LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING(A)

Accredited by NAAC with Grade A & NBA(ECE,EEE,CSE,IT & Mech.,Under Tier - I)
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 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 – A Sec	**A.Y.**	**:** 2022-23

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	31-01-2023		TLM1	
2.	Overview of Course	1	01-02-2023		TLM2	
3.	CO's Discussion	1	03-02-2023		TLM1	
4.	Introduction	1	04-02-2023		TLM2	
5.	Process for self exploration: Natural Acceptance	1	07-02-2023		TLM.2	
6.	Experiential validation	1	08-02-2023		TLM2	
7.	Continuous Happiness and prosperity	1	10-02-2023		TLM2	
8.	A look at basic human aspirations: Right understanding	1	14-02-2023		TLM2	
9.	Relationship	1	15-02-2023		TLM2	
10.	Physical facility	1	17-02-2023		TLM2	
11.	Understanding Happiness and prosperity	1	21-02-2023		TLM2	
12.	Understanding Happiness and prosperity	1	22-02-2023		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	24-02-2023		TLM2	
14.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	25-02-2023		TLM2	
15.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	28-02-2023		TLM2	
16.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	01-03-2023		TLM2	
17.	Understanding the Body as an instrument of 'I'	1	03-03-2023		TLM2	
18.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	04-03-2023		TLM2	

19.	Understanding the harmony of I with the Body	1	07-03-2023		TLM2	
20.	Sanyam and Health	1	10-03-2023		TLM2	
21.	Correct appraisal of Physical needs	1	11-03-2023		TLM2	
22.	Meaning of prosperity in detail	1	14-03-2023		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	15-03-2023		TLM2	
24.	Program for fulfillment to ensure mutual happiness	1	17-03-2023		TLM2	
25.	Trust and Respect as the foundational values of relationship	1	18-03-2023		TLM2	
26.	Trust and Respect as the foundational values of relationship	1	21-03-2023		TLM2	
27.	Understanding Harmony in the society: Resolution	1	24-03-2023		TLM2	
28.	Review	1	25-03-2023		TLM2	
29.	**I-Mid examinations**					
30.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	04-04-2023		TLM2	
31.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	08-04-2023		TLM2	
32.	Visualizing a universal harmonious order in the society- undivided society	1	11-04-2023		TLM2	
33.	Visualizing a universal harmonious order in the society- undivided society		12-04-2023		TLM2	
34.	Universal order-from family to world family	1	15-04-2023		TLM2	
35.	Gratitude as a universal value in relationships	1	18-04-2023		TLM2	
36.	Review	1	19-04-2023			
No. of classes required to complete UNIT-III: 14				**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
37.	Understanding Harmony in the Nature	1	21-04-2023		TLM2	
38.	Interconnectedness and mutual fulfillment among four orders of	1	25-04-2023		TLM2	

	nature					
39.	Recyclability and self regulation in nature	1	26-04-2023		TLM2	
40.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	28-04-2023		TLM2	
41.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	29-04-2023		TLM2	
42.	Holistic perception of harmony at all levels of existence	1	02-05-2023		TLM2	
43.	Review		03-05-2023			
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
44.	Natural acceptance of human values	1	05-05-2023		TLM2	
45.	Definitiveness of ethical human conduct	1	06-05-2023		TLM2	
46.	Definitiveness of ethical human conduct	1	09-05-2023		TLM2	
47.	Basis for humanistic education	1	10-05-2023		TLM2	
48.	Basis for humanistic education	1	12-05-2023		TLM2	
49.	Humanistic constitution and humanistic universal order	1	16-05-2023		TLM2	
50.	Competence in professional ethics	1	17-05-2023		TLM2	
51.	Competence in professional ethics	1	19-05-2023		TLM2	
52.	Strategy for transition from the present state to universal human order	1	20-05-2023		TLM2	
53.	Strategy for transition from the present state to universal human order	1	23-05-2023		TLM2	
54.	Revision	3	24-05-2023 to 27-05-2023		TLM2	
No. of classes required to complete UNIT-V: 11				**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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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs B.Rajeswari, Sr.Assistant 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.:** 2022-23

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	31-01-2023			
2.	Concept of Control systems, Open loop and Closed loop control systems	1	03-02-2023			
3.	Modeling of Electrical systems	1	04-02-2023			
4.	Modeling of Mechanical systems	1	06-02-2023			
5.	Electrical analogy of Mechanical systems	2	07-02-2023 10-02-2023			
6.	**Tutorial-1**	1	13-02-2023			
7.	Block Diagrams Reduction rules	1	14-02-2023			
8.	Signal Flow Graph Terminology	1	17-02-2023			
9.	SFG Reduction using Masons Gain Formula	2	20-02-2023 21-02-2023			
10.	Feedback System Characteristics	2	24-02-2023 27-02-2023			
11.	**Tutorial-2**	1	25-02-2023			
No. of classes required to complete UNIT-I: 14				**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	28-02-2023			
13.	Time response of first order systems	1	03-03-2023			
14.	**Tutorial-3**	1	04-03-2023			
15.	Response of second order system	1	06-03-2023			
16.	Response of second order for different damping values	2	07-03-2023 10-03-2023			
17.	Time domain specifications	1	13-03-2023			
18.	Steady state errors and error constants.	1	14-03-2023			
19.	Introduction to PI, PD and PID Controllers	1	17-03-2023			
20.	**Tutorial-4**	1	18-03-2023			
No. of classes required to complete UNIT-II: 10				**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
21.	Concepts of stability	1	20-03-2023			
22.	Necessary conditions for Stability	1	21-03-2023			
23.	Routh stability criterion	1	24-03-2023			
24.	Relativestability analysis	1	25-03-2023			
25.	Root Locus Technique	1	03-04-2023			
26.	Construction of root loci	1	04-04-2023			
27.	**Tutorial-5**	1	10-04-2023			
28.	Effects of adding poles and zeros to G(s) H(s) on the root loci.	1	11-04-2023			
No. of classes required to complete UNIT-III: 08				**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
29.	Frequency domain specifications	1	15-04-2023			
30.	Frequency response of standard second order system	1	17-04-2023			
31.	Bode Plot - Frequency domain specifications	1	18-04-2023			
32.	Transfer function from the Bode Plot	1	21-04-2023			
33.	Polar Plot	1	24-04-2023			
34.	**Tutorial-6**	1	25-04-2023			
35.	Nyquist plot- Nyquist Stability criteria	1	28-04-2023			
36.	Introduction to Lag, Lead Compensators	1	29-04-2023			
37.	Lead-Lag Compensator	1	01-05-2023			
38.	**Tutorial-7**	1	02-05-2023			
No. of classes required to complete UNIT-IV: 10				**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
39.	Concept of state variables	1	05-05-2023			
40.	State models for linear and time invariant Systems	1	06-05-2023			
41.	The Transfer Function from the State Equation	1	08-05-2023			
42.	Solution of state equation	1	09-05-2023			
43.	State transition matrix and it's properties	1	12-05-2023			
44.	Computation of state transition matrix using Laplace transformation method	2	15-05-2023 16-05-2023			
45.	**Tutorial-8**	1	19-05-2023			
46.	Concepts of controllability	1	20-05-2023			
47.	observability	1	22-05-2023			
48.	**Tutorial-9**	1	23-05-2023			
49.	**Revision of 5 units**	1	26-05-2023			
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50.	Root Locus Construction using MatLab	1	27-05-2023		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	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

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

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Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi.
L.B.Reddy Nagar, Mylavaram – 521 230, Andhra Pradesh, INDIA.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.E.V.Krishna Rao, Professor and Dean R&D
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 : 2022-23

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, 1stedition, 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

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	31-01-2023		**TLM1**	
2.	Introduction - Block diagram of DSP System, Advantages , Limitations and Applications of DSP	1	01-02-2023		**TLM1**	
3.	Elementary Discrete Time Signals, Representation of Discrete Time Signals	1	03-02-2023		**TLM1**	
4.	Operations on Discrete Time Signals and properties	1	06-02-2023		**TLM1**	
5.	Properties or classifications of Discrete Time Systems	1	07-02-2023		**TLM1**	
6.	Analysis of LTI Systems through LCCDE	1	08-02-2023		**TLM1**	
7.	Analysis of LTI Systems through LCCDE	1	10-02-2023		**TLM1**	
8.	Linear Convolution	1	13-02-2023		**TLM1**	
9.	Linear Convolution	1	14-02-2023		**TLM2**	
10.	DTFT of a Sequence and System	1	15-02-2023		**TLM1**	
11.	DTFT of a Sequence and System	1	17-02-2023		**TLM1**	
12.	Properties of DTFT	1	20-02-2023		**TLM2**	
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
13.	Introduction, Z-Transform of a sequence and ROC – its properties	1	21-02-2023		**TLM1**	
14.	Properties of Z-Transforms	1	22-02-2023		**TLM1**	
15.	Properties of Z-Transforms	1	24-02-2023		**TLM1**	
16.	Inverse Z-Transform	1	27-02-2023		**TLM1**	
17.	Problems on Z-Transforms	1	28-02-2023		**TLM1**	
18.	Problems on Inverse Z-Transforms	1	01-03-2023		**TLM1**	
19.	Analysis of LTI system using Z-transforms	1	03-03-2023		**TLM1**	
20.	Analysis of LTI system using Z-transforms	1	06-03-2023		**TLM1**	
21.	Direct Form-I, Direct Form-II,	1	07-03-2023		**TLM2**	
22.	Cascade Form and Parallel Form for IIR systems	1	10-03-2023		**TLM2**	

