skills. (**Apply – L3**)

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

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

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

TEXT BOOK(S):

T1 S. Sumathi, P.Surekha, Virtual Instrumentation with LabVIEW, ACME Learning Pvt. Ltd.,2007.

T2 Jeffrey Travis, Jimkring, LabVIEW for Everyone, Pearson Education, 2009.

REFERENCE BOOK(S):

R1 Jovitha Jerome, Virtual Instrumentation using LabVIEW, PHI Learning Pvt. Ltd., 2006.

R2 Rick Bitter, Taqi Mohiuddin, Matt Nawrocki – LabVIEW Advanced Programming Techniques, CRC Press, 2009.

Part – A: Theory

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	02-01-2024		TLM2	
2.	VI and Data operations	1	09-01-2024		TLM2	
3.	VI front and block panel	1	23-01-2024		TLM2	
4.	Data flow programming	1	30-01-2024		TLM2	
5.	Graph programming	1	06-02-2024		TLM2	
6.	Loops, Arrays applications	1	13-02-2024		TLM2	
7.	Concepts of VI& Sub VIs	1	20-02-2024		TLM2	
8.	Applications of sequence structures	1	05-03-2024		TLM2	
9.	Waveforms and Graphs	1	12-03-2024		TLM2	
10.	Applications	1	19-03-2024		TLM2	
11.	Modules	1	26-03-2024		TLM2	
12.	NI Hardware	1	02-04-2024		TLM2	
13.	DAQ Installation and configuration	1	09-04-2024		TLM2	
14.	Applications	1	16-04-2024		TLM2	
15.	DAQ Hardware	1	23-04-2024		TLM2	

PART – B:

S.No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Virtual Instruments, Cos, Numeric	3	02-01-2024		TLM2	
2.	Boolean and compound operations	3	09-01-2024		TLM4	
3.	For and while loops	3	23-01-2024		TLM4	
4.	Structures, Timers	3	30-01-2024		TLM4	
5.	Arrays & Clusters	3	06-02-2024		TLM4	
6.	Formula node, Sub VI	3	13-02-2024		TLM4	
7.	Files	3	20-02-2024		TLM4	
8.	DAQ – installation, Application	3	05-03-2024		TLM4	
9.	Analog applications	3	12-03-2024		TLM4	
10.	Digital applications	3	19-03-2024		TLM4	
11.	Discussion of Models & Demo	3	26-03-2024		TLM2	
12.	Discussion of Models & Demo	3	02-04-2024		TLM2	
13.	Discussion of Models & Demo	3	09-04-2024		TLM2	

14.	Documentation Verification	3	16-04-2024		TLM6	
15.	Documentation Verification	3	23-04-2024		TLM6	

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

EVALUATION PROCESS:

Report	**10**
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the

engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Dr P. Rakesh Kumar	Mr V.V. Rama Krishna	Dr B. Poornaiah	Dr Y. Amar Babu
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B. Rambabu/ Mr. P. Venkateswara Rao
Dr. M. V Sudhakar / Mr.T. Anil Raju

Course Name & Code : Digital Signal Processing Lab – 20EC55

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- A **A.Y :** 2023-24

Pre-Requisites: C – Programming, Basic Definitions of signals and systems.

Course Objectives: This course provides generation of basic signals and operations on signals. This course also provides design of IIR filters using Butterworth and Chebyshev approximation techniques and FIR filters using windowing techniques. This course also gives the knowledge about DSP Processors.

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

CO 1	**Understand** the generation and operations of signals using MATLAB. **(Understand – L2)**
CO 2	**Analyze** the signals in time and frequency domains using MATLAB and Code Composer Studio.**(Analyze – L4)**
CO 3	**Design** IIR and FIR Filters and obtain their frequency response using MATLAB.**(Apply – L3)**
CO 4	**Adapt** effective communication, presentation skills and report writing. **(Apply – L3)**

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

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

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

TEXT BOOK(S):

T1 Rudra Pratap, "*MATLAB Getting Started with MATLAB 7*", oxford university press,
T2 Tarun Kumar Rawat, "Digital Signal Processing", oxford university press,2015

DSP LAB SCHEDULE (LESSON PLAN): Section-B

PART-B

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DSP Lab experiments, COs, Pos and PSOs	--	3	03-01-2024			
Cycle – I – MATLAB Software							
1	Generation of Discrete Time (DT) signals	CO1	3	10-01-2024			
2	Operations on DT signals	CO1	3	24-01-2024			
3	Linear Convolution, Circular Convolution	CO2	3	07-02-2024			
4	Computation of N-Point DFT and IDFT.	CO2	3	14-02-2024			
5	Linear and Circular Convolution Using DFT & IDFT, Power Spectral Density for sinusoidal signal.	CO2	3	21-02-2024			
6	Design of Digital IIR butter worth filter using Bi-linear Transformation, Design of Digital IIR Chebyshev filter using Bi-linear Transformation	CO3	3	06-03-2024			
7	Design of FIR filters using window techniques	CO3	3	13-03-2024			
Cycle – II - Code Composer Studio Simulation Software and DSPProcessors							
8	Linear Convolution, Circular Convolution	CO2	3	20-03-2024			
9	Computation of DFT.	CO2	3	27-03-2024			
--	Content Beyond the Experiment	--	3	03-04-2024			
--	Internal Lab Examination	--	3	10-04-2024			
No. of classes required to complete Lab			**36**	No. of classes conducted:			

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work (Viva =2M & Experiment Conduction =3M) = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	15
Semester End Examinations = D	1,2,3,4,5,6,7,8…	D = 35
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	50

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 02.01.2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr B Ram Babu	Mr. P. Venkateswara Rao	Dr. G L N Murthy	Dr. Y Amar Babu

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India

DEPARTMENTOFELECTRONICS&COMMUNICATIONSENGINEERING

COURSE HANDOUT

Name of Course Instructors	:	Ms. Asha. G / Mr. P Venkateswara Rao
Course Name	:	Association
Program/Sem/Sec	:	B.Tech./ ECE - IV-Sem / A,B & C - Sections
A.Y.	:	2023 - 24

COURSE DELIVERY PLAN (LESSON PLAN) :

S.No	Topics to be covered	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1	Discussion about AssociationActivities by course instructors and Self-Introduction.	05-01-2024		
2	JAM on Aditya L1 Mission.	12-01-2024		
3	Group Discussion on National Education Policy.	19-01-2024		
4	Seminar related to VIKSIT BHARAT.	02-02-2024		
5	Group Discussion on smart devices& social networks.	09-02-2024		
6	Innovations in Technology with respect to ECE(PPT).	09-02-2024		
7	Debate on Machine Learning & Deep Learning.	16-02-2024		
8	Technical Quiz on competitive exam topics.	23-02-2024		
9	Current affairs on technological changes/Technical Talks (PPT/Video).	23-02-2024		
10	Debate-Role of AI on Man Kind.	15-03-2024		
11	Presentation on Role of Technology in economical growth of a country.	22-03-2024		
12	Group Discussion on Drone Technology for real time applications.	05-04-2024		
13	Presentation on 5G Technology.	12-04-2024		
14	Testing knowledge on verbal/quantitative/reasoning/problem solving/logical/etc. skills.	19-04-2024		
15	Technical Quiz.	26-04-2024		

Course Instructors

Ms. Asha. G

Mr. P.Venkateswara Rao

HOD

Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. E V KRISHNA RAO

Course Name & Code : Universal Human Values 2: Understanding Harmony **(20HS01)**
L-T-P Structure : 3-0-0 **Credits** : 3
Program/Sem/Sec : B.Tech IV Semester – ECE – B Sec **A.Y.** : 2023-24

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves and their surroundings (family, society, nature); they would become more responsible in life and in handling problems with sustainable solutions while keeping human relationships and human nature in mind.

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

CO1	Apply the value inputs in life and profession
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the self and the Body
CO3	Understand the role of a human being in ensuring harmony in society
CO4	Understand the role of a human being in ensuring harmony in the nature and existence
CO5	Distinguish between ethical and unethical practices

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

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

TEXTBOOKS:

T1 R R Gaur, r singal, G P Bagaria, "Human values and Professional Ethics", Excel Books, New Delhi,2010

REFERENCE BOOKS:

R1 Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999
R2 Human values, A N Tripathi, New Age Publishers, New Delhi, 2004
R3 The story of my experiments with Truth, Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Need, Basic Guide lines, content and Process for value Education

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	02-01-2024		TLM2	
2.	Process for self exploration: Natural Acceptance	1	04-01-2024		TLM.2	
3.	Experiential validation	1	06-01-2024		TLM2	
4.	Continuous Happiness and prosperity	1	08-01-2024		TLM2	
5.	Continuous Happiness and prosperity	1	09-01-2024		TLM2	
6.	A look at basic human aspirations: Right understanding	1	11-01-2024		TLM2	
7.	Relationship	1	18-01-2024		TLM2	
8.	Physical facility	1	20-01-2024		TLM2	
9.	Physical facility	1	22-01-2024		TLM2	
10.	Understanding Happiness and prosperity	1	23-01-2024		TLM2	
11.	Understanding Happiness and prosperity	1	25-01-2024		TLM2	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Understanding Harmony in the Human Being-Harmony in myself

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	27-01-2024		TLM2	
13.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	29-01-2024		TLM2	
14.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	30-01-2024		TLM2	
15.	Understanding the Body as an instrument of 'I'	1	01-02-2024		TLM2	
16.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	03-02-2024		TLM2	
17.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	05-02-2024		TLM2	
18.	Understanding the harmony of I with the Body	1	06-02-2024		TLM2	
19.	Sanyam and Health	1	08-02-2024		TLM2	

20.	Sanyam and Health	1	12-02-2024		TLM2	
21.	Correct appraisal of Physical needs	1	13-02-2024		TLM2	
22.	Meaning of prosperity in detail	1	15-02-2024		TLM1	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: Understanding Harmony in the Family and society-Harmony in Human- Human Relationship

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.	Understanding values in human-human relationship: meaning of justice	1	17-02-2024		TLM2	
24.	Program for fulfillment to ensure mutual happiness, Trust and Respect as the foundational values of relationship	1	19-02-2024		TLM2	
25.	Program for fulfillment to ensure mutual happiness, Trust and Respect as the foundational values of relationship	1	20-02-2024		TLM2	
26.	Understanding Harmony in the society: Resolution	1	22-02-2024		TLM2	
27.	Understanding Harmony in the society: Resolution	1	24-02-2024		TLM2	
28.	**I-Mid examinations**		26-02-2024 02-03-2024			
29.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	04-03-2024		TLM2	
30.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	05-03-2024		TLM2	
31.	Visualizing a universal harmonious order in the society- undivided society	1	07-03-2024		TLM2	
32.	Visualizing a universal harmonious order in the society- undivided society	1	11-03-2024		TLM2	
33.	Universal order-from family to world family	1	12-03-2024		TLM2	
34.	Universal order-from family to world family	1	14-03-2024		TLM2	
35.	Gratitude as a universal value in relationships	1	16-03-2024		TLM2	
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Understanding Harmony in the Nature and Existence- Whole existence as Coexistence

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Understanding Harmony in the Nature	1	18-03-2024		TLM2	
37.	Interconnectedness and mutual fulfillment among four orders of nature	1	19-03-2024		TLM2	
38.	Interconnectedness and mutual fulfillment among four orders of nature	1	21-03-2024		TLM2	

39.	Recyclability and self regulation in nature	1	23-03-2024		TLM2	
40.	Recyclability and self regulation in nature	1	26-03-2024		TLM2	
41.	Recyclability and self regulation in nature	1	28-03-2024		TLM2	
42.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	30-03-2024		TLM2	
43.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	01-04-2024		TLM2	
44.	Holistic perception of harmony at all levels of existence	1	02-04-2024		TLM2	
45.	Holistic perception of harmony at all levels of existence	1	04-04-2024		TLM2	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Implications of the above Holistic understanding of Harmony on professional ethics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
46.	Natural acceptance of human values	1	06-04-2024		TLM2	
47.	Definitiveness of ethical human conduct	1	08-04-2024		TLM2	
48.	Basis for humanistic education	1	15-04-2024		TLM2	
49.	Basis for humanistic education	1	16-04-2024		TLM2	
50.	Humanistic constitution and humanistic universal order	1	18-04-2024		TLM2	
51.	Humanistic constitution and humanistic universal order	1	20-04-2024		TLM2	
52.	Competence in professional ethics	1	22-04-2024		TLM2	
53.	Competence in professional ethics	1	23-04-2024		TLM2	
54.	Strategy for transition from the present state to universal human order	1	25-04-2024		TLM2	
No. of classes required to complete UNIT-V: 8				**No. of classes taken:**		

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.		27-04-2024				

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. E V Krishna Rao**	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**
Signature				

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COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.Ch.Siva Rama Krishna, Sr.Asst.Professor

Course Name & Code	**:** Control Systems-20EE09	**Regulation**: R20
L-T-P Structure	**:** 2-1-0	**Credits:** 03
Program/Sem/Sec	: B. Tech. IV-Sem., ECE-B Sec	**A.Y.:** 2023-24

PRE REQUISITE: Electrical Circuit Analysis and Applied Physics.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

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

CO1	Develop mathematical models of systems in terms of transfer function and state-space. **(Apply-L3)**
CO2	Analyze control systems in time domain **(Apply-L3)**
CO3	Analyze control systems in frequency domain**(Apply-L3)**
CO4	Understand the concepts of controllers and compensators. **(Understand-L2)**

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

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

TEXTBOOKS:

T1 B. C. Kuo , "Automatic Control Systems" John Wiley and Sons ,9th edition,2014.

T2 I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P)Limited Publishers,6th edition,2018

REFERENCE BOOKS:

R1 Katsuhiko Ogata , "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 5thedition,2009

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: MATHEMATICAL MODELLING OF CONTROL SYSTEMS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	02-01-2024		**TLM1**	
2.	Concept of Control systems, Open loop and Closed loop control systems	1	04-01-2024		**TLM2**	
3.	Modeling of Electrical systems	1	06-01-2024		**TLM2**	
4.	Modeling of Mechanical systems	1	08-01-2024		**TLM1**	
5.	Electrical analogy of Mechanical systems	1	09-01-2024		**TLM2**	
6.	**Tutorial-1**	1	11-01-2024		**TLM3**	
7.	Block Diagrams Reduction rules	1	18-01-2024		**TLM1**	
8.	Signal Flow Graph Terminology	1	21-01-2024		**TLM1**	
9.	**Tutorial-2**	1	22-01-2024		**TLM3**	
10.	SFG Reduction	1	23-01-2024		**TLM1**	
11.	Feedback Control System Characteristics	1	25-01-2024		**TLM2**	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: TIME RESPONSE ANALYSIS-I

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Standard test signals	1	28-01-2024		**TLM2**	
13.	Time response of first order systems	1	29-01-2024		**TLM2**	
14.	Response of second order system	1	30-01-2024		**TLM1**	
15.	Response of second order for different damping values	2	01-02-2024 03-02-2024		**TLM2**	
16.	Time domain specifications	1	05-02-2024		**TLM1**	
17.	**Tutorial-3**	1	06-02-2024		**TLM3**	
18.	Steady state errors and error constants.	1	08-02-2024		**TLM1**	

19.	Introduction to PI, PD Controllers	1	12-02-2024		**TLM2**	
20.	Introduction to PID Controllers	1	13-02-2024		**TLM2**	
21.	**Tutorial-4**	1	15-02-2024		**TLM3**	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: **TIME RESPONSE ANALYSIS-II**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Concepts of stability	1	17-02-2024		**TLM2**	
23.	Necessary conditions for Stability	1	19-02-2024		**TLM2**	
24.	Routh stability criterion	1	20-02-2024		**TLM1**	
25.	Relativestability analysis	1	22-02-2024		**TLM2**	
26.	**Tutorial-5**	1	24-02-2024		**TLM3**	
27.	Root Locus Technique	1	04-03-2024		**TLM1**	
28.	Construction of root loci	1	05-03-2024		**TLM2**	
29.	Effects of adding poles to the root loci.	1	07-03-2024		**TLM2**	
30.	Effects of adding zeros to the root loci.	1	11-03-2024		**TLM2**	
31.	**Tutorial-6**	1	12-03-2024		**TLM3**	
No. of classes required to complete UNIT-III: 10				**No. of classes taken:**		

UNIT-IV: FREQUENCY RESPONSE ANALYSIS

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.	Frequency domain specifications	1	14-03-2024		**TLM2**	
33.	Frequency response of standard second order system	1	16-03-2024		**TLM2**	
34.	Bode Plot - Frequency domain specifications	2	18-03-2024 19-03-2024		**TLM1**	
35.	**Tutorial-7**	1	21-03-2024		**TLM3**	
36.	Determination of transfer function from the Bode Plot	1	23-03-2024		**TLM2**	
37.	Polar Plot	1	26-03-2024		**TLM2**	
38.	Nyquist Stability criteria	2	28-03-2024 30-03-2024		**TLM2**	
39.	**Tutorial-8**	1	01-04-2024		**TLM3**	
40.	Introduction to Lag, Lead Compensators	1	02-04-2024		**TLM2**	

41.	Lead-Lag Compensator	1	04-04-2024		**TLM2**	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: STATE SPACE ANALYSIS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Concept of state variables	1	06-04-2024		**TLM2**	
43.	State models for linear and time invariant Systems	1	08-04-2024		**TLM2**	
44.	The Transfer Function from the State Equation	1	11-04-2024		**TLM1**	
45.	Solution of state equation	1	15-04-2024		**TLM1**	
46.	**Tutorial-9**	1	16-04-2024		**TLM3**	
47.	State transition matrix and it's properties	1	18-04-2024		**TLM1**	
48.	Computation of state transition matrix using Laplace transformation method	1	20-04-2024		**TLM1**	
49.	Concepts of controllability and observability	1	22-04-2024		**TLM1**	
50.	**Tutorial-10**	1	23-04-2024		**TLM3**	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
52.	Root Locus Construction using MatLab	2	25-04-2024 26-04-2024		**TLM4**	

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.Ch.Siva Rama Krishna**	**Dr.B Rambabu**	**Dr. G. L N Murthy**	**Dr. Y. Amar Babu**
Signature				

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. P.Venkateswara Rao
Course Name & Code : Digital Signal Processing – 20EC06

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- B A.Y : 2023-24

Pre-Requisites: Signals and Systems.