23.	Direct Form, Cascade Form and Parallel Form, Linear Phase Realization for FIR systems	1	13-03-2023		**TLM1**	
No. of classes required to complete UNIT-II		**11**	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
24.	Introduction - DFT, Computation of DFT, IDFT, Relation between DTFT and DFT, Twiddle factor – Properties, Problems	1	14-03-2023		**TLM1**	
25.	Properties of DFT	1	15-03-2023		**TLM1**	
26.	Properties of DFT, Problems	1	17-03-2023		**TLM1**	
27.	Linear Convolution and Circular Convolution	1	20-03-2023		**TLM1**	
28.	Circular Convolution through DFT & IDFT, Linear Convolution through DFT & IDFT	1	21-03-2023		**TLM2**	
29.	Revision for Mid Exam	1	24-03-2023		**TLM1**	
30.	Need for FFT	1	03-04-2023		**TLM1**	
31.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	04-04-2023		**TLM2**	
32.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	10-04-2023		**TLM2**	
33.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	11-04-2023		**TLM1**	
34.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	12-04-2023		**TLM1**	
35.	Radix – 2 DIT-FFT Algorithm for IDFT computation.	1	17-04-2023		**TLM1**	
36.	Radix – 2 DIF-FFT Algorithm for IDFT computation	1	18-04-2023		**TLM1**	
37.	Revision	1	19-04-2023		**TLM1**	
No. of classes required to complete UNIT-III			**14**	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
38.	Introduction - Characteristics and Classification of Filters	1	21-04-2023		**TLM1**	
39.	Design of IIR Digital Filter – Impulse Invariant Transformation – Aliasing effect	1	24-04-2023		**TLM1**	
40.	Design of IIR Digital Filter – Bilinear Transformation – Frequency warping	1	25-04-2023		**TLM2**	
41.	Problems on Impulse Invariance and Bilinear Transformation	1	26-04-2023		**TLM1**	
42.	Specifications of Low pass filters , Design of IIR Analog filter using Butterworth Approximations	1	28-04-2023		**TLM1**	

43.	Problems on Butterworth Filter	1	01-05-2023		**TLM1**	
44.	Design of IIR Analog filter using Chebyshev Approximations	1	02-05-2023		**TLM2**	
45.	Problems on Chebyshev Filter	1	03-05-2023		**TLM1**	
46.	Analog Frequency Transformation	1	05-05-2023		**TLM1**	
47.	Problems on Frequency Transformations	1	08-05-2023		**TLM1**	
48.	Revision	1	09-05-2023		**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
49.	Comparisons between IIR and FIR filters, Characteristics of FIR filters with linear phase.	1	10-05-2023		**TLM1**	
50.	Frequency Response Linear Phase FIR filters	1	12-05-2023		**TLM1**	
51.	Frequency Response Linear Phase FIR filters	1	15-05-2023		**TLM1**	
52.	Design of FIR filters using Fourier series method	1	16-05-2023		**TLM2**	
53.	Problems	1	17-05-2023		**TLM1**	
54.	Design of FIR filters using window method and various window(s) characteristics	1	19-05-2023		**TLM1**	
55.	Design of FIR filters using window method and various window(s) characteristics	1	22-05-2023		**TLM2**	
56.	Design of FIR filters using window method and various window(s) characteristics	1	23-05-2023		**TLM1**	
57.	Problems	1	24-05-2023		**TLM1**	
58.	Revision	1	26-05-2023		**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**	26-05-2023		**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.KrishnaRao	Dr.E.V.KrishnaRao	Dr. G L N Murthy	Dr. Y. Amar Babu

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

DEPARTMENT OF ELECTRONICS& COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B. Poornaiah
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 : 2022-23

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	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.	General Interaction	1	01-02-2023		TLM1	
2.	Introduction to Course.Course Outcomes	1	02-02-2023		TLM1	
3.	Elements of a communication system, Need for modulation, Classification of Modulation	1	03-02-2023		TLM3	
4.	Tutorial -I	1	04-02-2023		TLM1	
5.	Amplitude Modulation:Definition, Time and Frequency Domain Representation	1	08-02-2023		TLM1	
6.	Power relations in AM wave, Generation of AM waves using square law modulator, Switching modulator.	1	09-02-2023		TLM1	
7.	Demodulation of AM waves using square law Demodulator, Envelop Detector	1	10-02-2023		TLM1	
8.	Introduction to DSBSC -AM, Time and Frequency domain Representation	1	15-02-2023		TLM2	
9.	Generation of DSBSC wave using Balanced Modulator	1	16-02-2023		TLM1	
10.	Generation of DSBSC using Ring Modulator, Coherent Detection of DSBSC wave	1	17-02-2023		TLM3	
11.	Tutorial -II	1	22-02-2023		TLM1	
12.	Effect of Phase and frequency Errors,Costas Loop	1	23-02-2023		TLM1	
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	24-02-2023		TLM3	

14.	Generation of SSB wave: Filter Method, Phase Discrimination	1	25-02-2023		TLM1	
15.	Tutorial -III	1	01-03-2023		TLM3	
16.	Coherent detection of SSB wave	1	02-03-2023		TLM3	
17.	Effect of Phase and Frequency Error in the detection	1	03-03-2023		TLM1	
18.	Tutorial -IV	1	04-03-2023		TLM3	
19.	Vestigial Side band Modulation: Definition, Time and frequency domain representation	1	09-03-2023		TLM1	
20.	Generation of VSB wave Envelope detection of VSB wave plus carrier	1	10-03-2023		TLM1	
21.	Comparisons of amplitude modulation techniques,Applications of different AM systems	1	11-03-2023		TLM1	
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	16-03-2023		TLM1	
23.	Narrow Band Frequency Modulation: Time and Frequency domain representation	1	17-03-2023		TLM1	
24.	Tutorial -V	1	18-03-2023		TLM3	
25.	Wide band Frequency Modulation Time and Frequency Domain representation	1	23-03-2023		TLM3	
26.	Transmission power and Band width of FM wave	1	24-03-2023		TLM1	
27.	Tutorial -VI	1	25-03-2023		TLM3	
28.	Generation of FM wave: Direct method & Indirect method	1	06-04-2023		TLM1	
29.	Demodulation of FM – frequency Discrimination	1	08-04-2023		TLM3	

	methods: simple slope detector, Balanced slope detector					
30.	Phase Discrimination methods: Foster Seeley Discrimination method, ratio Detector, PLL	1	12-04-2023		TLM1	
31.	Tutorial -VII	1	13-04-2023		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	19-04-2023		TLM1	
33.	FM Transmitter: Reactance tube method, Armstrong method	1	20-04-2023		TLM3	
34.	Radio Receiver introduction and classification	1	21-04-2023		TLM1	
35.	Tutorial-VIII	1	26-04-2023		TLM3	
36.	Tuned Radio Frequency receiver and its limitations	1	27-04-2023		TLM3	
37.	Need of heterodyning AM Super heterodyne Receiver,Frequency Changing and Tracking Concept of IF	1	28-04-2023		TLM3	
38.	Significance of AGC in AM Radio Receivers, Simple AGC, Delayed AGC,FM receiver	1	29-04-2023		TLM1	
39.	Tutorial-IX	1	03-05-2023		TLM3	
No. of classes required to complete UNIT-IV		8		No. of classes taken:		

UNIT-V Noise in Analog Communication Systems& Analog Pulse 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
40.	Definition of Noise in communication system Signal to Noise ratio calculations in AM	1	04-05-2023		TLM3	
41.	Signal to Noise ratio calculations in DSBSC, SSBSC and FM receivers	1	05-05-2023		TLM1	
42.	Threshold Effect, Pre-Emphasis and De Emphasis circuits	1	06-05-2023		TLM2	

43.	Tutorial-10	1	10-05-2023		TLM3	
44.	Introduction to Carrier to Noise Ratio Signal to Interference plus Noise Ratio	1	11-05-2023		TLM3	
45.	Pulse Amplitude Modulation Generation and Demodulation.	1	12-05-2023		TLM1	
46.	Analog Pulse Modulation: Need for Pulse Modulation Types of Pulse analog Modulation,	1	17-05-2023		TLM1	
47.	Tutorial-11	1	18-05-2023		TLM3	
48.	Pulse Width, Pulse Position Modulation Generation and Demodulation	1	19-05-2023		TLM2	
49.	**Multiplexing:** Frequency Division Multiplexing,	1	20-05-2023		TLM1	
50.	Time Division Multiplexing		24-05-2023			
51.	Tutorial-12	1	25-05-2023		TLM3	
No. of classes required to complete UNIT-V:		12		No. of classes taken		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Recent Trends and application areas in Communication	1	26.05.2023		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

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

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India.
Department of ECE

COURSE HANDOUT

PART-A

Name of Course Instructor : M.Sambasiva 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 : 2022-23

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	30-1-2023			
2.	Introduction to Unit-I	1	01-2-2023			
3.	Vector Algebra, Coordinate System	1	02-2-2023			
4.	Vector Calculus	1	03-2-2023			
5.	Coulombs Law & Electric Field Intensity	1	06-2-2023			
6.	Electric Field due to continuous charge distributions	1	08-2-2023			
7.	Electric Flux & Electric Flux Density	1	09-2-2023			
8.	Gauss's Law and Applications	1	10-2-2023			
9.	Electric Potential and Potential Gradient	1	13-2-2023			
10.	Maxwell's two equations for Electrostatic Fields	1	15-2-2023			
11.	Electric Dipole and Dipole Moment	1	16-2-2023			
12.	Electrostatic Energy and Energy Density	1	17-2-2023			
13.	Poisson's and Laplace's Equations	1	20-2-2023			
14.	Capacitance and Different Capacitors	1	22-2-2023			
15.	Problem Solving	1	23-2-2023			
16.	Problem Solving	1	24-2-2023			
No. of classes required to complete UNIT-I		16	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
17.	Magnetic Field Intensity & Biot-Savart's Law	1	27-2-2023			
18.	Ampere's Circuit Law & Applications	1	01-3-2023			
19.	Magnetic Flux & Magnetic Flux Density	1	02-3-2023			
20.	Maxwell's two equations for Magnetostatic Fields	1	03-3-2023			
21.	Magnetic Scalar & Vector Potentials	1	06-3-2023			
22.	Force Due to Magnetic Field	1	09-3-2023			
23.	Magnetic Energy and Energy Density	1	10-3-2023			
24.	Concept of Inductance	1	13-3-2023			
25.	Problem Solving	1	15-3-2023			
26.	Problem Solving	1	16-3-2023			
No. of classes required to complete UNIT-II		10	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
27.	Time varying Fields, Faradays Law, Continuity Equation	1	17-3-2023			
28.	Inconsistency of Ampere's Law, Displacement Current Density	1	20-3-2023			
29.	Time Varying Four Maxwell's Equations	1	23-3-2023			
30.	Boundary Conditions	1	24-3-2023			
No. of classes required to complete UNIT-III(First Half - 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
31.	Introduction to EM Waves-Scalar, Vector Form, Solution of EM Wave Equations	1	03-4-2023			
32.	Intrinsic Impedance, Attenuation and Phase Constants, Loss Tangent, Velocity and Wavelength of EM Wave	1	06-4-2023			
33.	Wave Propagation in Lossy Dielectrics	1	10-4-2023			
34.	Wave Propagation in Lossless Dielectrics	1	12-4-2023			
35.	Wave Propagation in Free Space	1	13-4-2023			
36.	Wave Propagation in Good Conductors	1	17-4-2023			
37.	Polarization-Linear, Circular & Elliptical	1	19-4-2023			
38.	Problem Solving	1	20-4-2023			
39.	Problem Solving	1	21-4-2023			
40.	Problem Solving	1	24-4-2023			
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
41.	Poynting Vector-Time Average Power, Power Loss in a Plane Conductor	1	26-4-2023			
42.	Poynting Theorem	1	27-4-2023			
43.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Dielectric	1	28-4-2023			
44.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Conductor	1	01-5-2023			
45.	Reflection of a Plane Wave at Oblique Incidence– Parallel Polarization	1	03-5-2023			
46.	Reflection of a Plane Wave at Oblique Incidence–Perpendicular Polarization	1	04-5-2023			
47.	Brewster Angle, Critical Angle and Total Internal reflection, Surface Impedance	1	05-5-2023			
48.	Problem Solving	1	08-5-2023			
49.	Problem Solving	1	10-5-2023			
50.	Problem Solving	1	11-5-2023			

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
51.	Types of Transmission Lines, Transmission Lines Equations	1	12-5-2023			
52.	Primary and Secondary Constants of a Transmission Line	1	15-5-2023			
53.	Lossless, Distortion less, Low loss Transmission lines, Concept of Loading	1	17-5-2023			
54.	Input Impedance of a Transmission Line, Reflection Coefficient, VSWR	1	18-5-2023			
55.	Short Circuit, Open Circuit and Matched Lines	1	19-5-2023			
56.	Smith Chart and Applications	1	22-5-2023			
57.	Problem Solving	1	24-5-2023			
58.	Problem Solving	1	25-5-2023			
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
59.	Antenna and Wave Propagation	1	26-5-2023			
60.	Microwaves	1	26-5-2023			

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
M.Sambasiva Reddy	Dr.B.Siva Hari Prasad	Dr.B.Y.V.N.R.Swamy	Dr.Y.Amar Babu

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K.Ravi Kumar/Mr.P. Venkateswara Rao/ Ms.G.Asha/Mr.M.K. Lingamurthy

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.:** 2022-23

PRE REQUISITE: 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

THEORY

S.No	Topics to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CO's, Introduction, Language basics	1	06-02-2023		TLM1	
2.	Variables, Operators, data types, Constructs	2	06-02-2023		TLM1	
3.	Language Basics and Example programs on data types usage	2	13-02-2023		TLM1	
4.	Language Basics and Example programs on loops	1	13-02-2023		TLM1	
5.	Lists in python- introduction, methods and built in functions	1	06-03-2023		TLM1	
6.	Tuples in python- introduction, methods, examples	1	13-03-2023		TLM1	
7.	Sets in python- union, intersection, difference, comparisons, examples	1	20-03-2023		TLM1	
8.	Dictionaries in python- sorting, keys, concatenation, mapping, examples	1	03-04-2023		TLM1	
9.	Functions & Recursions- defining functions in python, examples	2	10-04-2023		TLM1	
10.	Strings in python- different string operations, string length comparisons, examples	1	24-04-2023		TLM1	
11.	Regular expressions in python- checking the validity of string/password, examples	1	01-05-2023		TLM1	
12.	Matplotlib Library in python- line, plot, multiple plots, bar chart, examples,pie chart, scatter plot, examples	1	08-05-2023		TLM1	
Number of classes required:		15	No. of classes conducted:			

LAB

COURSE DELIVERY PLAN (LESSON PLAN)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction: Language Basics and Example Problems	3	20-02-2023		TLM1	
2.	Introduction: Language Basics and Example Problems	3	27-02-2023		TLM4	
3.	Module 1: Exercise Programs on Lists	2	06-03-2023		TLM4	
4.	Module 2: Exercise Programs on Tuples	2	13-03-2023		TLM4	
5.	Module 3: Exercise Programs on Sets	2	20-03-2023		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	2	03-04-2023		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	4	10-04-2023 17-04-2023		TLM4	
8.	Module 6: Exercise Programs on Strings	2	24-04-2023		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	2	01-05-2023		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	2	08-05-2023		TLM4	
11.	Internal Lab Exam	3	22-05-2023		-	
No. of classes required to complete - 27				**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.	Signal processing application using python	3	15-05-2023		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:

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	**Dr.K.Ravi Kumar**	**Dr.K.Ravi Kumar**	**Dr. B.Poornaiah**	**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 : Mr. M K Linga Murthy / Mrs. B Rajeswari
Mr. M Siva Sankara Rao / Dr. E V Krishna 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- A **A.Y :** 2022-23

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-A
Wednesday – 21761A0401 to 21761A0464 & 22765A0401 to 22765A0408

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	02.02.2023			
Cycle – I – MATLAB Software							
1	Generation of Discrete Time (DT) signals	CO1	3	09.02.2023			
1	Operations on DT signals	CO1	3	16.02.2023			
2	Linear Convolution	CO2	3	23.02.2023			
3	Circular Convolution	CO2	3	02.03.2023			
4	Computation of N-Point DFT and IDFT.	CO2	3	09.03.2023			
5	Linear and Circular Convolution Using DFT & IDFT	CO2	3	16.03.2023			
6	Power Spectral Density for sinusoidal signal.	CO2	3	23.03.2023			
7	Design of Digital IIR butter worth filter using Bi-linear Transformation.	CO3	3	06.04.2023			
8	Design of Digital IIR Chebyshev filter using Bi-linear Transformation	CO3	3	13.04.2023			
9	Design of FIR filters using window techniques	CO3	3	20.04.2023			
Cycle – II - Code Composer Studio Simulation Software and DSPProcessors							
10	Linear Convolution	CO2	3	27.04.2023			
11	Circular Convolution	CO2	3	04.05.2023			
12	Computation DFT.	CO2	3	11.05.2023			
--	Content Beyond the Experiment	--	3	18.05.2023			
--	Internal Lab Examination	--	3	25.05.2023			
No. of classes required to complete Lab			**48**	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.

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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: 01.02.2023

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M K Linga Murthy	Mr. M Siva Sankara Rao	Dr. G L N Murthy	Dr. Y Amar Babu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

COURSE HANDOUT

Part-A

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

ACADEMIC YEAR : 2022-23

COURSE NAME & CODE : Analog Communications Lab – 20EC56

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

COURSE CREDITS : 1

COURSE INSTRUCTOR : Dr.B. Poornaiah / Mrs. M.V.L.Bhavani / Mr.Ch. Siva Rama Krishna

COURSE COORDINATOR : Dr. GLN 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	31-01-2023		-	TLM1	
2	Experiments-1	3	07-02-2023		CO1, CO3, CO4	TLM4	
3	Experiment-2	3	14-02-2023		CO1, CO3, CO4	TLM4	
4	Experiment-3	3	21-02-2023		CO1, CO3, CO4		
5	Experiment -4	3	28-02-2023		CO1, CO3, CO4	TLM4	
6	Experiment-9	3	07-03-2023		CO1, CO3, CO4	TLM4	
7	Experiment-10	3	14-03-2023		CO1, CO3, CO4	TLM4	
8	Experiment-5	3	21-03-2023		CO2, CO3, CO4	TLM4	
9	Experiment-6	3	04-04-2023		CO2, CO3, CO4	TLM4	
10	Experiment-7	3	11-04-2023		CO2, CO3, CO4	TLM4	
11	Experiment-8	3	18-04-2023		CO2, CO3, CO4	TLM4	
12	Experiment-11	3	25-04-2023		CO2, CO3, CO4	TLM4	
13	Revision	3	02-05-2023		CO1, CO3, CO4		
14	Experiment beyond content	3	09-05-2023			TLM4	
15	Internal exam	3	16-05-2023				