Course Objectives:

This course introduces discrete time signals and systems and operations performed on them. It introduces Discrete time Fourier Transform, Discrete Fourier transform and Z transform meant for spectral analysis of discrete time signals and systems. Fast Fourier Transform that is an efficient way of implementing DFT is also introduced. It also provides the basic knowledge about the design of both IIR and FIR filters.

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

CO1	Interpret the basics of discrete time signal processing techniques.**(Understand – L2)**
CO2	Examine Discrete Time Signals in time and frequency domain using DTFT, DFT, FFTand Z-transforms **(Apply – L3)**
CO3	Apply DFT, FFT and Z-Transform techniques to solve and realize discrete systems **(Apply – L3)**
CO4	Construct the IIR Filters using Butterworth, Chebyshev Approximation techniques andFIR Filters using Fourier series method and windowing Techniques **(Apply – L3)**

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	-	-	1
CO2	2	1	1	-	-	-	-	-	-	-	-	2	-	-	2
CO3	3	3	1	1	-	-	-	-	-	-	-	2	-	-	2
CO4	3	3	2	1	-	-	-	-	-	-	-	3	-	-	2

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

TEXT BOOK(S):

T1 John G. Proakis, Dimitris G. Manolakis ***"Digital Signal Processing, Principles, Algorithms& Applications"***, Pearson education, 4th edition, 2008

T2 Alan V Openheim, Ronald W. Schafer, ***"Digital Signal Processing"***, PHI learning, 1st edition, 2010.

REFERENCE BOOK(S):

R1 P.RameshBabu, ***"Digital Signal Processing"***, Scitech Publications, 4th edition, 2012Pvt Ltd.

R2 A.NagoorKani, ***"Digital Signal Processing"***, RBA Publications,1st edition, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I: Discrete Time Signals, Discrete Time Systems & DTFT

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course, CEO, COs, POs and PSOs	1	02-01-2024		**TLM1**	
2.	Introduction - Block diagram of DSP System, Advantages , Limitations and Applications of DSP	1	04-01-2024		**TLM1**	
3.	Elementary Discrete Time Signals, Representation of Discrete Time Signals	1	06-01-2024		**TLM1**	
4.	Operations on Discrete Time Signals	1	08-01-2024		**TLM1**	
5.	Properties or classifications of Discrete Time Signals	1	09-01-2024		**TLM1**	
6.	Properties or classifications of Discrete Time Systems	1	11-01-2024		**TLM1**	
7.	Analysis of LTI Systems through LCCDE-Natural response and forced response	1	18-01-2024		**TLM1**	
8.	Linear Convolution	1	20-01-2024		**TLM1**	
9.	DTFT of a Sequence and System, Frequency, Magnitude, and phase response	1	22-01-2024		**TLM1**	
10.	Properties of DTFT	1	23-01-2024		**TLM1**	
No. of classes required to complete UNIT-I		**10**	No. of classes taken			

UNIT-II: Z-Transforms

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Z-Transform of a sequence and ROC – its properties	1	25-01-2024		**TLM1**	
2.	Properties of Z-Transforms	2	27-01-2024 29-01-2024		**TLM1**	
3.	Inverse Z-Transform	1	30-01-2024		**TLM1**	
4.	Problems on Z-Transforms	1	01-02-2024		**TLM1**	
5.	Problems on Inverse Z-Transforms	1	03-02-2024		**TLM1**	
6.	Analysis of LTI system using Z-transforms	2	05-02-2024 06-02-2024		**TLM1**	
7.	Direct Form-I, Direct Form-II Realizations	1	08-02-2024		**TLM1**	
8.	Cascade Form and Parallel Form for IIR systems	1	12-02-2024		**TLM1**	
9.	Direct Form, Cascade Form and Parallel Form, Linear Phase Realization for FIR systems	2	13-02-2024 15-02-2024		**TLM1**	
No. of classes required to complete UNIT-II		**12**	No. of classes taken			

UNIT-III: Discrete Fourier Transform (DFT) and Fast Fourier Transforms

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction - DFT, Computation of DFT, IDFT, Relation between DTFT and DFT, Twiddle factor – Properties, Problems	1	17-02-2024		**TLM1**	
2.	Properties of DFT	2	19-02-2024		**TLM1**	
3.	Linear Convolution and Circular Convolution	1	20-02-2024		**TLM1**	
4.	Linear Convolution through Circular Convolution	1	22-02-2024		**TLM1**	
5.	Circular Convolution through DFT & IDFT, Linear Convolution through DFT & IDFT	1	24-02-2024		**TLM1**	
6.	Need for FFT	1	04-03-2024		**TLM1**	
7.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	05-03-2024		**TLM1**	
8.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	07-03-2024		**TLM1**	
9.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	11-03-2024		**TLM1**	
10.	Radix – 2 DIT-FFT, Radix – 2 DIF-FFT Algorithm for IDFT computation.	1	12-03-2024		**TLM1**	
11.	Comparison between DIT and DIF Algorithm	1	14-03-2024		**TLM1**	
12.	Inverse FFT	1	16-03-2024		**TLM1**	
No. of classes required to complete UNIT-III		13	No. of classes taken			

UNIT-IV: IIR Filter Design

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction - Characteristics and Classification of Filters	1	18-03-2024			
2.	Design of IIR Digital Filter – Impulse Invariant Transformation – Aliasing effect	1	19-03-2024		**TLM1**	
3.	Design of IIR Digital Filter – Bilinear Transformation – Frequency warping	1	21-03-2024		**TLM1**	
4.	Problems on Impulse Invariance and Bilinear Transformation	1	23-03-2024		**TLM1**	
5.	Specifications of Low pass filters, Design of IIR Analog filter using Butterworth Approximations	1	26-03-2024		**TLM1**	
6.	Problems on Butterworth Filter	1	28-03-2024		**TLM1**	
7.	Design of IIR Analog filter using Chebyshev Approximations	1	30-03-2024		**TLM1**	
8.	Problems on Chebyshev Filter	1	01-04-2024		**TLM1**	
9.	Analog Frequency Transformations	1	02-04-2024		**TLM1**	

10.	Problems on Frequency Transformations	1	04-04-2024		**TLM1**	
No. of classes required to complete UNIT-IV			**10**	No. of classes taken		

UNIT-V: FIR filters Design

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Comparisons between IIR and FIR filters, Characteristics of FIR filters with linear phase.	1	06-04-2024		**TLM1**	
2.	Frequency Response Linear Phase FIR filters	2	08-04-2024 15-04-2024		**TLM1**	
3.	Design of FIR filters using Fourier series method	1	16-04-2024		**TLM1**	
4.	Problems	1	18-04-2024		**TLM1**	
5.	Design of FIR filters using window method and various window(s) characteristics	2	22-04-2024 23-04-2024		**TLM1**	
6.	Problems	1	25-04-2024		**TLM1**	
No. of classes required to complete UNIT-V		**8**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Multirate Signal Processing	**1**	27-04-2024		**TLM1**	

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:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 02-01-2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. P.Venkateswara Rao	Mr.T.Anil Raju	Dr. G L N Murthy	Dr. Y. Amar Babu

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COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.G.L.N.Murthy
Course Name & Code : Analog Communications&20EC07
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- B A.Y : 2023-24

PRE-REQUISITE: Signals & Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on various analog modulation techniques in both time and frequency domains. The course will give an idea about generation and demodulation methods of various analog modulation techniques. It also gives complete information regarding the transmitters and receivers types and performance evaluation of continuous wave modulation.

COURSE OUTCOMES (CO): At the end of the course, students will be able to

CO1:	Understand the fundamental concepts of various analog modulation schemes with relevant time and frequency domain representations.(Understand – L2)
CO2:	Interpret the generation, detection of continuous wave and pulse analogmodulation techniques. (Understand – L2)
CO3:	Apply the concepts of analog modulation and demodulation techniques for calculating communication system related parameters.(Apply – L3)
CO4:	Analyze the performance of continuous wave modulation schemes in the presenceof channel noise.(Analyze – L4)

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	1	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Simon Haykin, *"Communication Systems"*, John Wiley & Sons, 2nd Edition, 1983

T2 George Kennedy ,Davis, *"Electronic Communication Systems"*, Tata McGraw Hill Education, 4th edition, 1999.

BOS APPROVED REFERENCE BOOKS:

R1 G.K.Mithal, "*Radio Engineering*", Khanna Publishers,20th Edition,2000

R2 Sanjay Sharma, *"Analog Communication Systems",*S.K.Katariya& Sons,2nd Edition, 2007

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I :Introduction to Communication System ,Amplitude modulation,Double Side band Suppressed Carrier Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course. Course Outcomes	1	02.01.2024		TLM1	
2.	Review of Fourier Transform	1	03.01.2024		TLM1	
3.	Elements of a communication system	1	04.01.2024		TLM1	
4.	Need for modulation, Classification of Modulation	1	05.01.2024		TLM1	
5.	Amplitude Modulation: Definition, Time and Frequency Domain Representation	1	09.01.2024		TLM1	
6.	Power relations in AM wave, Generation of AM waves using square law modulator, Switching modulator.	1	10.01.2024		TLM1	
7.	Demodulation of AM waves using square law Demodulator, Envelop Detector	1	11.01.2024		TLM1	
8.	Introduction to DSBSC -AM, Time and Frequency domain Representation	1	12.01.2024		TLM1	
9.	Generation of DSBSC wave using Balanced Modulator	1	18.01.2024		TLM1	
10.	Generation of DSBSC using Ring Modulator, Coherent Detection of DSBSC wave	1	19.01.2024		TLM1	
11.	Effect of Phase and frequency Errors, Costas Loop	1	23.01.2024		TLM1	
12.	Problem Solving	1	24.01.2024		TLM3	
No. of classes required to complete UNIT-I		12	No. of classes taken:			

UNIT-II:Single Side band Modulation & Vestigial Side band Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Single Side band Modulation: Definition, Time and Frequency domain representation	1	25.01.2024		TLM1	

14.	Generation of SSB wave: Filter Method, Phase Discrimination	1	30.01.2024		TLM3	
15.	Coherent detection of SSB wave	1	31.01.2024		TLM1	
16.	Effect of Phase and Frequency Error in the detection	1	01.02.2024		TLM1	
17.	Vestigial Side band Modulation: Definition, Time and frequency domain representation	1	02.02.2024		TLM1	
18.	Generation of VSB wave	1	06.02.2024		TLM1	
19.	Envelope detection of VSB wave plus carrier	1	07.02.2024		TLM1	
20.	Comparisons of amplitude modulation techniques, Applications of different AM systems	1	08.02.2024		TLM1	
21.	Problem Solving	1	09.02.2024		TLM3	
No. of classes required to complete UNIT-II		9	No. of classes taken:			

UNIT-III :Angle Modulation, Demodulation of FM Wave

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Types of Angle Modulation Frequency Modulation: Time domain representation, Single tone Frequency Modulation	1	13.02.2024		TLM1	
23.	Narrow Band Frequency Modulation: Time and Frequency domain representation	1	14.02.2024		TLM1	
24.	Wide band Frequency Modulation Time and Frequency Domain representation	1	15.02.2024		TLM3	
25.	Transmission power and Band width of FM wave	1	16.02.2024		TLM1	
26.	Problem Solving	1	20.02.2024		TLM1	
27.	Generation of FM wave: Direct method & Indirect method	1	21.02.2024		TLM1	
28.	Demodulation of FM – frequency Discrimination methods: simple slope detector, Balanced slope detector	1	22.02.2024		TLM1	
29.	Phase Discrimination methods: Foster Seeley Discrimination method	1	23.02.2024		TLM1	

30.	Ratio Detector, PLL	1	05.03.2024		TLM1	
31.	Problem Solving	1	06.03.2024		TLM3	
No. of classes required to complete UNIT-III		10	No. of classes taken:			

UNIT-IV :: Radio Transmitters and Receivers

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.	Radio transmitter introduction and classification AM transmitters-low level and high level	1	07.03.2024		TLM1	
33.	FM Transmitter: Reactance tube method, Armstrong method	1	12.03.2024		TLM1	
34.	Radio Receiver introduction and classification	1	13.03.2024		TLM1	
35.	Problem Solving	1	14.03.2024		TLM3	
36.	Tuned Radio Frequency receiver and its limitations	1	15.03.2024		TLM1	
37.	Need of heterodyning AM Super heterodyne Receiver, Frequency Changing and Tracking Concept of IF	1	19.03.2024		TLM1	
38.	Significance of AGC in AM Radio Receivers, Simple AGC, Delayed AGC	1	20.03.2024		TLM1	
39.	FM receiver	1	21.03.2024		TLM1	
No. of classes required to complete UNIT-IV		8	No. of classes taken:			

UNIT-V Noise in Analog Communication Systems, Analog Pulse modulation& Multiplexing

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.	Definition of Noise in communication system Signal to Noise ratio calculations in AM	1	22.03.2024		TLM1	
41.	Signal to Noise ratio calculations in DSBSC, SSBSC and FM receivers	3	26.03.2024, 27.03.2024 & 28.03.2024		TLM1	
42.	Threshold Effect, Pre-Emphasis and De Emphasis circuits	1	03.04.2024		TLM1	
43.	Introduction to Carrier to Noise Ratio Signal to Interference plus Noise Ratio	1	04.04.2024		TLM1	

44.	Pulse Amplitude Modulation Generation and Demodulation.	1	10.04.2024		TLM1 TLM1	
45.	Analog Pulse Modulation: Need for Pulse Modulation Types of Pulse analog Modulation,	1	12.04.2024		TLM1	
46.	Pulse Width Modulation Generation	1	16.04.2024		TLM1	
47.	Pulse Width Modulation Demodulation Pulse Position Modulation&Demodulation	2	18.04.2024 19.04.2024		TLM1	
48.	**Multiplexing:** Frequency Division Multiplexing, Time Division Multiplexing	2	23.04.2024 24.04.2024		TLM1	
49.	Problem Solving	1	25.04.2024		TLM3	
No. of classes required to complete UNIT-V:		14	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Recent Trends in Communication	1	26.04.2024		TLM2	

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

PART-C

EVALUATION PROCESS:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.G.L.N.Murthy	Dr.G.L.N.Murthy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India.
Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.B.Ramesh Reddy

Course Name & Code : Electromagnetic Waves & Transmission Lines - 20EC08

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- B A.Y : 2023-24

Pre-Requisites: Vector Algebra, Coordinate Systems, Vector Calculus.

Course Objectives: This course is useful to impart knowledge on electric and magnetic fields in both static and dynamic domains. The course will introduce the application of Maxwell's equations. The course gives the complete information regarding the Electromagnetic wave propagation in different mediums. This course will help in the analysis of transmission line using circuit theory and use the Smith chart to find reflection coefficient, VSWR, impedance in easy way.

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

CO1	Define the basic laws of Electrostatic and Magnetostatic Fields (Remember Level – L1).
CO2	Understand the basic concepts of Electromagnetic fields in static and time varying conditions (Understand Level – L2).
CO3	Apply the Electromagnetic concepts to solve real time problems (Apply Level – L3).
CO4	Analyze the characteristics of EM wave propagation in different mediums (Analyze Level – L4).

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	2	2	-	-	1	-	-	-	-	-	1	3	-	-
CO3	3	2	2	-	-	1	-	-	-	-	-	1	3	-	-
CO4	3	2	2	1	1	-	1	-	-	-	-	1	3	-	-

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

TEXT BOOK(S):

T1 Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.

T2 William Hayt, J A Buck, M JallelAkhtar "Engineering Electromagnetics", TMH Publishers, 8th Edition.

REFERENCE BOOK(S):

R1 Jordan and Balmain, "Electromagnetic fields and Radiating systems", Pearson education.

R2 K.Shevgaonkar, "Electromagnetic waves" TMH Publishers.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN) - Section-B

UNIT-I: Electrostatics

S.No.	Topic/s	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	3-1-2024			
2.	Introduction to Unit-I	1	5-1-2024			
3.	Vector Algebra, Coordinate System	1	6-1-2024			
4.	Vector Calculus	1	8-1-2024			
5.	Coulombs Law & Electric Field Intensity	1	10-1-2024			
6.	Electric Field due to continuous charge distributions	1	12-1-2024			
7.	Electric Flux & Electric Flux Density	1	17-1-2024			
8.	Gauss's Law and Applications	1	19-1-2024			
9.	Electric Potential and Potential Gradient	1	20-1-2024			
10.	Maxwell's two equations for Electrostatic Fields	1	22-1-2024			
11.	Electric Dipole and Dipole Moment Electrostatic Energy and Energy Density	1	24-1-2024			
12.	Poisson's and Laplace's Equations	1	27-1-2024			
13.	Capacitance and Different Capacitors	1	29-1-2024			
14.	Problem Solving	1	31-1-2024			
No. of classes required to complete UNIT-I		14	No. of classes taken			

UNIT-II: Magnetostatics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Magnetic Field Intensity & Biot-Savart's Law	1	02-2-2024			
16.	Ampere's Circuit Law & Applications	1	03-2-2024			
17.	Magnetic Flux & Magnetic Flux Density	1	05-2-2024			
18.	Maxwell's two equations for Magnetostatic Fields	1	07-2-2024			
19.	Magnetic Scalar & Vector Potentials	1	09-2-2024			
20.	Force on a charged particle	1	12-2-2024			
21.	Magnetic Energy and Energy Density, Concept of Inductance	1	14-2-2024			
22.	Problem Solving	1	16-2-2024			
23.	Problem Solving	1	17-2-2024			
No. of classes required to complete UNIT-II		9	No. of classes taken			

UNIT-III (First Half Unit): Maxwell's Equations

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Time varying Fields, Faradays Law, Continuity Equation	1	19-2-2024			
25.	Inconsistency of Ampere's Law, Displacement Current Density	1	21-2-2024			
26.	Time Varying Four Maxwell's Equations	1	23-2-2024			
27.	Boundary Conditions	1	24-2-2024			
No. of classes required for UNIT-III(First 50%)		4	No. of classes taken			

UNIT-III (Second Half Unit): Electromagnetic Waves-I

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Introduction to EM Waves-Scalar, Vector Form, Solution of EM Wave Equations	1	04-3-2024			
29.	Intrinsic Impedance, Attenuation and Phase Constants, Loss Tangent, Velocity and Wavelength of EM Wave	1	06-3-2024			
30.	Wave Propagation in Lossy Dielectrics	1	11-3-2024			
31.	Wave Propagation in Lossless Dielectrics	1	13-3-2024			
32.	Wave Propagation in Free Space	1	15-3-2024			
33.	Wave Propagation in Good Conductors	1	16-3-2024			
34.	Polarization-Linear, Circular & Elliptical	1	18-3-2024			
35.	Problem Solving	1	20-3-2024			
No. of classes required to complete UNIT-III. (Second Half - 50%)		10	No. of classes taken			

UNIT-IV: Electromagnetic Waves-II

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Poynting Vector-Time Average Power, Power Loss in a Plane Conductor	1	22-3-2024			
37.	Poynting Theorem	1	23-3-2024			
38.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Dielectric	1	27-3-2024			
39.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Conductor	1	30-3-2024			
40.	Reflection of a Plane Wave at Oblique Incidence– Parallel Polarization	1	01-4-2024			
41.	Reflection of a Plane Wave at Oblique Incidence–Perpendicular Polarization	1	03-4-2024			
42.	Brewster Angle, Critical Angle and Total Internal reflection, Surface Impedance	1	06-4-2024			
43.	Problem Solving	1	08-4-2024			
No. of classes required to complete UNIT-IV		10	No. of classes taken			

UNIT-V: Transmission Lines

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Types of Transmission Lines, Transmission Lines Equations	1	10-4-2024			
45.	Primary and Secondary Constants of a Transmission Line	1	12-4-2024			
46.	Lossless, Distortion less, Low loss Transmission lines, Concept of Loading	1	15-4-2024			
47.	Input Impedance of a Transmission Line, Reflection Coefficient, VSWR	1	19-4-2024			
48.	Short Circuit, Open Circuit and Matched Lines	1	20-4-2024			
49.	Smith Chart and Applications	1	22-4-2024			
50.	Problem Solving	1	24-4-2024			
No. of classes required to complete UNIT-V		**9**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Introduction to Antennas	1	26-4-2024			
52.	Introduction to Microwaves	1	27-4-2024			

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:

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**
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	**30**
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	**70**
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools.

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.B.Ramesh Reddy	Dr.B.Ramesh Reddy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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ELECTRONIC AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Shaheda Niloufer
Course Name & Code : Environmental Science & 20MC03
L-T-P Structure : 2-0-0 Credits : 0
Program/Sem/Sec : B.Tech., ECE-B., IV-Sem., SEC-B A.Y : 2023-24

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs): The purpose of this course is to provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities and how human activities influence our air, water and soil. It also helps in developing an understanding about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO 1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO 2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO 3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 4	Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.

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

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

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

TEXT BOOKS:

T1 Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, 5th Edition, Delhi, 2016.

T2 Mahua Basu, S. Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 1st Edition, Delhi, 2016.

REFERENCE BOOKS:

R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.

R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press, 2nd Edition, New Delhi, 2012.

R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.
R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.
R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

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 of course and course objectives. Introduction of components of Environment	1	03-01-2024		2	
2.	Population explosion and variations among Nations.	1	08-01-2024		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	10-01-2024		2	
4.	Environmental Hazards	1	22-01-2024		2	
5.	Role of Information Technology in environmental management and human health.	1	23-01-2024		2	
No. of classes required to complete UNIT-I: 5				No. of classes taken:		

UNIT-II: NATURAL RESOURCES AND CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and classification of Natural resources, Forest Resources,	1	29-01-2024		2	
2.	Water Resources	1	31-01-2024		2	
3.	Mineral Resources	1	05-02-2024		2	
4.	Food Resources	1	07-02-2024		2	
5.	Energy Resources	1	12-02-2024		2	
6.	Food Resources	1	14-02-2024		2	
No. of classes required to complete UNIT-II: 6				No. of classes taken:		

UNIT-III: ECOLOGY AND BIODIVERSITY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Definition, structure and functions of an ecosystem	1	19-02-2024		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids, Bio-geo-chemical cycles	1	21-02-2024		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species, Bio-geographical classification of	1	21-02-2024		2	

	India. India as a mega diversity nation					
4.	**I MID EXAMINATION**	1	26-02-2024			
5.	**I MID EXAMINATION**	1	28-02-2024			
6.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Assignment in Unit II	1	04-03-2024		2	
7.	Man and wild life conflicts. Endangered and endemic species of India	1	16-03-2024		2,3	
8.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	11-03-2024		2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV : ENVIRONMENTAL POLLUTION

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.	Air Pollution	1	13-03-2024		2	
2.	Causes, effects and control measures of: Water Pollution	1	18-03-2024		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	28-03-2024			
4.	Noise Pollution		20-03-2024			
5.	Solid Waste Management	1	27-04-2024		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	01-04-2024		2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V : ENVIRONMENTAL MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sustainable Development	1	03-04-2024		2	
2.	Climate disruption- Greenhouse effect, ozone layer depletion and acid rain. Stockholm conference	1	08-04-2024		2,3	
3.	Environmental Impact Assessment (EIA),	1	10-04-2024		2	
4.	Environmental Law		15-04-2024		2	
5.	Green building		22-04-2024			
6.	Revision		24-04-2024			
7.	II MID EXAMINATIONS	1	29-04-2024		2	
8.	II MID EXAMINATIONS	1	01-05-2024		2	
No. of classes required to complete UNIT-V: 06				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	Dr. A. Rami Reddy
Signature				

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COURSE HANDOUT
PART-A

Name of Course Instructor: Smt.K.Balavani/Ms.G.Asha
Course Name & Code : Programming using Python Lab-20AD53 **Regulation**: R20
L-T-P Structure : 1-0-2 **Credits:**02
Program/Sem/Sec :B.Tech. IV-Sem., ECE-B Sec **A.Y.:**2023-24

PREREQUISITE:Programming Languages like C Language.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of python course is to lead the students from the basics of writing and running python scripts in problem solving and also to design and implement the modules and understands the working of classes and objects in python.

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

CO1	**Identify** various programming constructs available in Python and **apply** them in solving computational problems **(Apply- L3)**
CO2	**Demonstrate** data structures available in Python and **apply** them in solving computational problems **(Apply- L3)**
CO3	**Implement** modular programming, string manipulations and Python Libraries **(Apply- L3)**
CO4	**Improve** individual / teamwork skills, communication & report writing skills with ethical values

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

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

TEXTBOOKS:

T1 Reema Thareja,"Python Programming Using Problem Solving Approach ", Oxford Publications

T2 Python for Everybody: Exploring Data In Python 3by Dr. Charles Russell Severance, Sue Blumenberg

REFERENCE BOOKS:

R1 Gowri Shankar, Sand Veena,"Introduction to Python Programming", CRC Press, Taylor, and Francis Group–Achapman & Hallbook.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Batch 1 22761A0467 to 22761A04A2

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: Language Basics and Example Problems	6	05-01-24 19-01-24		TLM1 & TLM4	
2.	Introduction: Language Basics and Example Problems	3	02-02-24		TLM4	
3.	Module 1: Exercise Programs on Lists	3	09-02-24		TLM4	
4.	Module 2: Exercise Programs on Tuples	3	16-02-24		TLM4	
5.	Module 3: Exercise Programs on Sets	3	23-02-24		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	3	01-03-24		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	3	15-03-24		TLM4	
8.	Module 6: Exercise Programs on Strings	3	22-03-24		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	3	05-04-24		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	12-04-24		TLM4	
11.	Internal Lab Exam	-	26-04-24		-	
No. of classes required to complete -				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Applications in science and Engineering	1	19-04-24		TLM4, 6	
13.	Competitive Exam Problems	2	19-04-24		TLM4, 6	

COURSE DELIVERY PLAN (LESSON PLAN): Batch 2 22761A04A3 to 23765A0412

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: Language Basics and Example Problems	6	02-01-24 09-01-24		TLM1 & TLM4	
2.	Introduction: Language Basics and Example Problems	3	23-01-24		TLM4	
3.	Module 1: Exercise Programs on Lists	3	30-01-24		TLM4	
4.	Module 2: Exercise Programs on Tuples	3	06-02-24		TLM4	
5.	Module 3: Exercise Programs on Sets	3	20-02-24		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	3	05-03-24		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	3	12-03-24		TLM4	
8.	Module 6: Exercise Programs on Strings	3	19-03-24		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	3	26-03-24		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	02-04-24		TLM4	
11.	Internal Lab Exam	3	23-04-24		-	
No. of classes required to complete -				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Applications in science and Engineering	1	16-04-24		TLM4, 6	
13.	Competitive Exam Problems	2	16-04-24		TLM4, 6	

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

PART-C

EVALUATION PROCESS:

Evaluation Task	Exp no's	Marks
Day to Day work=**A**	1,2,3,4,5,6,7,8…	A=05
Record= **B**	1,2,3,4,5,6,7,8…	B=05
Internal Test= **C**	1,2,3,4,5,6,7,8…	C=05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D=35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**50**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources,

	and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**K.Balavani**	**Dr.K.Ravi Kumar**	**Dr. B.Poornaiah**	**Dr. Y. Amar Babu**
Signature				

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. P. Venkateswara Rao / Dr.B.Rambabu
Dr.M.V Sudhakar / Mr.T.Anil Raju

Course Name & Code : Digital Signal Processing Lab – 20EC55

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- B **A.Y :** 2023-24

Pre-Requisites: C – Programming, Basic Definitions of signals and systems.

Course Objectives: This course provides generation of basic signals and operations on signals. This course also provides design of IIR filters using Butterworth and Chebyshev approximation techniques and FIR filters using windowing techniques. This course also gives the knowledge about DSP Processors.

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

CO 1	**Understand** the generation and operations of signals using MATLAB. **(Understand – L2)**
CO 2	**Analyze** the signals in time and frequency domains using MATLAB and Code Composer Studio.**(Analyze – L4)**
CO 3	**Design** IIR and FIR Filters and obtain their frequency response using MATLAB.**(Apply – L3)**
CO 4	**Adapt** effective communication, presentation skills and report writing.**(Apply – L3)**

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

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

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

TEXT BOOK(S):

T1 Rudra Pratap, "*MATLAB Getting Started with MATLAB 7*", oxford university press,
T2 Tarun Kumar Rawat, "Digital Signal Processing", oxford university press,2015

DSP LAB SCHEDULE (LESSON PLAN): Section-B

PART-B

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DSP Lab experiments, COs, Pos and PSOs	--	3	06-01-2024			
Cycle – I – MATLAB Software							
1	Generation of Discrete Time (DT) signals	CO1	3	20-01-2024			
2	Operations on DT signals	CO1	3	27-01-2024			
3	Linear Convolution, Circular Convolution	CO2	3	03-02-2024			
4	Computation of N-Point DFT and IDFT.	CO2	3	17-02-2024			
5	Linear and Circular Convolution Using DFT & IDFT, Power Spectral Density for sinusoidal signal.	CO2	3	24-02-2024			
6	Design of Digital IIR butter worth filter using Bi-linear Transformation, Design of Digital IIR Chebyshev filter using Bi-linear Transformation	CO3	3	16-03-2024			
7	Design of FIR filters using window techniques	CO3	3	23-03-2024			
Cycle – II - Code Composer Studio Simulation Software and DSPProcessors							
8	Linear Convolution, Circular Convolution	CO2	3	30-03-2024			
9	Computation of DFT.	CO2	3	06-04-2024			
--	Content Beyond the Experiment	--	3	20-04-2024			
--	Internal Lab Examination	--	3	27-04-2024			
No. of classes required to complete Lab			**36**	No. of classes conducted:			

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work (Viva =2M & Experiment Conduction =3M) = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	15
Semester End Examinations = D	1,2,3,4,5,6,7,8…	D = 35
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	50

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 02.01.2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. P.Venkateswara Rao	Mr. P.Venkateswara Rao	Dr. G L N Murthy	Dr. Y Amar Babu

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COURSE HANDOUT

Part-A

PROGRAM : B.Tech., IV-Sem., ECE-B

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : Analog Communications Lab – 20EC56

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR (s) : Dr.G.L.N.Murthy / Mr.M.K.Linga Murthy

COURSE OBJECTIVES: This course provides the practical exposure on analog communication schemes and gives the practical knowledge about pulse modulation techniques used in communication systems. It also gives the knowledge on implementation of continuous wave and pulse modulation schemes using MATLAB.

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

CO1 : Demonstrate the practical aspects of continuous wave modulation schemes. **(Understand – L2)**
CO2 : Construct the circuits for studying pulse modulation techniques. **(Apply – L3)**
CO3 : Apply the programming aspects of MATLAB in simulation of continuous wave and pulse modulation techniques **(Apply – L3)**
CO4 : Adapt effective communication, presentation and report writing skills**. (Apply – L3**)

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

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

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

Part-B

Batch-1

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	02.01.2024		-	TLM1	
2	Experiments-1	3	09.01.2024		CO1, CO4	TLM4	
3	Experiment-2	3	16.01.2024		CO1, CO4	TLM4	
4	Experiment-3	3	23.01.2024		CO1, CO4	TLM4	
5	Experiment -4	3	30.01.2024		CO1, CO4	TLM4	
6	Experiment-9	3	06.02.2024		CO1, CO3, CO4	TLM4	
7	Experiment-10	3	13.02.2024		CO1, CO3, CO4	TLM4	
8	Experiment-5	3	20.02.2024		CO1, CO4	TLM4	
9	Experiment-6	3	05.03.2024		CO2, CO4	TLM4	
10	Experiment-7	3	12.03.2024		CO2, CO4	TLM4	
11	Experiment-8	3	19.03.2024		CO2, CO4	TLM4	
12	Experiment-11	3	26.03.2024		CO2, CO3, CO4	TLM4	
13	Experiment-12	3	02.04.2024		CO2, CO3, CO4	TLM4	
14	Simulation in GNU Radio Content beyond syllabus	3	16.04.2024		-	TLM4	
15	Internal exam	3	23.04.2024		-		

Batch-2

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	05.01.2024		-	TLM1	
2	Experiments-1 & 2	3	12.01.2024		CO1, CO4	TLM4	
3	Experiment-3 & 4	3	19.01.2024		CO1, CO4	TLM4	
4	Experiment-5	3	02.02.2024		CO1, CO4	TLM4	
5	Experiment – 6 & 7	3	09.02.2024		CO2 CO4	TLM4	
6	Experiment-8	3	16.02.2024		CO2, CO4	TLM4	
7	Experiment-9	3	23.02.2024		CO1, CO3, CO4	TLM4	
8	Experiment-10	3	15.03.2024		CO1, CO3, CO4	TLM4	
9	Experiment-11	3	22.03.2024		CO2, CO3, CO4	TLM4	
10	Experiment-12	3	12.04.2024		CO2, CO3, CO4	TLM4	
11	Simulation in GNU Radio Content beyond syllabus	3	19.04.2024		-	TLM4	
12	Internal exam	3	26.04.2024		-	TLM4	

List of Experiments:

Exp. No	Experiments to be conducted	Exp. No	Experiments to be conducted
CYCLE-1			CYCLE-2
1.	Generate the Amplitude modulated (AM) signal for different modulation indices and reconstruct the original signal.	5.	Estimate the cutoff frequencies for Pre emphasis and De-emphasis circuits.
2.	Demonstrate the generation of Frequency modulated signal and reconstruction of original signal.	6.	Generate the Pulse Amplitude Modulated signal and reconstruct the original signal using low pass filter
3.	Use product modulator to generate double sideband suppressed carrier AM signal and demodulate the signal using Synchronous detector.	7.	Construct circuits for generating the Pulse width and Pulse position modulated signals using IC555 and perform demodulation to reconstruct the message signal
4.	Apply phase shift method for generating the Single sideband modulated AM signal and demodulate using coherent detector.	8.	Generation of sampled signal for different sampling rates and verify sampling theorem for efficient reconstruction.
9.	Amplitude Modulation and Demodulation (Simulation Using MATLAB)	11.	Pulse Amplitude Modulation techniques (Simulation Using MATLAB)
10	Frequency Modulation and Demodulation (Simulation Using MATLAB)	12.	Frequency modulation and demodulation (Simulation Using MATLAB)
For Batch 2 MATLAB experiments are to be conducted first followed by hard ware experiments			

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination: A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**50**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
PEO2: To Function professionally in the rapidly changing world with advances in technology
PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner.