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	04-02-2023		-	TLM1	
2	Experiments-1	3	25-02-2023		CO1, CO3, CO4	TLM4	
3	Experiment-2	3	04-03-2023		CO1, CO3, CO4	TLM4	
4	Experiment-3	3	11-03-2023		CO1, CO3, CO4		
5	Experiment -4	3	18-03-2023		CO1, CO3, CO4	TLM4	
6	Experiment-9	3	25-03-2023		CO1, CO3, CO4	TLM4	
7	Experiment-10	3	08-04-2023		CO1, CO3, CO4	TLM4	
8	Experiment-5	3	15-04-2023		CO2, CO3, CO4	TLM4	
9	Experiment-6	3	29-04-2023		CO2, CO3, CO4	TLM4	
10	Experiment-7	3	06-05-2023		CO2, CO3, CO4	TLM4	
11	Experiment-8	3	13-05-2023		CO2, CO3, CO4	TLM4	
12	Experiment-11	3	20-04-2023		CO2, CO3, CO4	TLM4	
13	Internal exam	3	27-05-2023				

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**

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.
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.
PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the 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.B.Poornaiah	Dr.GLN Murthy	Dr.M.V.Sudhakar	Dr.Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD

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Phone: 08659-222933, Fax: 08659-222931

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 – B Sec	**A.Y.**	**:** 2022-23

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	31-01-2023		TLM1	
2.	Overview of Course	1	03-02-2023		TLM2	
3.	CO's Discussion	1	04-02-2023		TLM1	
4.	Introduction	1	06-02-2023		TLM2	
5.	Process for self exploration: Natural Acceptance	1	07-02-2023		TLM.2	
6.	Experiential validation	1	10-02-2023		TLM2	
7.	Continuous Happiness and prosperity	1	13-02-2023		TLM2	
8.	A look at basic human aspirations: Right understanding	1	14-02-2023		TLM2	
9.	Relationship	1	17-02-2023		TLM2	
10.	Physical facility	1	20-02-2023		TLM2	
11.	Understanding Happiness and prosperity	1	21-02-2023		TLM2	
12.	Understanding Happiness and prosperity	1	24-02-2023		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	25-02-2023		TLM2	
14.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	27-02-2023		TLM2	
15.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	28-02-2023		TLM2	
16.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	03-03-2023		TLM2	
17.	Understanding the Body as an instrument of 'I'	1	04-03-2023		TLM2	
18.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	06-03-2023		TLM2	

19.	Understanding the harmony of I with the Body	1	07-03-2023		TLM2	
20.	Sanyam and Health	1	10-03-2023		TLM2	
21.	Correct appraisal of Physical needs	1	11-03-2023		TLM2	
22.	Meaning of prosperity in detail	1	13-03-2023		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	14-03-2023		TLM2	
24.	Program for fulfillment to ensure mutual happiness	1	17-03-2023		TLM2	
25.	Trust and Respect as the foundational values of relationship	1	18-03-2023		TLM2	
26.	Trust and Respect as the foundational values of relationship	1	20-03-2023		TLM2	
27.	Understanding Harmony in the society: Resolution	1	21-03-2023		TLM2	
28.	Understanding Harmony in the society: Resolution	1	24-03-2023		TLM2	
29.	Review	1	25-03-2023		TLM2	
30.	**I-Mid examinations**					
31.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	03-04-2023		TLM2	
32.	Prosperity, fearlessness and co-existence as comprehensive human goals	1	04-04-2023		TLM2	
33.	Visualizing a universal harmonious order in the society- undivided society	1	08-04-2023		TLM2	
34.	Visualizing a universal harmonious order in the society- undivided society		10-04-2023		TLM2	
35.	Universal order-from family to world family	1	11-04-2023		TLM2	
36.	Gratitude as a universal value in relationships	1	15-04-2023		TLM2	
37.	Review	1	17-04-2023			
No. of classes required to complete UNIT-III: 14				**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
38.	Understanding Harmony in the Nature	1	18-04-2023		TLM2	

39.	Interconnectedness and mutual fulfillment among four orders of nature	1	21-04-2023		TLM2	
40.	Recyclability and self regulation in nature	1	24-04-2023		TLM2	
41.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	25-04-2023		TLM2	
42.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	28-04-2023		TLM2	
43.	Holistic perception of harmony at all levels of existence	1	29-04-2023		TLM2	
44.	Review		01-05-2023			
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
45.	Natural acceptance of human values	1	02-05-2023		TLM2	
46.	Definitiveness of ethical human conduct	1	05-05-2023		TLM2	
47.	Definitiveness of ethical human conduct	1	06-05-2023		TLM2	
48.	Basis for humanistic education	1	08-05-2023		TLM2	
49.	Basis for humanistic education	1	09-05-2023		TLM2	
50.	Humanistic constitution and humanistic universal order	1	12-05-2023		TLM2	
51.	Competence in professional ethics	1	15-05-2023		TLM2	
52.	Competence in professional ethics	1	16-05-2023		TLM2	
53.	Strategy for transition from the present state to universal human order	1	19-05-2023		TLM2	
54.	Strategy for transition from the present state to universal human order	1	20-05-2023		TLM2	
55.	Revision	3	22-05-2023 to 27-05-2023		TLM2	
No. of classes required to complete UNIT-V: 11				**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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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.P.Venkateswara Rao, Assistant 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.:** 2022-23

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	01-02-2023			
2.	Concept of Control systems, Open loop and Closed loop control systems	1	03-02-2023			
3.	Modeling of Electrical systems	1	04-02-2023			
4.	Modeling of Mechanical systems	1	06-02-2023			
5.	Electrical analogy of Mechanical systems	2	08-02-2023 10-02-2023			
6.	**Tutorial-1**	1	11-02-2023			
7.	Block Diagrams Reduction rules	1	13-02-2023			
8.	Signal Flow Graph Terminology	1	15-02-2023			
9.	SFG Reduction using Masons Gain Formula	2	17-02-2023 20-02-2023			
10.	Feedback System Characteristics	2	22-02-2023 24-02-2023			
11.	**Tutorial-2**	1	25-02-2023			
No. of classes required to complete UNIT-I: 14				**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	27-02-2023			
13.	Time response of first order systems	1	01-03-2023			
14.	Response of second order system	1	03-03-2023			
15.	**Tutorial-3**	1	04-03-2023			
16.	Response of second order for different damping values	2	06-03-2023 10-03-2023			
17.	Time domain specifications	1	13-03-2023			
18.	Steady state errors and error constants.	1	15-03-2023			
19.	Introduction to PI, PD and PID Controllers	1	17-03-2023			
20.	**Tutorial-4**	1	18-03-2023			
No. of classes required to complete UNIT-II: 10				**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
21.	Concepts of stability	1	20-03-2023			
22.	Necessary conditions for Stability	1	24-03-2023			
23.	Routh stability criterion	1	25-03-2023			
24.	Relativestability analysis	1	03-04-2023			
25.	Root Locus Technique	1	10-04-2023			
26.	Construction of root loci	1	12-04-2023			
27.	**Tutorial-5**	1	15-04-2023			
28.	Effects of adding poles and zeros to G(s) H(s) on the root loci.	1	17-04-2023			
No. of classes required to complete UNIT-III: 08				**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
29.	Frequency domain specifications	1	19-04-2023			
30.	Frequency response of standard second order system	1	21-04-2023			
31.	Bode Plot - Frequency domain specifications	1	24-04-2023			
32.	Transfer function from the Bode Plot	1	26-04-2023			
33.	Polar Plot	1	28-04-2023			
34.	**Tutorial-6**	1	29-04-2023			
35.	Nyquist plot- Nyquist Stability criteria	1	01-05-2023			
36.	Introduction to Lag, Lead Compensators	1	03-05-2023			
37.	Lead-Lag Compensator	1	05-05-2023			
38.	**Tutorial-7**	1	06-05-2023			
No. of classes required to complete UNIT-IV: 11				**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
39.	Concept of state variables	1	08-05-2023			
40.	State models for linear and time invariant Systems	1	10-05-2023			
41.	The Transfer Function from the State Equation	1	12-05-2023			
42.	Solution of state equation	1	15-05-2023			
43.	State transition matrix and it's properties	1	17-05-2023			
44.	Computation of state transition matrix using Laplace transformation method	1	19-05-2023			
45.	**Tutorial-8**	1	20-05-2023			
46.	Concepts of controllability	1	22-05-2023			
47.	observability	1	24-05-2023			
48.	**Tutorial-9**	1	26-05-2023			
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50.	Root Locus Construction using MatLab	1	27-05-2023		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	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Date:

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.P.Venkateswara Rao**	**Mrs.B.Rajeswari**	**Dr. G. L N Murthy**	**Dr. Y. Amar Babu**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING(Autonomous)
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Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi.
L.B.Reddy Nagar, Mylavaram – 521 230, Andhra Pradesh, INDIA.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.E.V.Krishna Rao Professor and Dean R&D
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 : 2022-23

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, 1stedition, 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 **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	31-01-2023		**TLM1**	
2.	Introduction - Block diagram of DSP System, Advantages , Limitations and Applications of DSP	1	01-02-2023		**TLM1**	
3.	Elementary Discrete Time Signals, Representation of Discrete Time Signals	1	02-02-2023		**TLM1**	
4.	Operations on Discrete Time Signals	1	03-02-2023		**TLM1**	
5.	Properties or classifications of Discrete Time Signals	1	07-02-2023		**TLM1**	
6.	Properties or classifications of Discrete Time Systems	1	08-02-2023		**TLM1**	
7.	Analysis of LTI Systems through LCCDE	1	09-02-2023		**TLM1**	
8.	Analysis of LTI Systems through LCCDE	1	10-02-2023		**TLM1**	
9.	Linear Convolution	1	14-02-2023		**TLM1**	
10.	Linear Convolution	1	15-02-2023		**TLM2**	
11.	DTFT of a Sequence and System	1	16-02-2023		**TLM1**	
12.	DTFT of a Sequence and System	1	17-02-2023		**TLM1**	
13.	Properties of DTFT	1	21-02-2023		**TLM1**	
No. of classes required to complete UNIT-I		**13**	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
14.	Introduction, Z-Transform of a sequence and ROC – its properties	1	22-02-2023		**TLM1**	
15.	Properties of Z-Transforms	1	23-02-2023		**TLM1**	
16.	Properties of Z-Transforms	1	24-02-2023		**TLM1**	
17.	Inverse Z-Transform	1	28-02-2023		**TLM1**	
18.	Problems on Z-Transforms	1	01-03-2023		**TLM1**	
19.	Problems on Inverse Z-Transforms	1	02-03-2023		**TLM1**	
20.	Analysis of LTI system using Z-transforms	1	03-03-2023		**TLM1**	
21.	Analysis of LTI system using Z-transforms	1	07-03-2023		**TLM1**	
22.	Direct Form-I, Direct Form-II,	1	09-03-2023		**TLM2**	
23.	Cascade Form and Parallel Form for IIR systems	1	10-03-2023		**TLM2**	

24.	Direct Form, Cascade Form and Parallel Form, Linear Phase Realization for FIR systems	1	14-03-2023		**TLM1**	
No. of classes required to complete UNIT-II		**11**	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
25.	Introduction - DFT, Computation of DFT, IDFT, Relation between DTFT and DFT, Twiddle factor – Properties, Problems	1	15-03-2023		**TLM1**	
26.	Properties of DFT	1	16-03-2023		**TLM2**	
27.	Properties of DFT, Problems	1	17-03-2023		**TLM1**	
28.	Linear Convolution and Circular Convolution	1	21-03-2023		**TLM1**	
29.	Linear Convolution and Circular Convolution	1	23-03-2023		**TLM1**	
30.	Circular Convolution through DFT & IDFT, Linear Convolution through DFT & IDFT	1	24-03-2023		**TLM2**	
31.	Need for FFT	1	04-04-2023		**TLM1**	
32.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	06-04-2023		**TLM2**	
33.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	11-04-2023		**TLM2**	
34.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	12-04-2023		**TLM1**	
35.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	13-04-2023		**TLM1**	
36.	Radix – 2 DIT-FFT Algorithm for IDFT computation.	1	18-04-2023		**TLM1**	
37.	Radix – 2 DIF-FFT Algorithm for IDFT computation	1	19-04-2023		**TLM1**	
38.	Revision	1	20-04-2023		**TLM1**	
No. of classes required to complete UNIT-III			**14**	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
39.	Introduction - Characteristics and Classification of Filters	1	21-04-2023		**TLM1**	
40.	Design of IIR Digital Filter – Impulse Invariant Transformation – Aliasing effect	1	25-04-2023		**TLM2**	
41.	Design of IIR Digital Filter – Bilinear Transformation – Frequency warping	1	26-04-2023		**TLM2**	
42.	Problems on Impulse Invariance and Bilinear Transformation	1	27-04-2023		**TLM1**	
43.	Specifications of Low pass filters , Design of IIR Analog filter using Butterworth Approximations	1	28-04-2023		**TLM1**	

44.	Problems on Butterworth Filter	1	02-05-2023		**TLM1**	
45.	Design of IIR Analog filter using Chebyshev Approximations	1	03-05-2023		**TLM2**	
46.	Problems on Chebyshev Filter	1	04-05-2023		**TLM1**	
47.	Analog Frequency Transformation	1	05-05-2023		**TLM1**	
48.	Problems on Frequency Transformations	1	09-05-2023		**TLM1**	
49.	Revision	1	10-05-2023		**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
50.	Comparisons between IIR and FIR filters, Characteristics of FIR filters with linear phase.	1	11-05-2023		**TLM1**	
51.	Frequency Response Linear Phase FIR filters	1	12-05-2023		**TLM1**	
52.	Frequency Response Linear Phase FIR filters	1	16-05-2023		**TLM2**	
53.	Design of FIR filters using Fourier series method	1	17-05-2023		**TLM2**	
54.	Problems	1	18-05-2023		**TLM1**	
55.	Design of FIR filters using window method and various window(s) characteristics	1	19-05-2023		**TLM1**	
56.	Design of FIR filters using window method and various window(s) characteristics	1	23-05-2023		**TLM2**	
57.	Design of FIR filters using window method and various window(s) characteristics	1	24-05-2023		**TLM1**	
58.	Problems	1	25-05-2023		**TLM1**	
59.	Revision	1	26-05-2023		**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**	26-05-2023		**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.KrishnaRao	Dr.E.V.KrishnaRao	Dr. G L N Murthy	Dr. Y. Amar Babu

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

DEPARTMENT OF ELECTRONICS& COMMUNICATION ENGINEERING

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 : 2022-23

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	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.	General Interaction	1	31.01.2023		TLM1	
2.	Introduction to Course. Course Outcomes	1	01.02.2023		TLM1	
3.	Elements of a communication system, Need for modulation, Classification of Modulation	1	02.02.2023		TLM1	
4.	Amplitude Modulation: Definition, Time and Frequency Domain Representation	1	04.02.2023		TLM3	
5.	Tutorial -I	1	07.02.2023		TLM1	
6.	Power relations in AM wave, Generation of AM waves using square law modulator, Switching modulator.	1	08.02.2023		TLM1	
7.	Demodulation of AM waves using square law Demodulator, Envelop Detector	1	09.02.2023		TLM1	
8.	Introduction to DSBSC -AM, Time and Frequency domain Representation	1	14.02.2023		TLM1	
9.	Generation of DSBSC wave using Balanced Modulator	1	15.02.2023		TLM1	
10.	Generation of DSBSC using Ring Modulator, Coherent Detection of DSBSC wave	1	16.02.2023		TLM1	
11.	Tutorial -II	1	21.02.2023		TLM3	
12.	Effect of Phase and frequency Errors, Costas Loop	1	22.02.2023		TLM1	
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	23.02.2023		TLM1	
14.	Generation of SSB wave: Filter Method, Phase Discrimination	1	25.02.2023		TLM1	
15.	Tutorial -III	1	28.02.2023		TLM3	
16.	Coherent detection of SSB wave	1	01.03.2023		TLM1	
17.	Effect of Phase and Frequency Error in the detection	1	02.03.2023		TLM1	
18.	Tutorial -IV	1	04.03.2023		TLM3	
19.	Vestigial Side band Modulation: Definition, Time and frequency domain representation	1	07.03.2023		TLM1	
20.	Generation of VSB wave Envelope detection of VSB wave plus carrier	1	09.03.2023		TLM1	
21.	Comparisons of amplitude modulation techniques, Applications of different AM systems	1	14.03.2023		TLM1	
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	15.03.2023		TLM1	
23.	Narrow Band Frequency Modulation: Time and Frequency domain representation	1	16.03.2023		TLM1	
24.	Tutorial -V	1	18.03.2023		TLM3	

25.	Wide band Frequency Modulation Time and Frequency Domain representation	1	21.03.2023		TLM3	
26.	Transmission power and Band width of FM wave	1	23.03.2023		TLM1	
27.	Tutorial -VI	1	25.03.2023		TLM3	
28.	Generation of FM wave: Direct method & Indirect method	2	04.04.2023 06.04.2023		TLM1	
29.	Demodulation of FM – frequency Discrimination methods: simple slope detector, Balanced slope detector	1	11.04.2023		TLM1	
30.	Phase Discrimination methods: Foster Seeley Discrimination method	1	12.04.2023		TLM1	
31.	Ratio Detector, PLL	1	13.04.2023		TLM1	
32.	Tutorial -VII	1	15.04.2023		TLM3	
No. of classes required to complete UNIT-III		12	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
33.	Radio transmitter introduction and classification AM transmitters-low level and high level	1	18.04.2023		TLM1	
34.	FM Transmitter: Reactance tube method, Armstrong method	1	19.04.2023		TLM1	
35.	Radio Receiver introduction and classification	1	20.04.2023		TLM1	
36.	Tutorial-VIII	1	25.04.2023		TLM3	
37.	Tuned Radio Frequency receiver and its limitations	1	26.04.2023		TLM1	
38.	Need of heterodyning AM Super heterodyne Receiver ,Frequency Changing and Tracking Concept of IF	1	27.04.2023		TLM1	
39.	Significance of AGC in AM Radio Receivers, Simple AGC, Delayed AGC	1	29.04.2023		TLM1	
40.	FM receiver	1	02.05.2023		TLM1	
41.	Tutorial-IX	1	03.05.2023		TLM3	
No. of classes required to complete UNIT-IV		9	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	04.05.2023		TLM1	
41.	Signal to Noise ratio calculations in DSBSC, SSBSC and FM receivers	1	06.05.2023		TLM1	
42.	Threshold Effect, Pre-Emphasis and De Emphasis circuits	1	09.05.2023		TLM1	
43.	Tutorial-10	1	10.05.2023		TLM3	
44.	Introduction to Carrier to Noise Ratio Signal to Interference plus Noise Ratio	1	11.05.2023		TLM1 TLM2	
45.	Pulse Amplitude Modulation Generation and Demodulation.	1	16.05.2023		TLM1	
46.	Analog Pulse Modulation: Need for Pulse Modulation Types of Pulse analog Modulation,	1	17.05.2023		TLM1	
47.	Tutorial-11	1	18.05.2023		TLM3	
48.	Pulse Width, Pulse Position Modulation Generation and Demodulation	1	20.05.2023		TLM1 TLM2	
49.	**Multiplexing:** Frequency Division Multiplexing, Time Division Multiplexing	2	23.05.2023 24.05.2023		TLM1	
50.	Tutorial-12	1	25.05.2023		TLM3	
No. of classes required to complete UNIT-V:		12	No. of classes taken			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Recent Trends and application areas in Communication	1	27.05.2023		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