PROGRAMME OUTCOMES (POs)

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PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
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PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Dr.G.L.N.Murthy	Mr.M.K.Linga Murthy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr V.V. Rama Krishna

Course Name & Code : MODELING, DESIGN AND PROTOTYPING – 20ECS2

L-T-P Structure : 1-0-2 Credits : 2

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- B A.Y : 2023-24

Pre-requisites: C-Programming, Pulse and Digital Circuits.

Course Educational Objectives: In this course, student will learn about how to build an engineering application with LabVIEW software and associatedhardware.

Course Outcomes (Cos): At the end of the course, students are able to

CO1	Understand the programming concept of virtual instruments. (**Understand – L2**)
CO2	Develop real time applications using loops, formula nodes, array, clusters and DAQ. (**Apply – L3**)
CO3	Adopt Communication, Presentation and Report writing skills. (**Apply – L3**)

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

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

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

TEXT BOOK(S):

T1 S. Sumathi, P.Surekha, Virtual Instrumentation with LabVIEW, ACME Learning Pvt. Ltd.,2007.

T2 Jeffrey Travis, Jimkring, LabVIEW for Everyone, Pearson Education, 2009.

REFERENCE BOOK(S):

R1 Jovitha Jerome, Virtual Instrumentation using LabVIEW, PHI Learning Pvt. Ltd., 2006.

R2 Rick Bitter, Taqi Mohiuddin, Matt Nawrocki – LabVIEW Advanced Programming

Techniques, CRC Press, 2009.

Part – A: Theory

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	03-01-2024		TLM2	
2.	VI and Data operations	1	10-01-2024		TLM2	
3.	VI front and block panel	1	24-01-2024		TLM2	
4.	Data flow programming	1	31-01-2024		TLM2	
5.	Graph programming	1	07-02-2024		TLM2	
6.	Loops, Arrays applications	1	14-02-2024		TLM2	
7.	Concepts of VI& Sub VIs	1	21-02-2024		TLM2	
8.	Applications of sequence structures	1	06-03-2024		TLM2	
9.	Waveforms and Graphs	1	13-03-2024		TLM2	
10.	Applications	1	20-03-2024		TLM2	
11.	Modules	1	27-03-2024		TLM2	
12.	NI Hardware	1	03-04-2024		TLM2	
13.	DAQ Installation and configuration	1	10-04-2024		TLM2	
14.	Applications	1	17-04-2024		TLM2	
15.	DAQ Hardware	1	24-04-2024		TLM2	

PART – B:

S.No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Virtual Instruments, Cos, Numeric	3	03-01-2024		TLM2	
2.	Boolean and compound operations	3	10-01-2024		TLM4	
3.	For and while loops	3	24-01-2024		TLM4	
4.	Structures, Timers	3	31-01-2024		TLM4	
5.	Arrays & Clusters	3	07-02-2024		TLM4	
6.	Formula node, Sub VI	3	14-02-2024		TLM4	
7.	Files	3	21-02-2024		TLM4	
8.	DAQ – installation, Application	3	06-03-2024		TLM4	
9.	Analog applications	3	13-03-2024		TLM4	
10.	Digital applications	3	20-03-2024		TLM4	
11.	Discussion of Models & Demo	3	27-03-2024		TLM2	
12.	Discussion of Models & Demo	3	03-04-2024		TLM2	

13.	Discussion of Models & Demo	3	10-04-2024		TLM2	
14.	Documentation Verification	3	17-04-2024		TLM6	
15.	Documentation Verification	3	24-04-2024		TLM6	

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

EVALUATION PROCESS:

Report	**10**
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive

clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Mr V.V. Rama Krishna	Mr V.V. Rama Krishna	Dr B. Poornaiah	Dr Y. Amar Babu
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENTOFELECTRONICS&COMMUNICATIONSENGINEERING

COURSEHANDOUT

Name ofCourseInstructors:Ms. Asha. G/Mr.P Venkateswara Rao
Course Name:Association
Program/Sem/Sec :B.Tech./ECEIV-Sem/A,B &C-Sections A.Y :2023-2024

COURSEDELIVERYPLAN(LESSONPLAN):

S.No	Topicstobecovered	TentativeDate ofCompletion	ActualDate ofCompletion	HOD SignWeekly
1.	Discussion about AssociationActivities by course instructors and Self-Introduction.	05-01-2024		
2.	JAM on Aditya L1 Mission.	12-01-2024		
3.	Group Discussion on National Education Policy.	19-01-2024		
4.	Seminar related to VIKSIT BHARAT.	02-02-2024		
5.	Group Discussion on smart devices& social networks.	09-02-2024		
6.	Innovations in Technology with respect to ECE(PPT).	09-02-2024		
7.	Debate on Machine Learning & Deep Learning.	16-02-2024		
8.	Technical Quiz on competitive exam topics.	23-02-2024		
9.	Current affairs on technological changes/Technical Talks (PPT/Video).	23-02-2024		
10.	Debate-Role of AI on Man Kind.	15-03-2024		
11.	Presentation on Role of Technology in economical growth of a country.	22-03-2024		
12.	Group Discussion on Drone Technology for real time applications.	05-04-2024		
13.	Presentation on 5G Technology.	12-04-2024		
14.	Testing knowledge on verbal/quantitative/reasoning/problem solving/logical/etc. skills.	19-04-2024		
15.	Technical Quiz.	26-04-2024		

CourseInstructors
Ms. Asha. G
Mr.P.Venkateswara Rao

HOD

(Dr.Y.AmarBabu)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Y AMAR BABU
Course Name & Code : CPLD and FPGA Architectures – 20ECH1
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section-Honor A.Y : 2023-24

PRE-REQUISITES: Digital Circuits.

COURSE EDUCATIONAL OBJECTIVES (CEOs): In this course student will learn about the complex programmable logic devices, field programmable gate arrays, architecture of SRAM programmable and anti-fuse programmed FPGAs.

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

CO1	**Analyze** different types of Complex Programmable Logic Devices.
CO2	**Understand** different types of Field Programmable Gate Arrays.
CO3	**Evaluate** architecture of SRAM Programmable FPGAs.
CO4	**Explain** the device Architecture of Anti-Fuse Programmed FPGAs.

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

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

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

TEXT BOOKS:

T1 Field Programmable Gate Array Technology by Stephen M. Trimberger, Springer International Edition.
T2 Digital Systems Design by Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS:

R1 Field Programmable Gate Arrays by John V. Oldfield, Richard C. Dorf, Wiley India.
R2 Digital Design Using Field Programmable Gate Arrays by Pak K. Chan/Samiha Mourad, Pearson Low Price Edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - Honor

UNIT-I: Introduction to Programmable Logic Devices:

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	10-01-24			
2.	Simple Programmable Logic Devices	1	12-01-24			
3.	Read Only Memories	1	12-01-24			
4.	Programmable Logic Arrays	1	19-01-24			
5.	Programmable Array Logic	1	19-01-24			
6.	Programmable Logic Devices/Generic Array Logic	2	22-01-24 24-01-24			
7.	Assignment – Innovative Teaching	2	29-01-24 31-01-24			
8.	Tutorial	1	2-02-24			
No. of classes required to complete UNIT-I:		**10**	No. of classes taken:			

UNIT-II: Complex Programmable Logic 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.	Complex Programmable Logic Devices	1	02-02-24			
2.	Architecture of Xilinx Cool Runner XCR3064XL	1	05-02-24			
3.	CPLD Implementation of a Parallel Adder with Accumulation	1	07-02-24			
4.	Altera series – Max 5000/7000 series	1	09-02-24			
5.	Altera FLEX logic-10000 series CPLD	2	09-02-24 12-02-24			
6.	Assignment	1	14-02-24			
7.	Tutorial	1	16-02-24			
No. of classes required to complete UNIT-II:		**08**	No. of classes taken:			

UNIT-III: Field Programmable Gate Arrays:

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.	Organization of FPGAs	1	16-02-24			
2.	FPGA Programming Technologies	1	19-02-24			
3.	Programmable Logic Block Architectures	1	21-02-24			
4.	Programmable Interconnects	1	23-02-24			
5.	Programmable I/O blocks in FPGAs	1	23-02-24			
6.	Dedicated specialized Components of FPGAs	1	04-03-24			
7.	Applications of FPGAs.	2	06-03-24 11-03-24			
8.	Assignment	1	13-03-24			
9.	Tutorial	1	16-03-24			
No. of classes required to complete UNIT-III:		**10**	No. of classes taken:			

UNIT-IV: SRAM Programmable FPGAs

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, Programming Technology, Device Architecture	1	16-03-24			
2.	The Xilinx XC2000, XC3000, XC4000 Architectures	1	18-03-24			
3.	**Anti-Fuse Programmed FPGAs:**	1	20-03-24			
4.	Introduction, Programming Technology	1	22-03-24			
5.	Device Architecture	1	22-03-24			
6.	The Actel ACT1, ACT2 and ACT3 Architectures	2	25-03-24 27-03-24			
7.	Assignment	1	29-03-24			
8.	Tutorial	1	29-03-24			
No. of classes required to complete UNIT-IV:		**09**	No. of classes taken:			

UNIT-V: Design Applications

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	General Design Issues, Counter Examples	2	01-04-24 03-04-24			
2.	A Fast Video Controller	2	05-04-24			
3.	A Fast DMA Controller	2	08-04-24			
4.	Designing Counters with ACT devices	1	10-04-24			
5.	Designing Adders and Accumulators with the ACT Architecture.	2	12-04-24 15-04-24			
6.	Assignment	1	17-04-24			
7.	Tutorial	2	19-04-24			
No. of classes required to complete UNIT-V:		**12**	No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	ASIC Design	2	24-04-24 26-04-24			

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

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Units-2 1/2)	A1=5
I-Mid Examination (Units-2 1/2)	M1=15
I-Quiz Examination (Units-2 1/2)	Q1=10
Assignment-II (Units-2 1/2)	A2=5
II-Mid Examination (Units-2 1/2)	M2=15
II-Quiz Examination (Units-2 1/2)	Q2=10
Mid Marks =80% of Max(M1, M2)+20% of Min(M1, M2)	M=15
Quiz Marks =80% of Max(Q1, Q2)+20% of Min(Q1, Q2)	Q=10
Assignment Marks = Average of Best two of A1, A2	A=5
Cumulative Internal Examination (CIE) : M+Q+A	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Y. Amar Babu	Dr. Y. Amar Babu	Dr. P. Lachi Reddy	Dr. Y. Amar Babu

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COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Poornaiah Billa
Course Name & Code : Analog Communications&20EC07
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- C A.Y : 2023-24

PRE-REQUISITE: Signals & Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on various analog modulation techniques in both time and frequency domains. The course will give an idea about generation and demodulation methods of various analog modulation techniques. It also gives complete information regarding the transmitters and receivers types and performance evaluation of continuous wave modulation.

COURSE OUTCOMES (CO): At the end of the course, students will be able to

CO1:	Understand the fundamental concepts of various analog modulation schemes with relevant time and frequency domain representations.(Understand – L2)
CO2:	Interpret the generation, detection of continuous wave and pulse analogmodulation techniques. (Understand – L2)
CO3:	Apply the concepts of analog modulation and demodulation techniques for calculating communication system related parameters.(Apply – L3)
CO4:	Analyze the performance of continuous wave modulation schemes in the presenceof channel noise.(Analyze – L4)

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	1	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Simon Haykin, *"Communication Systems"*, John Wiley & Sons, 2nd Edition, 1983

T2 George Kennedy ,Davis, *"Electronic Communication Systems"*, Tata McGraw Hill Education, 4th edition, 1999.

BOS APPROVED REFERENCE BOOKS:

R1 G.K.Mithal, "*Radio Engineering*", Khanna Publishers,20th Edition,2000

R2 Sanjay Sharma, *"Analog Communication Systems",*S.K.Katariya& Sons,2nd Edition, 2007

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Introduction to Communication System ,Amplitude modulation,Double Side band Suppressed Carrier Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course. Course Outcomes	1	03-01-2024		TLM1	
2.	Review of Fourier Transform	1	04-01-2024		TLM1	
3.	Elements of a communication system	1	06-01-2024		TLM1	
4.	Need for modulation, Classification of Modulation	1	08-01-2024		TLM1	
5.	Amplitude Modulation: Definition, Time and Frequency Domain Representation	1	10-01-2024		TLM1	
6.	Power relations in AM wave, Generation of AM waves using square law modulator, Switching modulator.	1	11-01-2024		TLM1	
7.	Demodulation of AM waves using square law Demodulator, Envelop Detector	1	18-01-2024		TLM1	
8.	Introduction to DSBSC -AM, Time and Frequency domain Representation	1	20-01-2024		TLM1	
9.	Generation of DSBSC wave using Balanced Modulator	1	22-01-2024		TLM1	
10.	Generation of DSBSC using Ring Modulator, Coherent Detection of DSBSC wave	1	24-01-2024		TLM1	
11.	Effect of Phase and frequency Errors, Costas Loop	1	25-01-2024		TLM1	
12.	Problem Solving	1	27-01-2024		TLM3	
No. of classes required to complete UNIT-I :		12	No. of classes taken:			

UNIT-II: Single Side band Modulation & Vestigial Side band Modulation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Single Side band Modulation: Definition, Time and Frequency domain representation	1	29-01-2024		TLM1	
14.	Generation of SSB wave: Filter Method, Phase Discrimination	1	31-01-2024		TLM3	
15.	Coherent detection of SSB wave	1	01-02-2024		TLM1	
16.	Effect of Phase and Frequency Error in the detection	1	03-02-2024		TLM1	
17.	Vestigial Side band Modulation: Definition, Time and frequency domain representation	1	05-02-2024		TLM1	
18.	Generation of VSB wave	1	07-02-2024		TLM1	
19.	Envelope detection of VSB wave plus carrier	1	08-02-2024		TLM1	
20.	Comparisons of amplitude modulation techniques, Applications of different AM systems	1	10-02-2024		TLM1	
21.	Problem Solving	1	12-02-2024		TLM3	
No. of classes required to complete UNIT-II		9	No. of classes taken:			

UNIT-III : Angle Modulation, Demodulation of FM Wave

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Types of Angle Modulation Frequency Modulation: Time domain representation, Single tone Frequency Modulation	1	14-02-2024		TLM1	
23.	Narrow Band Frequency Modulation: Time and Frequency domain representation	1	15-02-2024		TLM1	
24.	Wide band Frequency Modulation Time and Frequency	1	19-02-2024		TLM3	

	Domain representation					
25.	Transmission power and Band width of FM wave	1	21-02-2024		TLM1	
26.	Problem Solving	1	22-02-2024		TLM1	
27.	Generation of FM wave: Direct method & Indirect method	1	24-02-2024		TLM1	
28.	Demodulation of FM – frequency Discrimination methods: simple slope detector, Balanced slope detector	1	04-03-2024		TLM1	
29.	Phase Discrimination methods: Foster Seeley Discrimination method	1	06-03-2024		TLM1	
30.	Ratio Detector, PLL	1	07-03-2024		TLM1	
31.	Problem Solving	1	11-03-2024		TLM3	
No. of classes to complete UNIT-III		10	No. of classes taken:			

UNIT-IV :: Radio Transmitters and Receivers

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.	Radio transmitter introduction and classification AM transmitters-low level and high level	1	13-03-2024		TLM1	
33.	FM Transmitter: Reactance tube method, Armstrong method	1	14-03-2024		TLM1	
34.	Radio Receiver introduction and classification	1	16-03-2024		TLM1	
35.	Problem Solving	1	18-03-2024		TLM3	
36.	Tuned Radio Frequency receiver and its limitations	1	20-03-2024		TLM1	
37.	Need of heterodyning AM Super heterodyne Receiver, Frequency Changing and Tracking Concept of IF	1	21-03-2024		TLM1	
38.	Significance of AGC in AM Radio Receivers, Simple AGC, Delayed AGC	1	23-03-2024		TLM1	
39.	FM receiver	1	25-03-2024		TLM1	
No. of classes required for UNIT-IV		8	No. of classes taken:			

UNIT-V: Noise in Analog Communication Systems, Analog Pulse modulation& Multiplexing

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.	Definition of Noise in communication system Signal to	1	27-03-2024		TLM1	

	Noise ratio calculations in AM					
41.	Signal to Noise ratio calculations in DSBSC, SSBSC and FM receivers	3	28-03-2024 30-03-2024 01-04-2024		TLM1	
42.	Threshold Effect, Pre-Emphasis and De Emphasis circuits	1	03-04-2024		TLM1	
43.	Introduction to Carrier to Noise Ratio Signal to Interference plus Noise Ratio	1	04-04-2024		TLM1	
44.	Pulse Amplitude Modulation Generation and Demodulation.	1	06-04-2024		TLM1 TLM1	
45.	Analog Pulse Modulation: Need for Pulse Modulation Types of Pulse analog Modulation,	1	08-04-2024		TLM1	
46.	Pulse Width Modulation Generation	1	10-04-2024		TLM1	
47.	Pulse Width Modulation Demodulation Pulse Position Modulation&Demodulation	2	13-04-2024		TLM1	
48.	**Multiplexing:** Frequency Division Multiplexing, Time Division Multiplexing	2	15-04-2024		TLM1	
49.	Problem Solving	1	18-04-2024		TLM3	
No. of classes required to complete UNIT-V:		14	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Recent Trends in Communication	1	26.04.2024		TLM2	

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

PART-C

EVALUATION PROCESS:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) +	30

20% of Min((M1+Q1+A1) , (M2+Q2+A2))	
Semester End Examination (SEE)(Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.B.Poornaiah	Dr.G.L.N.Murthy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. T.Anil Raju
Course Name & Code : Digital Signal Processing – 20EC06

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- B A.Y : 2023-24

Pre-Requisites: Signals and Systems.