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	Mrs.M.V.L.Bhavani	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India.
Department of ECE

COURSE HANDOUT

PART-A

Name of Course Instructor : Prof.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 : 2022-23

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	30-1-2023			
2.	Introduction to Unit-I	1	31-1-2023			
3.	Vector Algebra, Coordinate System	1	01-2-2023			
4.	Vector Calculus	1	02-2-2023			
5.	Coulombs Law & Electric Field Intensity	1	06-2-2023			
6.	Electric Field due to continuous charge distributions	1	07-2-2023			
7.	Electric Flux & Electric Flux Density	1	08-2-2023			
8.	Gauss's Law and Applications	1	09-2-2023			
9.	Electric Potential and Potential Gradient	1	13-2-2023			
10.	Maxwell's two equations for Electrostatic Fields	1	14-2-2023			
11.	Electric Dipole and Dipole Moment	1	15-2-2023			
12.	Electrostatic Energy and Energy Density	1	16-2-2023			
13.	Poisson's and Laplace's Equations	1	20-2-2023			
14.	Capacitance and Different Capacitors	1	21-2-2023			
15.	Problem Solving	1	22-2-2023			
16.	Problem Solving	1	23-2-2023			
No. of classes required to complete UNIT-I		16	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
17.	Magnetic Field Intensity & Biot-Savart's Law	1	27-2-2023			
18.	Ampere's Circuit Law & Applications	1	28-2-2023			
19.	Magnetic Flux & Magnetic Flux Density	1	01-3-2023			
20.	Maxwell's two equations for Magnetostatic Fields	1	02-3-2023			
21.	Magnetic Scalar & Vector Potentials	1	06-3-2023			
22.	Force Due to Magnetic Field	1	07-3-2023			
23.	Magnetic Energy and Energy Density	1	09-3-2023			
24.	Concept of Inductance	1	13-3-2023			
25.	Problem Solving	1	14-3-2023			
26.	Problem Solving	1	15-3-2023			
No. of classes required to complete UNIT-II		10	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
27.	Time varying Fields, Faradays Law, Continuity Equation	1	16-3-2023			
28.	Inconsistency of Ampere's Law, Displacement Current Density	1	20-3-2023			
29.	Time Varying Four Maxwell's Equations	1	21-3-2023			
30.	Boundary Conditions	1	23-3-2023			
No. of classes required to complete UNIT-III(First Half - 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
31.	Introduction to EM Waves-Scalar, Vector Form, Solution of EM Wave Equations	1	03-4-2023			
32.	Intrinsic Impedance, Attenuation and Phase Constants, Loss Tangent, Velocity and Wavelength of EM Wave	1	04-4-2023			
33.	Wave Propagation in Lossy Dielectrics	1	06-4-2023			
34.	Wave Propagation in Lossless Dielectrics	1	10-4-2023			
35.	Wave Propagation in Free Space	1	11-4-2023			
36.	Wave Propagation in Good Conductors	1	12-4-2023			
37.	Polarization-Linear, Circular & Elliptical	1	13-4-2023			
38.	Problem Solving	1	17-4-2023			
39.	Problem Solving	1	18-4-2023			
40.	Problem Solving	1	19-4-2023			
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
41.	Poynting Vector-Time Average Power, Power Loss in a Plane Conductor	1	20-4-2023			
42.	Poynting Theorem	1	24-4-2023			
43.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Dielectric	1	25-4-2023			
44.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Conductor	1	26-4-2023			
45.	Reflection of a Plane Wave at Oblique Incidence– Parallel Polarization	1	27-4-2023			
46.	Reflection of a Plane Wave at Oblique Incidence–Perpendicular Polarization	1	01-5-2023			
47.	Brewster Angle, Critical Angle and Total Internal reflection, Surface Impedance	1	02-5-2023			
48.	Problem Solving	1	03-5-2023			
49.	Problem Solving	1	04-5-2023			
50.	Problem Solving	1	08-5-2023			
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
51.	Types of Transmission Lines, Transmission Lines Equations	1	09-5-2023			
52.	Primary and Secondary Constants of a Transmission Line	1	10-5-2023			
53.	Lossless, Distortion less, Low loss Transmission lines, Concept of Loading	1	11-5-2023			
54.	Input Impedance of a Transmission Line, Reflection Coefficient, VSWR	1	15-5-2023			
55.	Short Circuit, Open Circuit and Matched Lines	1	16-5-2023			
56.	Smith Chart and Applications	1	17-5-2023			
57.	Problem Solving	1	18-5-2023			
58.	Problem Solving	1	22-5-2023			
59.	Problem Solving	1	23-5-2023			
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
60.	Antenna and Wave Propagation	1	24-5-2023			
61.	Microwaves	1	25-5-2023			

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
Prof.B.Ramesh Reddy	Dr.B.Siva Hari Prasad	Dr.B.Y.V.N.R.Swamy	Dr.Y.Amar Babu

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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-B., IV-Sem., SEC-B A.Y : 2022-23

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	30-01-2023		2	
2.	Population explosion and variations among Nations.	1	31-01-2023		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	06-02-2023		2	
4.	Environmental Hazards	1	07-02-2023		2	
5.	Role of Information Technology in environmental management and human health.	1	13-02-2023		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	14-02-2023		2	
2.	Water Resources	1	20-02-2023		2	
3.	Mineral Resources	1	21-02-2023		2	
4.	Food Resources	1	27-02-2023		2	
5.	Food Resources	1	28-02-2023		2	
6.	Food Resources	1	06-03-2023		2	
7.	Energy Resources	1	07-03-2023		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	13-03-2023		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids,	1	14-03-2023		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species, Bio-	1	20-03-2023		2	

	geographical classification of India. India as a mega diversity nation					
4.	Bio-geo-chemical cycles	1	21-03-2023			
5.	**I MID EXAMINATION**	1	27-03-2023			
6.	**I MID EXAMINATION**	1	28-03-2023			
7.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Assignment in Unit II	1	03-04-2023		2	
8.	Man and wild life conflicts. Endangered and endemic species of India	1	04-04-2023		2,3	
9.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	10-04-2023		2	
No. of classes required to complete UNIT-III: 7				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	11-04-2023		2	
2.	Causes, effects and control measures of: Water Pollution	1	17-04-2023		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	18-04-2023			
4.	Noise Pollution		24-04-2023			
5.	Solid Waste Management	1	25-04-2023		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	01-05-2023		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	02-05-2023		2	
2.	Climate disruption- Greenhouse effect, ozone layer depletion and acid rain.	1	08-05-2023		2,3	
3.	Stockholm conference	1	09-05-2023		2	
4.	Environmental Impact Assessment (EIA)		15-05-2023		2	
5.	Green building	1	16-05-2023		2	
6.	Environmental Law	1	22-05-2023		2	
7.	Revision	1	23-05-2023		2,3	
8.	II MID EXAMINATIONS	1	05-06-2023			
9.	II MID EXAMINATIONS	1	06-06-2023			
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 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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L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.P.Venkateswara Rao/Dr.P.Lachi Reddy
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-B Sec	**A.Y.:** 2022-23

PRE REQUISITE: 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

THEORY

S.No	Topics to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CO's, Introduction, Language basics	1	04-02-2023		TLM1	
2.	Variables, Operators, data types, Constructs	2	04-02-2023		TLM1	
3.	Language Basics and Example programs on data types usage	2	11-02-2023		TLM1	
4.	Language Basics and Example programs on loops	1	11-02-2023		TLM1	
5.	Lists in python- introduction, methods and built in functions	1	04-03-2023		TLM1	
6.	Tuples in python- introduction, methods, examples	1	18-03-2023		TLM1	
7.	Sets in python- union, intersection, difference, comparisons, examples	1	25-03-2023		TLM1	
8.	Dictionaries in python- sorting, keys, concatenation, mapping, examples	1	08-04-2023		TLM1	
9.	Functions & Recursions- defining functions in python, examples	1	15-04-2023		TLM1	
10.	Strings in python- different string operations, string length comparisons, examples	1	29-04-2023		TLM1	
11.	Regular expressions in python- checking the validity of string/password, examples	1	06-05-2023		TLM1	
12.	Matplotlib Library in python- line, plot, multiple plots, bar chart, examples,pie chart, scatter plot, examples	1	13-05-2023		TLM1	
Number of classes required:		14	No. of classes conducted:			