Course Objectives:

This course introduces discrete time signals and systems and operations performed on them. It introduces Discrete time Fourier Transform, Discrete Fourier transform and Z transform meant for spectral analysis of discrete time signals and systems. Fast Fourier Transform that is an efficient way of implementing DFT is also introduced. It also provides the basic knowledge about the design of both IIR and FIR filters.

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

CO1	Interpret the basics of discrete time signal processing techniques.**(Understand – L2)**
CO2	Examine Discrete Time Signals in time and frequency domain using DTFT, DFT, FFTand Z-transforms **(Apply – L3)**
CO3	Apply DFT, FFT and Z-Transform techniques to solve and realize discrete systems **(Apply – L3)**
CO4	Construct the IIR Filters using Butterworth, Chebyshev Approximation techniques andFIR Filters using Fourier series method and windowing Techniques **(Apply – L3)**

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	-	-	1
CO2	2	1	1	-	-	-	-	-	-	-	-	2	-	-	2
CO3	3	3	1	1	-	-	-	-	-	-	-	2	-	-	2
CO4	3	3	2	1	-	-	-	-	-	-	-	3	-	-	2

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

TEXT BOOK(S):

T1 John G. Proakis, Dimitris G. Manolakis ***"Digital Signal Processing, Principles, Algorithms& Applications"***, Pearson education, 4th edition, 2008

T2 Alan V Openheim, Ronald W. Schafer, ***"Digital Signal Processing"***, PHI learning, 1st edition, 2010.

REFERENCE BOOK(S):

R1 P.RameshBabu, ***"Digital Signal Processing"***, Scitech Publications, 4th edition, 2012Pvt Ltd.

R2 A.NagoorKani, ***"Digital Signal Processing"***, RBA Publications,1st edition, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

UNIT-I: Discrete Time Signals, Discrete Time Systems & DTFT

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course, CEO, COs, POs and PSOs	1	02-01-2024		**TLM1**	
2.	Introduction - Block diagram of DSP System, Advantages , Limitations and Applications of DSP	1	03-01-2024		**TLM2**	
3.	Elementary Discrete Time Signals, Representation of Discrete Time Signals	1	04-01-2024		**TLM2**	
4.	Operations on Discrete Time Signals	1	08-01-2024		**TLM1**	
5.	Properties or classifications of Discrete Time Signals	1	09-01-2024		**TLM1**	
6.	Properties or classifications of Discrete Time Systems	1	10-01-2024		**TLM1**	
7.	Analysis of LTI Systems through LCCDE-Natural response and forced response	1	11-01-2024		**TLM1**	
8.	Linear Convolution	1	18-01-2024		**TLM1**	
9.	DTFT of a Sequence and System, Frequency, Magnitude, and phase response	1	22-01-2024		**TLM1**	
10.	Properties of DTFT	1	23-01-2024		**TLM1**	
No. of classes required to complete UNIT-I		**10**	No. of classes taken			

UNIT-II: Z-Transforms

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Z-Transform of a sequence and ROC – its properties	1	24-01-2024		**TLM2**	
2.	Properties of Z-Transforms	2	25-01-2024 29-01-2024		**TLM1**	
3.	Inverse Z-Transform	1	30-01-2024		**TLM1**	
4.	Problems on Z-Transforms	1	31-02-2024		**TLM1**	
5.	Problems on Inverse Z-Transforms	1	01-02-2024		**TLM1**	
6.	Analysis of LTI system using Z-transforms	2	05-02-2024 06-02-2024		**TLM1**	
7.	Direct Form-I, Direct Form-II Realizations	1	07-02-2024		**TLM1**	
8.	Cascade Form and Parallel Form for IIR systems	1	08-02-2024		**TLM1**	
9.	Direct Form, Cascade Form and Parallel Form, Linear Phase Realization for FIR systems	2	12-02-2024 13-02-2024		**TLM1**	
No. of classes required to complete UNIT-II		**12**	No. of classes taken			

UNIT-III: Discrete Fourier Transform (DFT) and Fast Fourier Transforms

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction - DFT, Computation of DFT, IDFT, Relation between DTFT and DFT, Twiddle factor – Properties, Problems	1	14-02-2024		**TLM2**	
2.	Properties of DFT	1	15-02-2024		**TLM1**	
3.	Linear Convolution and Circular Convolution	1	19-02-2024		**TLM1**	
4.	Linear Convolution through Circular Convolution	1	20-02-2024		**TLM1**	
5.	Circular Convolution through DFT & IDFT, Linear Convolution through DFT & IDFT	1	21-02-2024		**TLM1**	
6.	Need for FFT	1	22-02-2024		**TLM1**	
7.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	04-03-2024		**TLM1**	
8.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	05-03-2024		**TLM1**	
9.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	06-03-2024		**TLM1**	
10.	Radix – 2 DIT-FFT, Radix – 2 DIF-FFT Algorithm for IDFT computation.	1	07-03-2024		**TLM1**	
11.	Comparison between DIT and DIF Algorithm	1	11-03-2024		**TLM1**	
12.	Inverse FFT	1	12-03-2024		**TLM1**	
No. of classes required to complete UNIT-III		12	No. of classes taken			

UNIT-IV: IIR Filter Design

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction - Characteristics and Classification of Filters	1	13-03-2024		**TLM2**	
2.	Design of IIR Filter – Impulse Invariant Transformation – Aliasing effect	1	14-03-2024		**TLM1**	
3.	Design of IIR Digital Filter – Bilinear Transformation – Frequency warping	1	18-03-2024		**TLM1**	
4.	Problems on Impulse Invariance and Bilinear Transformation	1	19-03-2024		**TLM1**	
5.	Specifications of LP filters, Design of IIR Analog filter using Butterworth Approximations	1	20-03-2024		**TLM1**	
6.	Problems on Butterworth Filter	1	21-03-2024		**TLM1**	
7.	Design of IIR Analog filter using Chebyshev Approximations	1	25-03-2024		**TLM1**	
8.	Problems on Chebyshev Filter	1	26-03-2024		**TLM1**	
9.	Analog Frequency Transformations	1	27-03-2024		**TLM1**	
10.	Problems on Frequency Transformations	1	28-0-2024		**TLM1**	
No. of classes required to complete UNIT-IV			**10**	No. of classes taken		

UNIT-V: FIR filters Design

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to FIR Filters	1	01-04-2024		**TLM2**	
2.	Comparisons between IIR and FIR filters	1	02-04-2024		**TLM1**	
3.	Characteristics of FIR filters with linear phase.	1	03-04-2024		**TLM1**	
4.	Frequency Response Linear Phase FIR filters	1	04-04-2024		**TLM1**	
5.	Design of FIR filters	1	08-04-2024		**TLM1**	
6.	Design of FIR filters using the Fourier Series method	1	15-04-2024		**TLM1**	
7.	Problems	1	16-04-2024		**TLM1**	
8.	Design of FIR filters using window method	1	18-04-2024		**TLM1**	
9.	Various window(s) characteristics	1	22-04-2024		**TLM1**	
10.	Problems	1	23-04-2024		**TLM1**	
No. of classes required to complete UNIT-V		**10**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Multirate Signal Processing	**1**	24-04-2024		**TLM2**	
2.	Introduction to 2D signal	**1**	25-04-2024		**TLM2**	

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

PART-C

EVALUATION PROCESS:

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
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	30
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 02-01-2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr.T.Anil Raju	Mr.T.Anil Raju	Dr. G L N Murthy	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. B. Rambabu, Professor

Course Name & Code	**:** Control Systems-20EE09	**Regulation**: R20
L-T-P Structure	**:** 2-1-0	**Credits:** 03
Program/Sem/Sec	: B. Tech. IV-Sem., ECE-C Sec	**A.Y.:** 2023-24

PRE-REQUISITE: Electrical Circuit Analysis and Applied Physics.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

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

CO1	Develop mathematical models of systems in terms of transfer function and state-space. **(Apply-L3)**
CO2	Analyze control systems in time domain **(Apply-L3)**
CO3	Analyze control systems in frequency domain **(Apply-L3)**
CO4	Understand the concepts of controllers and compensators. **(Understand-L2)**

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

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

TEXTBOOKS:

T1 B. C. Kuo, "Automatic Control Systems" John Wiley and Sons ,9th edition,2014.

T2 I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P)Limited Publishers,6th edition,2018

REFERENCE BOOKS:

R1 Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 5thedition,2009

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: MATHEMATICAL MODELLING OF CONTROL SYSTEMS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	02-01-2024			
2.	Concept of Control systems, Open loop and Closed loop control systems	1	03-01-2024			
3.	Modeling of Electrical systems	1	04-01-2024			
4.	Modeling of Mechanical systems	1	05-01-2024			
5.	**Tutorial-1**	1	09-01-2024			
6.	Electrical analogy of Mechanical systems	1	10-01-2024			
7.	Block Diagram Reduction rules	1	11-01-2024			
8.	Signal Flow Graph Terminology	1	12-01-2024			
9.	**Tutorial-2**	1	18-01-2024			
10.	SFG Reduction using Masons Gain Formula	1	19-01-2024			
11.	Problems practice	1	23-01-2024			
12.	Feedback Control System Characteristics	1	24-01-2024			
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: TIME RESPONSE ANALYSIS-I

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Standard test signals	1	25-01-2024			
14.	Time response of first order systems	1	30-01-2024			
15.	Response of second order system	1	31-01-2024			
16.	Response of second order for different damping values	1	01-02-2024			

17.	**Tutorial-3**	1	02-02-2024			
18.	Time domain specifications	2	06-02-2024			
19.	Steady state errors and error constants.	1	07-02-2024			
20.	**Tutorial-4**	1	08-02-2024			
21.	Introduction to PI, PD	1	09-02-2024			
22.	PID Controllers	1	13-02-2024			
23.	Problems Practice	1	14-02-2024			
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: **TIME RESPONSE ANALYSIS-II**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Concepts of stability	1	15-02-2024			
25.	Necessary conditions for Stability	1	16-02-2024			
26.	Routh stability criterion	1	20-02-2024			
27.	**Tutorial-5**	1	21-02-2024			
28.	Relative stability analysis	1	22-02-2024			
29.	Root Locus Technique	1	23-02-2024			
30.	Construction of root loci	3	05-03-2024 06-03-2024 07-03-2024			
31.	**Tutorial-6**	1	12-03-2024			
32.	Effects of adding poles and zeros to G(s) H(s) on the root loci.	1	13-03-2024			
33.	Problems Practice	1	14-03-2024			
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: FREQUENCY RESPONSE ANALYSIS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Frequency domain specifications	1	15-03-2024			
35.	Frequency response of standard second order system	1	19-03-2024			
36.	Bode Plot - Frequency domain specifications	3	20-03-2024 21-03-2024 22-03-2024			
37.	**Tutorial-7**	1	26-03-2024			
38.	Transfer function from the Bode Plot	1	27-03-2024			
39.	Polar Plot	2	28-03-2024			

			02-04-2024			
40.	**Tutorial-8**	1	03-04-2024			
41.	Nyquist plot-Nyquist Stability criteria	2	04-04-2024 05-04-2024			
42.	Introduction to Lag, Lead Compensators, Lead-Lag Compensator	1	07-04-2024			
43.	**Tutorial-9**	1	08-04-2024			
No. of classes required to complete UNIT-IV: 14				**No. of classes taken:**		

UNIT-V: STATE SPACE ANALYSIS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Concept of state variables	1	09-04-2024			
45.	State models for linear and time invariant Systems	1	10-04-2024			
46.	The Transfer Function from the State Equation	1	14-04-2024			
47.	Solution of state equation	1	15-04-2024			
48.	**Tutorial-10**	1	16-04-2024			
49.	State transition matrix and it's properties	1	17-04-2024			
50.	Computation of state transition matrix using Laplace transformation method	1	18-04-2024			
51.	Concepts of controllability and observability	1	19-04-2024			
52.	**Tutorial-11**	1	23-04-2024			
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
52.	Root Locus Construction using MatLab	3	24-04-2024 25-04-2024 29-04-2024		TLM1	

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

	knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.B.Ram Babu**	**Dr.B.Ram Babu**	**Dr. G. L N Murthy**	**Dr. Y. Amar Babu**
Signature				

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L.B.Reddy Nagar, Mylavaram-521230, NTR Dist, Andhra Pradesh, India.
Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.B.Y.V.N.R.Swamy

Course Name & Code : Electromagnetic Waves & Transmission Lines - 20EC08

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- C A.Y : 2023-24

Pre-Requisites: Vector Algebra, Coordinate Systems, Vector Calculus.

Course Objectives: This course is useful to impart knowledge on electric and magnetic fields in both static and dynamic domains. The course will introduce the application of Maxwell's equations. The course gives the complete information regarding the Electromagnetic wave propagation in different mediums. This course will help in the analysis of transmission line using circuit theory and use the Smith chart to find reflection coefficient, VSWR, impedance in easy way.

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

CO1	Define the basic laws of Electrostatic and Magnetostatic Fields (Remember Level – L1).
CO2	Understand the basic concepts of Electromagnetic fields in static and time varying conditions (Understand Level – L2).
CO3	Apply the Electromagnetic concepts to solve real time problems (Apply Level – L3).
CO4	Analyze the characteristics of EM wave propagation in different mediums (Analyze Level – L4).

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	2	2	-	-	1	-	-	-	-	-	1	3	-	-
CO3	3	2	2	-	-	1	-	-	-	-	-	1	3	-	-
CO4	3	2	2	1	1	-	1	-	-	-	-	1	3	-	-

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

TEXT BOOK(S):

T1 Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics", Oxford University Press, 4th Edition.

T2 William Hayt, J A Buck, M JallelAkhtar "Engineering Electromagnetics", TMH Publishers, 8th Edition.

REFERENCE BOOK(S):

R1 Jordan and Balmain, "Electromagnetic fields and Radiating systems", Pearson education.

R2 K.Shevgaonkar, "Electromagnetic waves" TMH Publishers.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN) - Section-B

UNIT-I: Electrostatics

S.No.	Topic/s	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	2-1-2024			
2.	Introduction to Unit-I	1	4-1-2024			
3.	Vector Algebra, Coordinate System	1	6-1-2024			
4.	Vector Calculus	1	9-1-2024			
5.	Coulombs Law & Electric Field Intensity	1	11-1-2024			
6.	Electric Field due to continuous charge distributions	1	12-1-2024			
7.	Electric Flux & Electric Flux Density	1	18-1-2024			
8.	Gauss's Law and Applications	1	19-1-2024			
9.	Electric Potential and Potential Gradient	1	20-1-2024			
10.	Maxwell's two equations for Electrostatic Fields	1	23-1-2024			
11.	Electric Dipole and Dipole Moment Electrostatic Energy and Energy Density	1	25-1-2024			
12.	Poisson's and Laplace's Equations	1	27-1-2024			
13.	Capacitance and Different Capacitors	1	29-1-2024			
14.	Problem Solving	1	30-1-2024			
No. of classes required to complete UNIT-I		14	No. of classes taken			

UNIT-II: Magnetostatics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Magnetic Field Intensity & Biot-Savart's Law	1	02-2-2024			
16.	Ampere's Circuit Law & Applications	1	03-2-2024			
17.	Magnetic Flux & Magnetic Flux Density	1	06-2-2024			
18.	Maxwell's two equations for Magnetostatic Fields	1	08-2-2024			
19.	Magnetic Scalar & Vector Potentials	1	09-2-2024			
20.	Force on a charged particle	1	13-2-2024			
21.	Magnetic Energy and Energy Density, Concept of Inductance	1	15-2-2024			
22.	Problem Solving	1	16-2-2024			
23.	Problem Solving	1	17-2-2024			
No. of classes required to complete UNIT-II		9	No. of classes taken			

UNIT-III (First Half Unit): Maxwell's Equations

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Time varying Fields, Faradays Law, Continuity Equation	1	20-2-2024			
25.	Inconsistency of Ampere's Law, Displacement Current Density	1	22-2-2024			
26.	Time Varying Four Maxwell's Equations	1	23-2-2024			
27.	Boundary Conditions	1	24-2-2024			
No. of classes required for UNIT-III(First 50%)		4	No. of classes taken			

UNIT-III (Second Half Unit): Electromagnetic Waves-I

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	Introduction to EM Waves-Scalar, Vector Form, Solution of EM Wave Equations	1	05-3-2024			
29.	Intrinsic Impedance, Attenuation and Phase Constants, Loss Tangent, Velocity and Wavelength of EM Wave	1	07-3-2024			
30.	Wave Propagation in Lossy Dielectrics	1	12-3-2024			
31.	Wave Propagation in Lossless Dielectrics	1	14-3-2024			
32.	Wave Propagation in Free Space	1	15-3-2024			
33.	Wave Propagation in Good Conductors	1	16-3-2024			
34.	Polarization-Linear, Circular & Elliptical	1	19-3-2024			
35.	Problem Solving	1	21-3-2024			
No. of classes required to complete UNIT-III. (Second Half - 50%)		10	No. of classes taken			

UNIT-IV: Electromagnetic Waves-II

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Poynting Vector-Time Average Power, Power Loss in a Plane Conductor	1	22-3-2024			
37.	Poynting Theorem	1	23-3-2024			
38.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Dielectric	1	26-3-2024			
39.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Conductor	1	30-3-2024			
40.	Reflection of a Plane Wave at Oblique Incidence– Parallel Polarization	1	02-4-2024			
41.	Reflection of a Plane Wave at Oblique Incidence–Perpendicular Polarization	1	04-4-2024			
42.	Brewster Angle, Critical Angle and Total Internal reflection, Surface Impedance	1	06-4-2024			
43.	Problem Solving	1	08-4-2024			
No. of classes required to complete UNIT-IV		10	No. of classes taken			

UNIT-V: Transmission Lines

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Types of Transmission Lines, Transmission Lines Equations	1	10-4-2024			
45.	Primary and Secondary Constants of a Transmission Line	1	12-4-2024			
46.	Lossless, Distortion less, Low loss Transmission lines, Concept of Loading	1	16-4-2024			
47.	Input Impedance of a Transmission Line, Reflection Coefficient, VSWR	1	19-4-2024			
48.	Short Circuit, Open Circuit and Matched Lines	1	20-4-2024			
49.	Smith Chart and Applications	1	23-4-2024			
50.	Problem Solving	1	25-4-2024			
No. of classes required to complete UNIT-V		**9**	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Introduction to Antennas	1	26-4-2024			
52.	Introduction to Microwaves	1	27-4-2024			

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:

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**
Cumulative Internal Examination (CIE) = 80% of Max((M1+Q1+A1) , (M2+Q2+A2)) + 20% of Min((M1+Q1+A1) , (M2+Q2+A2))	**30**
Semester End Examination (SEE) (Unit-I, Unit – II, Unit –III, Unit-IV and Unit-V)	**70**
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools.