LAB

COURSE DELIVERY PLAN (LESSON PLAN)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction: Language Basics and Example Problems	3	25-02-2023		TLM1	
2.	Introduction: Language Basics and Example Problems	2	04-03-2023		TLM4	
3.	Module 1: Exercise Programs on Lists	2	18-03-2023		TLM4	
4.	Module 2: Exercise Programs on Tuples	2	25-03-2023		TLM4	
5.	Module 3: Exercise Programs on Sets	2	08-04-2023		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	2	15-04-2023		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	2	29-04-2023		TLM4	
8.	Module 6: Exercise Programs on Strings	2	06-05-2023		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	2	13-05-2023		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	20-05-2023		TLM4	
11.	Internal Lab Exam	3	27-05-2023		-	
No. of classes required to complete - 25				**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.	Signal processing application using python	3	20-05-2023		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:

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	**Mr.P.Venkateswara Rao**	**Dr.K.Ravi Kumar**	**Dr. B.Poornaiah**	**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 : Mr. M Siva Sankara Rao / Dr. M V Sudhakar / Mr. M K Linga Murthy Mrs. B Rajeswari / Prof. B Ramesh Reddy

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 :** 2022-23

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
Wednesday – 21761A0465 to 21761A04C9 & 22765A0409 to 22765A0415

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	03.02.2023			
Cycle – I – MATLAB Software							
1	Generation of Discrete Time (DT) signals and Operations on DT signals	CO1	3	10.02.2023			
2	Linear Convolution	CO2	3	17.02.2023			
3	and Circular Convolution	CO2	3	24.02.2023			
4	Computation of N-Point DFT and IDFT.	CO2	3	03.03.2023			
5	Linear and Circular Convolution Using DFT & IDFT	CO2	3	10.03.2023			
6	Power Spectral Density for sinusoidal signal.	CO2	3	17.03.2023			
7	Design of Digital IIR butter worth filter using Bi-linear Transformation.	CO3	3	24.03.2023			
8	Design of Digital IIR Chebyshev filter using Bi-linear Transformation	CO3	3	14.04.2023			
9	Design of FIR filters using window techniques	CO3	3	21.04.2023			
Cycle – II - Code Composer Studio Simulation Software and DSPProcessors							
10	Linear Convolution and	CO2	3	28.04.2023			
11	Circular Convolution	CO2	3	05.05.2023			
12	Computation DFT	CO2	3	12.05.2023			
--	Content Beyond the Experiment	--	--	19.05.2023			
--	Internal Lab Examination	--	3	26.05.2023			
No. of classes required to complete Lab			**33**	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: 01.02.2023

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M Siva Sankara Rao	Mr. M Siva Sankara 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 : 2022-23

COURSE NAME & CODE : Analog Communications Lab – 20EC56

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

COURSE CREDITS : 1

COURSE INSTRUCTOR : Dr.G.L.N.Murthy / Mrs.M.V.L.Bhavani/ Mr.Ch.Sivramakrishna

COURSE COORDINATOR : Dr.G.L.N.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	06.02.2023		-	TLM1	
2	Experiments-1	3	13.02.2023		CO1, CO3, CO4	TLM4	
3	Experiment-2	3	20.02.2023		CO1, CO3, CO4	TLM4	
4	Experiment-3	3	27.02.2023		CO1, CO3, CO4	TLM4	
5	Experiment -4	3	06.03.2023		CO1, CO3, CO4	TLM4	
6	Experiment-9	3	13.03.2023		CO1, CO3, CO4	TLM4	
7	Experiment-10	3	20.03.2023		CO1, CO3, CO4	TLM4	
8	Experiment-5	3	03.04.2023		CO2, CO3, CO4	TLM4	
9	Experiment-6	3	10.04.2023		CO2, CO3, CO4	TLM4	
10	Experiment-7	3	17.04.2023		CO2, CO3, CO4	TLM4	
11	Experiment-8	3	24.04.2023		CO2, CO3, CO4	TLM4	
12	Experiment-11	3	01.05.2023		CO2, CO3, CO4	TLM4	
13	Experiment-12	3	08.05.2023		CO2, CO3, CO4	TLM4	
14	Simulation in GNU Radio Content beyond syllabus	3	15.05.2023		-	TLM4	
16	Internal exam	3	22.05.2023		-		

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	01.02.2023		-	TLM1	
2	Experiments-1	3	08.02.2023		CO1, CO3, CO4	TLM4	
3	Experiment-2	3	15.02.2023		CO1, CO3, CO4	TLM4	
4	Experiment-3	3	22.02.2023		CO1, CO3, CO4	TLM4	
5	Experiment -4	3	01.03.2023		CO1, CO3, CO4	TLM4	
6	Experiment-9	3	15.03.2023		CO1, CO3, CO4	TLM4	
7	Experiment-10	3	29.03.2023		CO2, CO3, CO4	TLM4	
8	Experiment-5	3	12.04.2023		CO2, CO3, CO4	TLM4	
9	Experiment-6	3	19.04.2023		CO2, CO3, CO4	TLM4	
10	Experiment-7	3	26.04.2023		CO2, CO3, CO4	TLM4	
11	Experiment-8	3	03.05.2023		CO2, CO3, CO4	TLM4	
12	Experiment-11 & 12	3	10.05.2023		CO2, CO3, CO4	TLM4	
13	Simulation in GNU Radio Content beyond syllabus	3	17.05.2023		-	TLM4	
12	Internal exam	3	24.05.2023		-	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)

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.
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.
PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the 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	Dr.G.L.N.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 : 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- B A.Y : 2022-23

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	02-02-2023		TLM2	
2.	VI and Data operations	1	09-02-2023		TLM2	
3.	VI front and block panel	1	16-02-2023		TLM2	
4.	Data flow programming	1	23-02-2023		TLM2	
5.	Graph programming	1	02-03-2023		TLM2	
6.	Loops, Arrays applications	1	09-03-2023		TLM2	
7.	Concepts of VI& Sub VIs	1	16-03-2023		TLM2	
8.	Applications of sequence structures	1	23-03-2023		TLM2	
9.	Waveforms and Graphs	1	06-04-2023		TLM2	
10.	Applications	1	13-04-2023		TLM2	
11.	Modules	1	20-04-2023		TLM2	
12.	NI Hardware	1	27-04-2023		TLM2	
13.	DAQ Installation and configuration	1	04-05-2023		TLM2	
14.	Applications	1	11-05-2023		TLM2	
15.	DAQ Hardware	1	18-05-2023		TLM2	
16.	Conclusion	1	25-05-2023		TLM2	

PART – B: Monday Batch

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	30-01-2023		TLM2	
2.	Boolean and compound operations	3	06-02-2023		TLM4	
3.	For and while loops	3	13-02-2023		TLM4	
4.	Structures, Timers	3	20-02-2023		TLM4	
5.	Arrays & Clusters	3	27-02-2023		TLM4	
6.	Formula node, Sub VI	3	06-03-2023		TLM4	
7.	Files	3	13-03-2023		TLM4	
8.	DAQ – installation, Application	3	20-03-2023		TLM4	
9.	Analog applications	3	03-04-2023		TLM4	
10.	Digital applications	3	10-04-2023		TLM4	
11.	Discussion of Models & Demo	3	17-04-2023		TLM2	
12.	Discussion of Models & Demo	3	24-04-2023		TLM2	

13.	Discussion of Models & Demo	3	01-05-2023		TLM2	
14.	Discussion of Models & Demo	3	08-05-2023		TLM2	
15.	Conclusion of Models & Reports	3	18-05-2023		TLM2	
16.	Documentation Verification	3	22-05-2023		TLM6	
17.	Documentation Verification	3	29-05-2023		TLM6	

PART B – Wednesday Batch

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Virtual Instruments, Cos, Numeric	3	01-02-2023		TLM2	
2.	Boolean and compound operations	3	08-02-2023		TLM4	
3.	For and while loops	3	15-02-2023		TLM4	
4.	Structures, Timers	3	22-02-2023		TLM4	
5.	Arrays & Clusters	3	01-03-2023		TLM4	
6.	Formula node, Sub VI	3	08-03-2023		TLM4	
7.	Files	3	15-03-2023		TLM4	
8.	DAQ – installation, Application	3	12-04-2023		TLM4	
9.	Analog applications	3	19-04-2023		TLM4	
10.	Digital applications	3	26-04-2023		TLM4	
11.	Discussion of Models & Demo	3	03-05-2023		TLM2	
12.	Discussion of Models & Demo	3	10-06-2023		TLM2	
13.	Conclusion of Models & Reports	3	17-06-2023		TLM2	
14.	Documentation Verification	3	24-06-2023		TLM6	
15.	Documentation Verification	3	31-06-2023		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 P. Rakesh Kumar	Dr P. Rakesh Kumar	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. 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-C A.Y : 2022-23