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Date:

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.B.Y.V.N.R.Swamy	Dr.B.Ramesh Reddy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. A.Narendra Babu

Course Name & Code : Universal Human Values 2: Understanding Harmony **(20HS01)**
L-T-P Structure : 3-0-0 **Credits** : 3
Program/Sem/Sec : B.Tech IV Semester – ECE – C- Sec **A.Y.** : 2023-24

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves and their surroundings (family, society, nature); they would become more responsible in life and in handling problems with sustainable solutions while keeping human relationships and human nature in mind.

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

CO1	Apply the value inputs in life and profession
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the self and the Body
CO3	Understand the role of a human being in ensuring harmony in society
CO4	Understand the role of a human being in ensuring harmony in the nature and existence
CO5	Distinguish between ethical and unethical practices

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

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

TEXTBOOKS:

T1 R R Gaur, r singal, G P Bagaria, "Human values and Professional Ethics", Excel Books, New Delhi,2010

REFERENCE BOOKS:

R1 Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999
R2 Human values, A N Tripathi, New Age Publishers, New Delhi, 2004
R3 The story of my experiments with Truth, Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Need, Basic Guide lines, content and Process for value Education

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.	Human Values Introduction	1	02-01-2024		TLM1	
2.	Overview of Course	1	05-01-2024		TLM2	
3.	CO's Discussion	1	06-01-2024		TLM1	
4.	Introduction	1	08-01-2024		TLM2	
5.	Process for self exploration: Natural Acceptance	1	09-01-2024		TLM.2	
6.	Experiential validation	1	12-01-2024		TLM2	
7.	Continuous Happiness and prosperity	1	19-01-2024		TLM2	
8.	A look at basic human aspirations: Right understanding	1	20-01-2024		TLM2	
9.	Relationship	1	22-01-2024		TLM2	
10.	Physical facility	1	23-01-2024		TLM2	
11.	Understanding Happiness and prosperity	1	27-01-2024		TLM2	
12.	Understanding Happiness and prosperity	1	29-01-2024		TLM2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Understanding Harmony in the Human Being-Harmony in myself

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.	Understanding Human being	1	30-01-2024		TLM2	
14.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	02-02-2024		TLM2	
15.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	03-02-2024		TLM2	
16.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	05-02-2024		TLM2	
17.	Understanding the Body as an instrument of 'I'	1	06-02-2024		TLM2	
18.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	09-02-2024		TLM2	

19.	Understanding the harmony of I with the Body	1	10-02-2024		TLM2	
20.	Sanyam and Health	1	12-02-2024		TLM2	
21.	Correct appraisal of Physical needs	1	13-02-2024		TLM2	
22.	Meaning of prosperity in detail	1	16-02-2024		TLM1	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Understanding Harmony in the Family and society-Harmony in Human- Human Relationship

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.	Understanding values in human-human relationship: meaning of justice	1	17-02-2024		TLM2	
24.	Program for fulfillment to ensure mutual happiness	1	19-02-2024		TLM2	
25.	Trust and Respect as the foundational values of relationship	1	20-02-2024		TLM2	
26.	Trust and Respect as the foundational values of relationship	1	23-02-2024		TLM2	
27.	Understanding Harmony in the society: Resolution	1	24-02-2024		TLM2	
28.	**I-Mid examinations**		26-02-2024	To 02-03-2024		
29.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	04-03-2024		TLM2	
30.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	05-03-2024		TLM2	
31.	Visualizing a universal harmonious order in the society- undivided society	1	09-02-2024		TLM2	
32.	Visualizing a universal harmonious order in the society- undivided society	1	11-03-2024		TLM2	
33.	Universal order-from family to world family	1	12-03-2024		TLM2	
34.	Gratitude as a universal value in relationships	1	15-03-2024		TLM2	
35.	Review	1	16-03-2024			
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Understanding Harmony in the Nature and Existence- Whole existence as Coexistence

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Understanding Harmony in the Nature	1	18-03-2024		TLM2	
37.	Interconnectedness and mutual fulfillment among four orders of nature	1	19-03-2024		TLM2	
38.	Recyclability and self regulation in nature	1	22-03-2024		TLM2	
39.	Understanding Existence as co-existence of mutually	1	23-03-2024		TLM2	

	interacting units in all pervasive space					
40.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	26-03-2024		TLM2	
41.	Holistic perception of harmony at all levels of existence	1	30-03-2024		TLM2	
42.	Review	1	01-04-2024		TLM2	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT-V: Implications of the above Holistic understanding of Harmony on professional ethics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Natural acceptance of human values	1	02-04-2024		TLM2	
44.	Definitiveness of ethical human conduct	1	06-04-2024		TLM2	
45.	Definitiveness of ethical human conduct	1	08-04-2024		TLM2	
46.	Basis for humanistic education	1	12-04-2024		TLM2	
47.	Basis for humanistic education	1	13-04-2024		TLM2	
48.	Humanistic constitution and humanistic universal order	1	15-04-2024		TLM2	
49.	Competence in professional ethics	1	16-04-2024		TLM2	
50.	Competence in professional ethics	1	19-04-2024		TLM2	
51.	Strategy for transition from the present state to universal human order	1	20-04-2024		TLM2	
52.	Strategy for transition from the present state to universal human order	1	22-04-2024		TLM2	
53.	Revision	3	23-04-2024 to 27-04-2024		TLM2	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.		17-06-22				

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. A.Narendra Babu**	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**	**Dr. Y.Amar Babu**
Signature				

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ELECTRONIC AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Shaheda Niloufer
Course Name & Code : Environmental Science & 20MC03
L-T-P Structure : 2-0-0 Credits : 0
Program/Sem/Sec : B.Tech., ECE-C., IV-Sem., SEC-C A.Y : 2023-24

PRE-REQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs): The purpose of this course is to provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities and how human activities influence our air, water and soil. It also helps in developing an understanding about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO 1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO 2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO 3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 4	Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.

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

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

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

TEXT BOOKS:

T1 Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, 5th Edition, Delhi, 2016.

T2 Mahua Basu, S. Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 1st Edition, Delhi, 2016.

REFERENCE BOOKS:

R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.

R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press, 2nd Edition, New Delhi, 2012.

R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.

R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.

R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

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 of course and course objectives. Introduction of components of Environment	1	02-01-2024		2	
2.	Population explosion and variations among Nations.	1	05-01-2024		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	09-01-2024		2	
4.	Environmental Hazards	1	12-01-2024		2	
5.	Role of Information Technology in environmental management and human health.	1	19-01-2024		2	
No. of classes required to complete UNIT-I: 5				No. of classes taken:		

UNIT-II: NATURAL RESOURCES AND CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and classification of Natural resources, Forest Resources,	1	23-01-2024		2	
2.	Water Resources	1	30-01-2024		2	
3.	Mineral Resources	1	02-02-2024		2	
4.	Food Resources	1	06-02-2024		2	
5.	Energy Resources	1	09-02-2024		2	
6.	Food Resources	1	13-02-2024		2	
No. of classes required to complete UNIT-II: 6				No. of classes taken:		

UNIT-III: ECOLOGY AND BIODIVERSITY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Definition, structure and functions of an ecosystem	1	16-02-2024		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids, Bio-geo-chemical cycles	1	20-02-2024		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological	1	23-02-2024		2	

	Niche and Keystone Species, Bio-geographical classification of India. India as a mega diversity nation					
4.	**I MID EXAMINATION**	1	27-02-2024			
5.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Assignment in Unit II	1	05-03-2024		2	
6.	Man and wild life conflicts. Endangered and endemic species of India	1	12-03-2024		2,3	
7.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	15-03-2024		2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

UNIT-IV : ENVIRONMENTAL POLLUTION

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.	Air Pollution	1	19-03-2024		2	
2.	Causes, effects and control measures of: Water Pollution	1	22-03-2024		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	26-03-2024			
4.	Noise Pollution		02-04-2024			
5.	Solid Waste Management	1	12-04-2024		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	16-04-2024		2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

UNIT-V : ENVIRONMENTAL MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sustainable Development, Environmental Law	1	19-04-2024		2	
2.	Climate disruption- Greenhouse effect, ozone layer depletion and acid rain. Stockholm conference,	1	23-04-2024		2,3	
3.	Environmental Impact Assessment (EIA), Green building	1	26-04-2024		2	
4.	II MID EXAMINATIONS	1	30-04-2024		2	
5.	II MID EXAMINATIONS	1	03-05-2024		2	
No. of classes required to complete UNIT-V: 03				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. A. Rami Reddy**
Signature				

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COURSE HANDOUT

Part-A

PROGRAM : B.Tech., IV-Sem., ECE-C

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : Analog Communications Lab – 20EC56

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR (s) : Dr.B.Poornaiah / Dr.P. Venkata Rao

COURSE OBJECTIVES: This course provides the practical exposure on analog communication schemes and gives the practical knowledge about pulse modulation techniques used in communication systems. It also gives the knowledge on implementation of continuous wave and pulse modulation schemes using MATLAB.

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

CO1 : Demonstrate the practical aspects of continuous wave modulation schemes. **(Understand – L2)**
CO2 : Construct the circuits for studying pulse modulation techniques. **(Apply – L3)**
CO3 : Apply the programming aspects of MATLAB in simulation of continuous wave and pulse modulation techniques **(Apply – L3)**
CO4 : Adapt effective communication, presentation and report writing skills**. (Apply – L3**)

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

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

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

Part-B

Batch-1

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	03-01-2024		-	TLM1	
2	Experiments-1	3	10-01-2024		CO1, CO4	TLM4	
3	Experiment-2	3	24-01-2024		CO1, CO4	TLM4	
4	Experiment-3	3	31-01-2024		CO1, CO4	TLM4	
5	Experiment -4	3	07-02-2024		CO1, CO4	TLM4	
6	Experiment-9	3	14-02-2024		CO1, CO3, CO4	TLM4	
7	Experiment-10	3	21-02-2024		CO1, CO3, CO4	TLM4	
8	Experiment-5	3	06-03-2024		CO1, CO4	TLM4	
9	Experiment-6	3	13-03-2024		CO2, CO4	TLM4	
10	Experiment-7	3	20-03-2024		CO2, CO4	TLM4	
11	Experiment-8	3	27-03-2024		CO2, CO4	TLM4	
12	Experiment-11	3	03-04-2024		CO2, CO3, CO4	TLM4	
13	Experiment-12	3	10-04-2024		CO2, CO3, CO4	TLM4	
14	Simulation in GNU Radio Content beyond syllabus	3	10-04-2024		-	TLM4	
15	Internal exam	3	24-04-2024		-		

Batch-2

S. No.	Experiments	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Learning Outcome COs	Teaching Learning Methods	HOD Sign Weekly
1	Demonstration	3	03-01-2024		-	TLM1	
2	Experiments-1 & 2	3	06-01-2024		CO1, CO4	TLM4	
3	Experiment-3 & 4	3	13-01-2024		CO1, CO4	TLM4	
4	Experiment-5	3	20-01-2024		CO1, CO4	TLM4	
5	Experiment – 6	3	27-01-2024		CO2 CO4	TLM4	
6	Experiment-7	3	03-02-2024		CO2, CO4	TLM4	
7	Experiment-8	3	10-02-2024		CO1, CO3, CO4	TLM4	
8	Experiment-9	3	17-02-2024		CO1, CO3, CO4	TLM4	
9	Experiment-10	3	24-02-2024		CO2, CO3, CO4	TLM4	
10	Experiment-11	3	16-03-2024		CO2, CO3, CO4	TLM4	
11	Experiment-12	3	23-03-2024		CO2, CO3, CO4	TLM4	
12	Simulation in GNU Radio Content beyond syllabus	3	06-04-2024		-	TLM4	
13	Revision	3	20-04-2024				
14	Internal exam	3	30-03-2024				

List of Experiments:

Exp. No	Experiments to be conducted	Exp. No	Experiments to be conducted
CYCLE-1			CYCLE-2
1.	Generate the Amplitude modulated (AM) signal for different modulation indices and reconstruct the original signal.	5.	Estimate the cutoff frequencies for Pre emphasis and De-emphasis circuits.
2.	Demonstrate the generation of Frequency modulated signal and reconstruction of original signal.	6.	Generate the Pulse Amplitude Modulated signal and reconstruct the original signal using low pass filter
3.	Use product modulator to generate double sideband suppressed carrier AM signal and demodulate the signal using Synchronous detector.	7.	Construct circuits for generating the Pulse width and Pulse position modulated signals using IC555 and perform demodulation to reconstruct the message signal
4.	Apply phase shift method for generating the Single sideband modulated AM signal and demodulate using coherent detector.	8.	Generation of sampled signal for different sampling rates and verify sampling theorem for efficient reconstruction.
9.	Amplitude Modulation and Demodulation (Simulation Using MATLAB)	11.	Pulse Amplitude Modulation techniques (Simulation Using MATLAB)
10	Frequency Modulation and Demodulation (Simulation Using MATLAB)	12.	Frequency modulation and demodulation (Simulation Using MATLAB)
For Batch 2 MATLAB experiments are to be conducted first followed by hard ware experiments			

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination: A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**50**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
PEO2: To Function professionally in the rapidly changing world with advances in technology
PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner.

PROGRAMME OUTCOMES (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Dr.B.Poornaiah/Dr.P.Venkta Rao	Mr.M.K.Linga Murthy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.T.Anil Raju / Dr.B.Rambabu
Dr.M.V Sudhakar / Mr. P. Venkateswara Rao

Course Name & Code : Digital Signal Processing Lab – 20EC55

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

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- C **A.Y :** 2023-24

Pre-Requisites: C – Programming, Basic Definitions of signals and systems.

Course Objectives: This course provides generation of basic signals and operations on signals. This course also provides design of IIR filters using Butterworth and Chebyshev approximation techniques and FIR filters using windowing techniques. This course also gives the knowledge about DSP Processors.

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

CO 1	**Understand** the generation and operations of signals using MATLAB. **(Understand – L2)**
CO 2	**Analyze** the signals in time and frequency domains using MATLAB and Code Composer Studio.**(Analyze – L4)**
CO 3	**Design** IIR and FIR Filters and obtain their frequency response using MATLAB.**(Apply – L3)**
CO 4	**Adapt** effective communication, presentation skills and report writing.**(Apply – L3)**

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

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

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

TEXT BOOK(S):

T1 Rudra Pratap, "*MATLAB Getting Started with MATLAB 7*", oxford university press,
T2 Tarun Kumar Rawat, "Digital Signal Processing", oxford university press,2015

DSP LAB SCHEDULE (LESSON PLAN): Section-C

PART-B

Expt. No	Experiment/s	COs	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
--	Introduction to DSP Lab experiments, COs, Pos and PSOs	--	3	04-01-2024			
Cycle – I – MATLAB Software							
1	Generation of Discrete Time (DT) signals	CO1	3	11-01-2024			
2	Operations on DT signals	CO1	3	18-01-2024			
3	Linear Convolution, Circular Convolution	CO2	3	25-01-2024			
4	Computation of N-Point DFT and IDFT.	CO2	3	01-02-2024			
5	Linear and Circular Convolution Using DFT & IDFT	CO2	3	08-02-2024			
6	Power Spectral Density for sinusoidal signal.	CO2	3	15-02-2024			
7	Design of Digital IIR butter worth filter using Bi-linear Transformation.	CO3	3	22-02-2024			
8	Design of Digital IIR Chebyshev filter using Bi-linear Transformation.	CO3	3	07-03-2024			
9	Design of FIR filters using window techniques	CO3	3	14-03-2024			
Cycle – II - Code Composer Studio Simulation Software and DSPProcessors							
10	Linear Convolution	CO2	3	21-03-2024			
11	Circular Convolution	CO2	3	28-03-2024			
12	Computation of DFT.	CO2	3	04-04-2024			
--	Content Beyond the Experiment (Color Image Processing)	--	3	18-04-2024			
--	Internal Lab Examination	--	3	25-04-2024			
No. of classes required to complete Lab			**36**	No. of classes conducted:			

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:

Evaluation Task	**Expt. no's**	**Marks**
Day to Day work (Viva =2M & Experiment Conduction =3M) = **A**	1,2,3,4,5,6,7,8…	A = 05
Record = **B**	1,2,3,4,5,6,7,8…	B = 05
Internal Test = **C**	1,2,3,4,5,6,7,8…	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	15
Semester End Examinations = D	1,2,3,4,5,6,7,8…	D = 35
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	50

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Date: 02.01.2024

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. T.Anil Raju	Mr. P.Venkateswara Rao	Dr. G L N Murthy	Dr. Y Amar Babu

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COURSE HANDOUT
PART-A

Name of Course Instructor: Ms. Asha. G/Dr. K. Ravi Kumar

Course Name & Code	**:** Programming using Python Lab-20AD53	**Regulation**: R20
L-T-P Structure	**:** 1-0-2	**Credits:**02
Program/Sem/Sec	:B.Tech./IV-Sem./ECE-C Sec	**A.Y.:**2023-2024

PREREQUISITE: Programming Languages like C Language.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of python course is to lead the students from the basics of writing and running python scripts in problem solving and also to design and implement the modules and understands the working of classes and objects in python.

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

CO1	**Identify** various programming constructs available in Python and **apply** them in solving computational problems **(Apply- L3)**
CO2	**Demonstrate** data structures available in Python and **apply** them in solving computational problems **(Apply- L3)**
CO3	**Implement** modular programming, string manipulations and Python Libraries **(Apply- L3)**
CO4	**Improve** individual / teamwork skills, communication & report writing skills with ethical values

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

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

TEXTBOOKS:

T1 Reema Thareja,"Python Programming Using Problem Solving Approach ", Oxford Publications

T2 Python for Everybody: Exploring Data In Python 3by Dr. Charles Russell Severance, Sue Blumenberg

REFERENCE BOOKS:

R1 Gowri Shankar, Sand Veena,"Introduction to Python Programming", CRC Press, Taylor, and Francis Group–Achapman & Hallbook.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Batch-1

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: Language Basics and Example Problems	6	03-01-2024 10-01-2024		TLM1 & TLM4	
2.	Introduction: Language Basics and Example Problems	3	24-01-2024		TLM4	
3.	Module 1: Exercise Programs on Lists	3	31-01-2024		TLM4	
4.	Module 2: Exercise Programs on Tuples	3	07-02-2024		TLM4	
5.	Module 3: Exercise Programs on Sets	3	14-02-2024		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	3	21-02-2024		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	3	06-03-2024		TLM4	
8.	Module 6: Exercise Programs on Strings	3	13-03-2024		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	3	20-03-2024		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	27-03-2024		TLM4	
11.	Internal Lab Exam	-	24-04-2024		-	
No. of classes required to complete -				**No. of classes taken:**		

Contents beyond the Syllabus

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Applications in science and Engineering	1	10-04-2024		TLM4, 6	
13.	Competitive Exam Problems	2	10-04-2024		TLM4, 6	

COURSE DELIVERY PLAN (LESSON PLAN): Batch-2

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: Language Basics and Example Problems	6	06-01-2024 20-01-2024		TLM1 & TLM4	
2.	Introduction: Language Basics and Example Problems	3	27-01-2024		TLM4	
3.	Module 1: Exercise Programs on Lists	3	03-02-2024		TLM4	
4.	Module 2: Exercise Programs on Tuples	3	10-02-2024		TLM4	
5.	Module 3: Exercise Programs on Sets	3	17-02-2024		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	3	24-02-2024		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	3	09-03-2024		TLM4	
8.	Module 6: Exercise Programs on Strings	3	16-03-2024		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	3	23-03-2024		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	30-03-2024		TLM4	
11.	Internal Lab Exam	3	27-04-2024		-	
No. of classes required to complete -				**No. of classes taken:**		

Contents beyond the Syllabus

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Applications in science and Engineering	1	06-04-2024		TLM4, 6	
13.	Competitive Exam Problems	2	13-04-2024		TLM4, 6	

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

PART-C

EVALUATION PROCESS:

Evaluation Task	Exp no's	Marks
Day to Day work=**A**	1,2,3,4,5,6,7,8…	A=05
Record= **B**	1,2,3,4,5,6,7,8…	B=05
Internal Test= **C**	1,2,3,4,5,6,7,8…	C=05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8…	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8…	**D=35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8…	**50**

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

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

	knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Ms. Asha. G**	**Dr. K. Ravi Kumar**	**Dr. B. Poornaiah**	**Dr. Y. Amar Babu**
Signature				

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr B. Siva Hari Prasad

Course Name & Code : MODELING, DESIGN AND PROTOTYPING – 20ECS2

L-T-P Structure : 1-0-2 Credits : 2

Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section- C A.Y : 2023-24

Pre-requisites: C-Programming, Pulse and Digital Circuits.

Course Educational Objectives: In this course, student will learn about how to build an engineering application with LabVIEW software and associatedhardware.

Course Outcomes (Cos): At the end of the course, students are able to

CO1	Understand the programming concept of virtual instruments. (**Understand – L2**)
CO2	Develop real time applications using loops, formula nodes, array, clusters and DAQ. (**Apply – L3**)
CO3	Adopt Communication, Presentation and Report writing skills. (**Apply – L3**)

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

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

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

TEXT BOOK(S):

T1 S. Sumathi, P.Surekha, Virtual Instrumentation with LabVIEW, ACME Learning Pvt. Ltd.,2007.

T2 Jeffrey Travis, Jimkring, LabVIEW for Everyone, Pearson Education, 2009.

REFERENCE BOOK(S):

R1 Jovitha Jerome, Virtual Instrumentation using LabVIEW, PHI Learning Pvt. Ltd., 2006.

R2 Rick Bitter, Taqi Mohiuddin, Matt Nawrocki – LabVIEW Advanced Programming Techniques, CRC Press, 2009.

Part – A: Theory

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	08-01-2024		TLM2	
2.	VI and Data operations	1	22-01-2024		TLM2	
3.	VI front and block panel	1	29-01-2024		TLM2	
4.	Data flow programming	1	05-02-2024		TLM2	
5.	Graph programming	1	12-02-2024		TLM2	
6.	Loops, Arrays applications	1	19-02-2024		TLM2	
7.	Concepts of VI& Sub VIs	1	04-02-2024		TLM2	
8.	Applications of sequence structures	1	11-03-2024		TLM2	
9.	Waveforms and Graphs	1	18-03-2024		TLM2	
10.	Applications	1	01-04-2024		TLM2	
11.	Modules	1	08-04-2024		TLM2	
12.	NI Hardware	1	15-04-2024		TLM2	
13.	DAQ Installation and configuration	1	22-04-2024		TLM2	
14.	Applications	1	29-04-2024		TLM2	
15.	DAQ Hardware	1	01-05-2024		TLM2	

PART – B:

S.No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Virtual Instruments, Cos, Numeric	3	08-01-2024		TLM2	
2.	Boolean and compound operations	3	22-01-2024		TLM4	
3.	For and while loops	3	29-01-2024		TLM4	
4.	Structures, Timers	3	05-02-2024		TLM4	
5.	Arrays & Clusters	3	12-02-2024		TLM4	
6.	Formula node, Sub VI	3	19-02-2024		TLM4	
7.	Files	3	04-02-2024		TLM4	
8.	DAQ – installation, Application	3	11-03-2024		TLM4	
9.	Analog applications	3	18-03-2024		TLM4	
10.	Digital applications	3	01-04-2024		TLM4	
11.	Discussion of Models & Demo	3	08-04-2024		TLM2	
12.	Discussion of Models & Demo	3	15-04-2024		TLM2	
13.	Discussion of Models & Demo	3	22-04-2024		TLM2	

14.	Documentation Verification	3	29-04-2024		TLM6	
15.	Documentation Verification	3	01-05-2024		TLM6	

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

EVALUATION PROCESS:

Report	**10**
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the

engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1: **Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO 2: **VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO 3: **Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Dr B. Siva Hari Prasad	Mr V.V. Rama Krishna	Dr B. Poornaiah	Dr Y. Amar Babu
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING

COURSE HANDOUT

Name of Course Instructors : Ms. Asha. G/Mr. P Venkateswara Rao
Course Name : Association
Program/Sem/Sec : B.Tech./ECE IV-Sem/A,B & C-Sections A.Y : 2023-2024

COURSE DELIVERY PLAN (LESSON PLAN):

S.No	Topics to be covered	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Discussion about Association Activities by course instructors and Self-Introduction.	05-01-2024		
2.	JAM on Aditya L1 Mission.	12-01-2024		
3.	Group Discussion on National Education Policy.	19-01-2024		
4.	Seminar related to VIKSIT BHARAT.	02-02-2024		
5.	Group Discussion on smart devices & social networks.	09-02-2024		
6.	Innovations in Technology with respect to ECE(PPT).	09-02-2024		
7.	Debate on Machine Learning & Deep Learning.	16-02-2024		
8.	Technical Quiz on competitive exam topics.	23-02-2024		
9.	Current affairs on technological changes/Technical Talks (PPT/Video).	23-02-2024		
10.	Debate-Role of AI on Man Kind.	15-03-2024		
11.	Presentation on Role of Technology in economical growth of a country.	22-03-2024		
12.	Group Discussion on Drone Technology for real time applications.	05-04-2024		
13.	Presentation on 5G Technology.	12-04-2024		
14.	Testing knowledge on verbal/quantitative/reasoning/problem solving/logical/etc. skills.	19-04-2024		
15.	Technical Quiz.	26-04-2024		

Course Instructors
Ms. Asha. G
Mr.P.Venkateswara Rao

HOD

(Dr. Y. Amar Babu)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Y AMAR BABU
Course Name & Code : CPLD and FPGA Architectures – 20ECH1
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., ECE., IV-Sem., Section-Honor A.Y : 2023-24

PRE-REQUISITES: Digital Circuits.

COURSE EDUCATIONAL OBJECTIVES (CEOs): In this course student will learn about the complex programmable logic devices, field programmable gate arrays, architecture of SRAM programmable and anti-fuse programmed FPGAs.

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

CO1	**Analyze** different types of Complex Programmable Logic Devices.
CO2	**Understand** different types of Field Programmable Gate Arrays.
CO3	**Evaluate** architecture of SRAM Programmable FPGAs.
CO4	**Explain** the device Architecture of Anti-Fuse Programmed FPGAs.

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

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

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

TEXT BOOKS:

T1 Field Programmable Gate Array Technology by Stephen M. Trimberger, Springer International Edition.
T2 Digital Systems Design by Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS:

R1 Field Programmable Gate Arrays by John V. Oldfield, Richard C. Dorf, Wiley India.
R2 Digital Design Using Field Programmable Gate Arrays by Pak K. Chan/Samiha Mourad, Pearson Low Price Edition.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - Honor

UNIT-I: Introduction to Programmable Logic Devices:

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	10-01-24			
2.	Simple Programmable Logic Devices	1	12-01-24			
3.	Read Only Memories	1	12-01-24			
4.	Programmable Logic Arrays	1	19-01-24			
5.	Programmable Array Logic	1	19-01-24			
6.	Programmable Logic Devices/Generic Array Logic	2	22-01-24 24-01-24			
7.	Assignment – Innovative Teaching	2	29-01-24 31-01-24			
8.	Tutorial	1	2-02-24			
No. of classes required to complete UNIT-I:		**10**	No. of classes taken:			

UNIT-II: Complex Programmable Logic 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.	Complex Programmable Logic Devices	1	02-02-24			
2.	Architecture of Xilinx Cool Runner XCR3064XL	1	05-02-24			
3.	CPLD Implementation of a Parallel Adder with Accumulation	1	07-02-24			
4.	Altera series – Max 5000/7000 series	1	09-02-24			
5.	Altera FLEX logic-10000 series CPLD	2	09-02-24 12-02-24			
6.	Assignment	1	14-02-24			
7.	Tutorial	1	16-02-24			
No. of classes required to complete UNIT-II:		**08**	No. of classes taken:			

UNIT-III: Field Programmable Gate Arrays:

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.	Organization of FPGAs	1	16-02-24			
2.	FPGA Programming Technologies	1	19-02-24			
3.	Programmable Logic Block Architectures	1	21-02-24			
4.	Programmable Interconnects	1	23-02-24			
5.	Programmable I/O blocks in FPGAs	1	23-02-24			
6.	Dedicated specialized Components of FPGAs	1	04-03-24			
7.	Applications of FPGAs.	2	06-03-24 11-03-24			
8.	Assignment	1	13-03-24			
9.	Tutorial	1	16-03-24			
No. of classes required to complete UNIT-III:		**10**	No. of classes taken:			

UNIT-IV: SRAM Programmable FPGAs

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, Programming Technology, Device Architecture	1	16-03-24			
2.	The Xilinx XC2000, XC3000, XC4000 Architectures	1	18-03-24			
3.	**Anti-Fuse Programmed FPGAs:**	1	20-03-24			
4.	Introduction, Programming Technology	1	22-03-24			
5.	Device Architecture	1	22-03-24			
6.	The Actel ACT1, ACT2 and ACT3 Architectures	2	25-03-24 27-03-24			
7.	Assignment	1	29-03-24			
8.	Tutorial	1	29-03-24			
No. of classes required to complete UNIT-IV:		**09**	No. of classes taken:			

UNIT-V: Design Applications

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	General Design Issues, Counter Examples	2	01-04-24 03-04-24			
2.	A Fast Video Controller	2	05-04-24			
3.	A Fast DMA Controller	2	08-04-24			
4.	Designing Counters with ACT devices	1	10-04-24			
5.	Designing Adders and Accumulators with the ACT Architecture.	2	12-04-24 15-04-24			
6.	Assignment	1	17-04-24			
7.	Tutorial	2	19-04-24			
No. of classes required to complete UNIT-V:		**12**	No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	ASIC Design	2	24-04-24 26-04-24			

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

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	**Marks**
Assignment-I (Units-2 1/2)	A1=5
I-Mid Examination (Units-2 1/2)	M1=15
I-Quiz Examination (Units-2 1/2)	Q1=10
Assignment-II (Units-2 1/2)	A2=5
II-Mid Examination (Units-2 1/2)	M2=15
II-Quiz Examination (Units-2 1/2)	Q2=10
Mid Marks =80% of Max(M1, M2)+20% of Min(M1, M2)	M=15
Quiz Marks =80% of Max(Q1, Q2)+20% of Min(Q1, Q2)	Q=10
Assignment Marks = Average of Best two of A1, A2	A=5
Cumulative Internal Examination (CIE) : M+Q+A	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date: 07-03-2022

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. Y. Amar Babu	Dr. Y. Amar Babu	Dr. P. Lachi Reddy	Dr. Y. Amar Babu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. P.NARENDRA BABU
Course Name & Code : ARTIFICIAL INTELLIGENCE – 20ADM1
L-T-P Structure : **3-0-0** **Credits:**3
Program/Branch/Sem : **B.Tech/ECE /IV** **A.Y.: 2023-24**

PRE-REQUISITE: Basic Engineering Mathematics Knowledge

Course Educational Objective:

The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, reasoning, and learning. Students will implement a small AI system in a team environment. The knowledge of artificial intelligence plays a considerable role in some applications students develop for courses in the program.

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

CO1	Enumerate the history and foundations of Artificial Intelligence. **(Understand-L2)**
CO2	Apply the basic principles of AI in problem solving. **(Apply-L3).**
CO3	Explain the different searching algorithms to find and optimize the solution for the given Problem. **(Understand-L2)**
CO4	Illustrate the different gaming algorithms and identify the importance of knowledge Representation in Artificial Intelligence. **(Apply-L3)**
CO5	Describe the use of predicate logic and rule-based system to represent the knowledge in AI domain. **(Understand-L2)**

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

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

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

BOS APPROVED TEXT BOOKS:

T1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach",3rd edition, Prentice Hall, 2009. Can also use 2nd Ed., Pearson Education International, 2003.
T2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011

BOS APPROVED REFERENCE BOOKS:

R1. Nils Nilsson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmann, 1998.
R2. David Poole, Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge Univ. Press, 2010.
R3. Ronald Brachman, "Knowledge Representation and Reasoning", Morgan Kaufmann, 2004.
R4. Frank van Harmelen, Vladimir Lifschitz, Bruce Porter (Eds), "Handbook of Knowledge representation", Elsevier, 2008.
R5. Ivan Bratko, "Prolog Programming for Artificial Intelligence", 4th Ed., Addison-Wesley, 2011.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I : INTRODUCTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Discussion of CEO's and CO's, Introduction	1	03-01-2024		-	CO1	-	
2.	Introduction: What Is AI?,	1	05-01-2024		TLM1	CO1	T1,T2	
3.	The Foundations of Artificial Intelligence	1	05-01-2024		TLM1	CO1	T1,T2	
4.	The History of Artificial Intelligence,	1	08-01-2024		TLM1	CO1	T1,T2	
5.	The State of the Art.	1	10-01-2024		TLM1	CO1	T1,T2	
6.	Agents and Environments	1	12-01-2024		TLM1	CO1	T1,T2	
7.	Types of agents	1	12-01-2024		TLM2	CO1	T1,T2	
8.	Good Behavior: The Concept of Rationality	1	19-01-2024		TLM1	CO1	T1,T2	
9.	Omniscience vs Rational agent	1	19-01-2024		TLM1	CO1	T1,T2	
10.	The Nature of Environments	1	22-01-2024		TLM1	CO1	T1,T2	
11.	The Structure of Agents	1	24-01-2024		TLM1	CO1	T1,T2	
12.	Assignment/Quiz-2	1	29-01-2024		TLM1	CO1	-	
No. of classes required to complete UNIT-I: 14					**No. of classes taken:**			

UNIT-II : PROBLEM SOLVING

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

13.	Problem-Solving Agents, Example Problems	1	31-01-2024		TLM1	CO2	T1,T2	
14.	searching for Solutions, Uninformed Search Strategies	1	02-02-2024		TLM1	CO2	T1,T2	
15.	Search algorithms terminologies	1	02-02-2024		TLM1	CO2	T1,T2	
16.	Properties of search algorithms	1	05-02-2024		TLM1	CO2	T1,T2	
17.	Types of search algorithms.	1	07-02-2024		TLM1	CO2	T1,T2	
18.	Best first search algorithm	1	09-02-2024		TLM2	CO2	T1,T2	
19.	A* Algorithm	1	09-02-2024		TLM2	CO2	T1,T2	
20.	AO* Algorithm	2	12-02-2024 & 14-02-2024		TLM2	CO2	T1,T2	
21.	Local Search Algorithms	1	16-02-2024		TLM2	CO2	T1,T2	
22.	Local Search Algorithms	1	16-02-2024		TLM2	CO2	T1,T2	
23.	Searching with Nondeterministic Actions.	1	19-02-2024		TLM2	CO2	T1,T2	
24.	Assignment/Quiz-2	1	21-02-2024		TLM1	CO2	T1,R1	
No. of classes required to complete UNIT-II: 13					**No. of classes taken:**			

UNIT-III : SEARCH ALGORITHMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
25.	Introduction	1	23-02-2024		TLM1	CO3	T1,T2	
26.	Uniformed/Blind Search Algorithms:	1	23-02-2024		TLM1	CO3	T1,T2	
27.	Breadth-first Search	1	04-03-2024		TLM2	CO3	T1,T2	
28.	Depth-first Search,	1	06-03-2024		TLM2	CO3	T1,T2	
29.	Depth limited search	1	08-03-2024		TLM2	CO3	T1,T2	
30.	Iterative deepening depth-first search	1	08-03-2024		TLM2	CO3	T1,T2	
31.	Uniform cost search	1	11-03-2024		TLM2	CO3	T1,T2	
32.	Bidirectional Search.	1	13-03-2024		TLM2	CO3	T1,T2	
33.	Assignment/Quiz-3	1	15-03-2024		TLM1	CO3	-	
No. of classes required to complete UNIT-III: 09					**No. of classes taken:**			

UNIT-IV: ADVERSARIAL SEARCH/ GAME PLAYING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
34.	Introduction	1	15-03-2024		TLM1	CO4	T1,T2	
35.	Minimax algorithm	2	18-03-2024 20-03-2024		TLM2	CO4	T1,T2	
36.	Alpha-Beta pruning	2	22-03-2024 22-03-2024		TLM2	CO4	T1,T2	
37.	Knowledge Based Agent, Architecture	2	27-03-2024 29-03-2024		TLM1	CO4	T1,T2	
38.	Knowledge base Levels and types	1	29-03-2024		TLM1	CO4	T1,T2	
39.	Representation mappings	1	01-04-2024		TLM1	CO4	T1,T2	
40.	Inference Engine:Forward chaining/reasoning	1	03-04-2024		TLM1	CO4	T1,T2	
41.	Backward chaining/reasoning	1	05-04-2024		TLM1	CO4	T1,T2	
42.	Approaches of knowledge representation,	2	05-04-2024 08-04-2024		TLM1	CO4	T1,T2	
43.	issues in knowledge representation	2	12-04-2024 12-04-2024		TLM1	CO4	T1,T2	
44.	Assignment/Quiz-4	1	15-04-2024		TLM1	CO4	-	
No. of classes required to complete UNIT-IV: 16					**No. of classes taken:**			

UNIT-V: KNOWLEDGE REPRESENTATION TECHNIQUES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
45.	Knowledge-Based Agents	1	19-04-2024		TLM1	CO5	T1,T2	
46.	Logic, Propositional Logic:	2	19-04-2024 22-04-2024		TLM1	CO5	T1,T2	
47.	Categories, Objects and Events	1	22-04-2024		TLM2	CO5	T1,T2	
48.	Reasoning Systems for Categories	2	24-04-2024 26-04-2024		TLM1	CO5	T1,T2	
49.	The Internet Shopping World	1	27-04-2024		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-V:07					**No. of classes taken:**			

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

	and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real timeproblems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. P.NARENDRA BABU**	**Mr. P.NARENDRA BABU**		
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : P.RAJASEKHAR
Course Name & Code :Introduction to Database Systems-20CSM4
L-T-P Structure : 3-1-0 Credits : 4
Program/Sem/Sec : B.Tech., EEE&ECE., IV-Sem., Sections- ALL A.Y: 2023-24

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

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

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

CO1	Outline the components of DBMS & design database using ER model
CO2	Construct database using SQL and extract data from database using Relational algebra & SQL queries.
CO3	Apply the normalization process for effective database design
CO4	Analyze components of transaction processing, Concurrency control mechanisms and recovery strategies of DBMS
CO5	Evaluate different File organization & Indexing Techniques

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	2	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	1	-	-	-	-	-	-	-	2	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-
CO4	2	1	2	-	-	-	-	-	-	-	-	-	1	3	-
CO5	2	1	2	-	-	-	-	-	-	-	-	-	1	3	-

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

TEXT BOOKS:

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

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

REFERENCE BOOKS:

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

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

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction, An overview of database management system	1	08-01-2024		**TLM1**	CO1	T1,T2,R1	
2.	Database system Vs file system	1	10-01-2024		**TLM1**	CO1	T1,T2,R1	
3.	Database system concepts and architecture	1	12-01-2024		**TLM1**	CO1	T1,T2,R1	
4.	Data models schema and instances	1	19-01-2024		**TLM1**	CO1	T1,T2,R1	
5.	Data independence and data base language and interfaces	1	22-01-2024		**TLM1**	CO1	T1,T2,R1	
6.	Data definitions language, DML, Overall Database Structure	1	24-01-2024		**TLM1**	CO1	T1,T2,R1	
7.	**Assignment/ Tutorial – I**	1	29-01-2024		**TLM3**	CO1		

8.	ER model concepts- notation for ER diagram	1	31-01-2024		**TLM1/ TLM2**	CO1	T1,T2,R1	
9.	Mapping constraints, keys	1	02-02-2024		**TLM1**	CO1	T1,T2,R1	
10.	Concepts of Super Key, candidate key, primary key, Generalization, aggregation	1	05-02-2024		**TLM1**	CO1	T1,T2,R1	
11.	Reduction of an ER diagrams to tables, Extended ER model, Relationships of higher degree	1	07-02-2024		**TLM1/ TLM2**	CO1	T1,T2,R1	
12.	**Assignment/ Tutorial – II**	1	09-02-2024		**TLM3**	CO1		
No. of classes required to complete UNIT-I		12			No. of classes taken:12			

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

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
13.	Relational data model concepts	1	12-02-2024		**TLM1**	CO2	T1,T2,R1	
14.	Integrity constraints: entity integrity, referential integrity	1	12-02-2024		**TLM1**	CO2	T1,T2,R1	
15.	Keys constraints, Domain constraints	1	12-02-2024		**TLM1**	CO2	T1,T2,R1	
16.	Relational algebra	1	12-02-2024		**TLM1**	CO2	T1,T2,R1	
17.	Tutorial – III	1	14-02-2024		**TLM3**	CO2		
18.	Characteristics of SQL, Advantage of SQL	1	14-02-2024		**TLM1**	CO2	T1,T2,R1	
19.	SQL data types and literals, Types of SQL commands	1	14-02-2024		**TLM1**	CO2	T1,T2,R1	
20.	SQL operators and their procedure	1	16-02-2024		**TLM1**	CO2	T1,T2,R1	

21.	Tables, views and indexes,	1	16-02-2024		**TLM1**	CO2	T1,T2,R1	
22.	Queries and sub queries, Aggregate functions	1	16-02-2024		**TLM1/ TLM2**	CO2	T1,T2,R1	
23.	Insert, update and delete operations	1	19-02-2024		**TLM1**	CO2	T1,T2,R1	
24.	Unions, Intersection, Minus, Cursors in SQL	1	19-02-2024		**TLM1**	CO2	T1,T2,R1	
25.	Tutorial – IV	1	21-02-2024		**TLM3**	CO2		
No. of classes required to complete **UNIT-2**		13			No. of classes taken:			

UNIT –III: Normalization

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	Functional Dependencies	1	21-02-2024		**TLM1**	CO3	T1,T2,R1	
27.	Normal Forms: First, Second	1	21-02-2024			CO3	T1,T2,R1	
28.	Third Normal Forms	1	23-02-2024			CO3	T1,T2,R1	
29.	BCNF, Inclusion Dependences	1	23-02-2024			CO3	T1,T2,R1	
30.	LossLess Join Decompositions	1	23-02-2024			CO3	T1,T2,R1	
31.	Tutorial – V	1	04-03-2024		**TLM3**			
32.	Normalization Using FD,MVD	1	06-03-2024		**TLM1**	CO3	T1,T2,R1	
33.	Normalization Using JD	1	11-03-2024		**TLM1**	CO3	T1,T2,R1	
34.	Alternative Approaches To Database Design	1	13-03-2024		**TLM1**	CO3	T1,T2,R1	
35.	Tutorial – VI	1	13-03-2024		**TLM3**	CO3		
No. of classes required to complete **UNIT-3**		10			No. of classes taken:			

UNIT –IV: Transaction Processing Concepts &Concurrency Control techniques

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
36.	Transaction System	1	15-03-2024		**TLM1**	CO4	T1,T2,R1	
37.	Testing Of Serializability	1	15-03-2024		**TLM1**	CO4	T1,T2,R1	
38.	Serializability Of Schedules	1	18-03-2024		**TLM1**	CO4	T1,T2,R1	
39.	Conflict & View Serializable Schedule	1	20-03-2024		**TLM1**	CO4	T1,T2,R1	
40.	Recoverability, Log Based Recovery, Checkpoints,	1	22-03-2024		**TLM1**	CO4	T1,T2,R1	
41.	ARIES Algorithm, Deadlock Handling	1	22-03-2024		**TLM1/ TLM2**	CO4	T1,T2,R1	
42.	Tutorial –VII	1	27-03-2024		**TLM3**			
43.	Concurrency Control	1	27-03-2024		**TLM1**	CO4	T1,T2,R1	
44.	Techniques For Concurrency Control	1	01-04-2024		**TLM1**	CO4	T1,T2,R1	
45.	Time Stamping Protocols For Concurrency Control	1	03-04-2024		**TLM1**	CO4	T1,T2,R1	
46.	Locking, Validation Based Protocol	1	08-04-2024		**TLM1**	CO4	T1,T2,R1	
47.	Multiple Granularity	1	10-04-2024		**TLM1**	CO4	T1,T2,R1	
48.	Recovery With Concurrent Transactions	1	12-04-2024		**TLM1/ TLM2**	CO4	T1,T2,R1	
49.	Tutorial-IV		15-04-2024		**TLM3**	CO4		
No. of classes required to		14			No. of classes taken:			

complete **UNIT-4**				

UNIT-V: Storage and Indexing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
50.	RAID Levels	1	19-04-2024		**TLM1**	CO5	T1,T2,R1	
51.	Page Formats	1	22-04-2024		**TLM1**	CO5	T1,T2,R1	
52.	Record Formats	1	22-04-2024		**TLM1**	CO5	T1,T2,R1	
53.	File Types And Organization, Tutorial – IX	1	24-04-2024 24-04-2024 24-04-2024		**TLM1/ TLM3**	CO5	T1,T2,R1	
54.	ISAM	1	24-04-2024		**TLM1/ TLM2**	CO5	T1,T2,R1	
55.	B-Tree	1	26-04-2024		**TLM1**	CO5	T1,T2,R1	
56.	B+-Tree	1	26-04-2024		**TLM1/ TLM2**	CO5	T1,T2,R1	
57.	Tutorial – X	1	26-04-2024		**TLM3**	CO5		
No. of classes required to complete **UNIT-5**		08			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
58.	CODD RULES	1	26-04-2024		**TLM1**	CO1-CO5	T1,T2,R1	

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

PART-C

EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO 1	Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
PSO 2	Data Engineering: To inculcate an ability to Analyse, Design and implement data driven applications into the students.
PSO 3	Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor	Course Coordinator	Module Coordinator	HOD
P.Rajasekhar	P.Rajasekhar	P.Rajasekhar	D.Veeraaiah

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.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs.S.JYOTHI

Course Name & Code : LINUX ESSENTIALS, 20ITM1

L-T-P Structure : **3-1-0** **Credits:** 4

Program/Sem/Sec : B.Tech, IV/ Minors **A.Y.:** 2023-24

PREREQUISITE : NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course meant for the students who want to build their career in Linux System Administration domain. The student who completed this course possesses the fundamental knowledge and proven skills in the area of Linux Essentials.

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

CO1	Demonstrate Linux Utilities. (Knowledge-L1)
CO2	Identify the Basics of using the Linux command line (Understanding- L2)
CO3	Create, Search and extract data from files in the home directory. (Apply- L3)
CO4	Familiarity in working with hardware components, server computers, networking configuration. (Understand- L2)
CO5	Understanding and manipulating file permissions and ownership settings. (Knowledge-L1)

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

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

TEXT BOOKS:

1. Linux Essentials, 2nd Edition, Author: Christine Bresnahan , Publisher: Sybex

REFERENCE BOOKS:

1. Linux Pocket Guide: Essential Commands Linux Pocket Guide is a book written by Jason Cannon. It provides an organized...
2. The Linux Command Line The Linux Command Line is a book written by William Shotts. The author takes you from your...
3. Linux for Beginners: An Introduction to the Linux Operating System and Command Line Linux for Beginners is a book...
4. Linux Command Line and Shell Scripting Bible, 3rd Edition Linux Command Line and Shell Scripting Bible is a reference...

E-BOOKS AND ONLINE COURSE MATERIALS:

1. Linux Essentials by CISCO Academy

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: The Linux Community and a Career in Open Source.

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, CO's and PO's	1	03/01/24		TLM-1	
2.	Linux Evolution	1	05/01/24		TLM-1	
3.	Popular Operating Systems	1	05/01/24		TLM-2	
4.	Major Open Source Applications	2	08/01/24& 10/01/24		TLM-2	
5.	Open Source Software and Licensing	1	12/01/24		TLM-2	
6.	ICT Skills	1	12/01/24		TLM-1	
7.	Working in Linux	1	19/01/24		TLM-1	
8.	**Tutorial**	2	22/01/24& 24/01/24		TLM-3	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: Finding Your Way on a Linux System.

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
9.	Command Line Basics,	1	29/01/24		TLM-1	
10.	Running help commands	1	31/01/24		TLM-1	
11.	navigation of the various help systems	2	02/02/24		TLM-1	
12.	Using Directories and Listing Files,	2	05/02/24& 07/02/24		TLM-1	
13.	Creating, Moving and Deleting Files	2	09/02/24		TLM-2	
14.	**Tutorial**	2	12/02/24& 14/02/24		TLM-3	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: The Power of the Command Line.

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.	Archiving Files on the Command Line,	3	16/02/24& 19/02/24		TLM-1	
16.	Searching and Extracting Data from Files,	3	21/02/24& 23/02/24		TLM-1	
17.	Turning Commands into a Script.	3	23/02/24& 04/03/24		TLM-1	
18.	**Tutorial**	2	06/03/24& 11/03/24		TLM-3	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: The Linux Operating System.

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	GUI versus command line,	1	13/03/24		TLM-2	
20.	desktop configuration	1	15/03/24		TLM-2	
21.	Maintenance cycles	1	15/03/24		TLM-2	
22.	beta and stable	1	18/03/24		TLM-1	
23.	Motherboards, processors, power supplies, optical drives, peripherals	2	20/03/24& 22/03/24		TLM-1	
24.	Hard drives, solid state disks and partitions	1	22/03/24		TLM-1	
25.	Drivers	1	27/03/24		TLM-1	
26.	**Tutorial**	2	01/04/24& 03/04/24		TLM-3	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Security and File Permissions.

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	Basic Security	1	08/04/24		TLM-2	
28.	Identifying User Types	1	10/04/24		TLM-1	
29.	Creating Users and Groups,	2	12/04/24		TLM-1	
30.	Managing File Permissions	1	15/04/24		TLM-1	
31.	Ownership	2	19/04/24		TLM-1	
32.	Special Directories and Files	1	22/04/24		TLM-1	
33.	**Tutorial**	1	26/04/24		TLM-3	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

Content Beyond The Syllabus:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Linux System Architecture	2	24/04/24		TLM-2	
No. of classes required to complete :2				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Organize, Analyze and Interpret the data to extract meaningful conclusions
PSO 2	Design, Implement and evaluate a computer-based system to meet desired needs
PSO 3	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.S.Jyothi	Mrs.S.Jyothi	Mr.G.Rajendra	Dr. B.Srinivasa Rao