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	07-03-22		**TLM1**	
2.	Need, Basic Guidelines, Content and Process for Value Education	1	08-03-22		**TLM1**	
3.	Natural Acceptance' and Experiential Validation- as the process for self-exploration	1	11-03-22		**TLM1**	
4.	Continuous Happiness and Prosperity	1	14-03-22		**TLM1**	
5.	Basic Human Aspirations	1	15-03-22		**TLM1**	
6.	Right understanding	1	21-03-22		**TLM1**	
7.	Relationship and Physical Facility	1	22-03-22		**TLM1**	
8.	Understanding Happiness and Prosperity	1	25-03-22		**TLM1**	
No. of classes required to complete UNIT-I:		**08**	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	28-03-22		**TLM2**	
2.	Understanding human being as a co-existence of the sentient 'I' and the material 'Body'	1	29-03-22		**TLM2**	
3.	Understanding the needs of Self ('I') and 'Body' - happiness and physical facility	1	01-04-22		**TLM2**	
4.	Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)	1	04-04-22		**TLM2**	
5.	Understanding the characteristics and activities of 'I' and harmony in 'I	1	08-04-22		**TLM2**	
6.	Understanding the harmony of I with the Body: Sanyam and Health	1	11-04-22		**TLM2**	
7.	Correct appraisal of Physical needs, meaning of Prosperity in detail	1	12-04-22		**TLM2**	
No. of classes required to complete UNIT-II:		**07**	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	18-04-22		**TLM2**	
2.	Meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness	1	19-04-22		**TLM2**	
3.	Trust and Respect as the foundational values of relationship	1	22-04-22		**TLM2**	
4.	Understanding the harmony in the	1	02-05-22			

	society: Resolution, Prosperity					
5.	Understanding the harmony in the society: fearlessness and co-existence as comprehensive Human Goals	1	06-05-22		**TLM2**	
6.	Visualizing a universal harmonious order in society- Undivided Society	1	09-05-22		**TLM2**	
7.	Universal Order- from family to world family, Gratitude as a universal value in relationships	1	10-05-22		**TLM2**	
8.	**Revision**	1	13-05-22			
No. of classes required to complete UNIT-III:		**08**	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	16-05-22		**TLM2**	
2.	Inter connectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature	1	17-05-22		**TLM2**	
3.	Understanding Existence as Co-existence of mutually interacting units in all-pervasive space	1	20-05-22		**TLM2**	
4.	Holistic perception of harmony at all levels of existence	1	23-05-22		**TLM2**	
5.	**Revision**	1	24-05-22		**TLM2**	
6.	**Revision**	1	27-05-22			
No. of classes required to complete UNIT-IV:		**06**	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	30-05-22		**TLM2**	
2.	Basis for Humanistic Education	1	31-05-22		**TLM2**	
3.	Humanistic Constitution and Humanistic Universal Order	1	03-06-22		**TLM2**	
4.	Competence in professional ethics	1	06-06-22		**TLM2**	
5.	Strategy for transition from the present state to Universal Human Order	1	07-06-22		**TLM2**	
6.	Revision	1	10-06-22		**TLM2**	
7.	**Revision**	1	13-06-22		**TLM2**	
8.	Overall review	1	14-06-22			
No. of classes required to complete UNIT-V:		**08**	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.		18-06-22				

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 (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: 31-01-2023

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF ECE

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-C Sec	**A.Y.:** 2021-22

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 withthe 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	07-03-2022			
2.	Concept of Control systems, Open loop and Closed loop control systems	1	08-03-2022			
3.	Modeling of Electrical systems	1	10-03-2022			
4.	Modeling of Mechanical systems	1	11-03-2022			
5.	Electrical analogy of Mechanical systems	1	14-03-2022			
6.	**Tutorial-1**	1	15-03-2022			
7.	Block Diagrams Reduction rules	1	17-03-2022			
8.	Signal Flow Graph Terminology	1	21-03-2022			
9.	**Tutorial-2**	1	22-03-2022			
10.	SFG Reduction using Masons Gain Formula	1	24-03-2022			
11.	Feedback Control System Characteristics	1	25-03-2022			
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	28-03-2022			
13.	Time response of first order systems	1	29-03-2022			
14.	Response of second order system	1	31-03-2022			
15.	Response of second order for different damping values	1	01-04-2022			
16.	Time domain specifications	1	04-04-2022			
17.	**Tutorial-3**	1	07-04-2022			
18.	Steady state errors	1	08-04-2022			

	and error constants.					
19.	Introduction to PI, PD and PID Controllers	1	11-04-2022			
20.	**Tutorial-4**	1	12-04-2022			
No. of classes required to complete UNIT-II: 09				**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
21.	Concepts of stability	1	18-04-2022			
22.	Necessary conditions for Stability	1	19-04-2022			
23.	Routh stability criterion	1	21-04-2022			
24.	Relativestability analysis	1	22-04-2022			
25.	**Tutorial-5**	1	02-05-2022			
26.	Root Locus Technique	1	05-05-2022			
27.	Construction of root loci	1	06-05-2022			
28.	Effects of adding poles and zeros to G(s) H(s) on the root loci.	1	09-05-2022			
29.	**Tutorial-6**	1	10-05-2022			
No. of classes required to complete UNIT-III: 09				**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
30.	Frequency domain specifications	1	12-05-2022			
31.	Frequency response of standard second order system	1	13-05-2022			
32.	Bode Plot - Frequency domain specifications	1	16-05-2022			
33.	**Tutorial-7**	1	17-05-2022			
34.	Transfer function from the Bode Plot	1	19-05-2022			
35.	Polar Plot	1	20-05-2022			
36.	Nyquist plot- Nyquist Stability criteria	2	23-05-2022 24-05-2022			
37.	**Tutorial-8**	1	26-05-2022			
38.	Introduction to Lag, Lead Compensators	1	27-05-2022			
39.	Lead-Lag Compensator	1	30-05-2022			
No. of classes required to complete UNIT-IV: 11				**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
40.	Concept of state variables	1	31-05-2022			
41.	State models for linear and time invariant Systems	1	02-06-2022			
42.	The Transfer Function from the State Equation	1	03-06-2022			
43.	Solution of state equation	1	06-06-2022			
44.	**Tutorial-9**	1	07-06-2022			
45.	State transition matrix and it's properties	1	09-06-2022			
46.	Computation of state transition matrix using Laplace transformation method	1	10-06-2022			
47.	Concepts of controllability and observability	1	13-06-2022			
48.	**Tutorial-10**	1	14-06-2022			
49.	Revision	1	16-06-2022			
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
52.	Root Locus Construction using MatLab	1	17-06-2022		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.K.Ravi Kumar**	**Dr.K.Ravi Kumar**	**Dr. G. L N Murthy**	**Dr. Y. Amar Babu**
Signature				

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. V.V.Rama Krishna
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- C A.Y : 2022-23

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	30-01-2023		TLM1	
2.	Introduction - Block diagram of DSP System, Advantages , Limitations and Applications of DSP	1	01-02-2023		TLM1	
3.	Elementary Discrete Time Signals, Representation of Discrete Time Signals	1	02-02-2023		TLM1	
4.	Operations on Discrete Time Signals	1	03-02-2023		TLM1	
5.	Properties or classifications of Discrete Time Signals	1	06-02-2023		TLM1	
6.	Properties or classifications of Discrete Time Systems	1	08-02-2023		TLM1	
7.	Analysis of LTI Systems through LCCDE	1	09-02-2023		TLM1	
8.	Analysis of LTI Systems through LCCDE	1	10-02-2023		TLM1	
9.	Linear Convolution	1	13-02-2023		TLM1	
10.	Linear Convolution	1	15-02-2023		TLM1	
11.	DTFT of a Sequence and System	1	16-02-2023		TLM1	
12.	DTFT of a Sequence and System	1	17-02-2023		TLM1	
13.	Properties of DTFT	1	20-02-2023		TLM1	
No. of classes required to complete UNIT-I		**13**	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	22-02-2023		TLM1	
2.	Properties of Z-Transforms	1	23-02-2023		TLM1	
3.	Properties of Z-Transforms	1	24-02-2023		TLM1	
4.	Inverse Z-Transform	1	27-02-2023		TLM1	
5.	Problems on Z-Transforms		01-03-2023		TLM1	
6.	Problems on Inverse Z-Transforms		02-03-2023		TLM1	
7.	Analysis of LTI system using Z-transforms	1	03-03-2023		TLM1	
8.	Analysis of LTI system using Z-transforms	1	06-03-2023		TLM1	
9.	Direct Form-I, Direct Form-II,	1	09-03-2023		TLM1	
10.	Cascade Form and Parallel Form for IIR systems	1	10-03-2023		TLM1	
11.	Direct Form, Cascade Form and Parallel Form, Linear Phase	1	13-03-2023		TLM1	

	Realization for FIR systems					
No. of classes required to complete UNIT-II		**11**	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	15-03-2023		**TLM1**	
2.	Properties of DFT	1	16-03-2023		**TLM1**	
3.	Properties of DFT, Problems	1	17-03-2023		**TLM1**	
4.	Linear Convolution and Circular Convolution	1	20-03-2023		**TLM1**	
5.	Linear Convolution through Circular Convolution	1	23-03-2023		**TLM1**	
6.	Circular Convolution through DFT & IDFT, Linear Convolution through DFT & IDFT	1	24-03-2023		**TLM1**	
7.	Need for FFT	1	03-04-2023		**TLM1**	
8.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	06-04-2023		**TLM1**	
9.	Radix – 2 DIT-FFT Algorithm for DFT computation	1	10-04-2023		**TLM1**	
10.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	12-04-2023		**TLM1**	
11.	Radix – 2 DIF-FFT Algorithm for DFT computation	1	13-04-2023		**TLM1**	
12.	Radix – 2 DIT-FFT Algorithm for IDFT computation.	1	03-04-2023		**TLM1**	
13.	Radix – 2 DIF-FFT Algorithm for IDFT computation	1	17-04-2023		**TLM1**	
14.	Revision	1	19-04-2023		**TLM1**	
No. of classes required to complete UNIT-III			**14**	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	20-04-2023			
2.	Design of IIR Digital Filter – Impulse Invariant Transformation – Aliasing effect	1	21-04-2023		**TLM1**	
3.	Design of IIR Digital Filter – Bilinear Transformation – Frequency warping	1	24-04-2023		**TLM1**	
4.	Problems on Impulse Invariance and Bilinear Transformation	1	26-04-2023		**TLM1**	
5.	Specifications of Low pass filters , Design of IIR Analog filter using Butterworth Approximations	1	27-04-2023		**TLM1**	
6.	Problems on Butterworth Filter	1	28-04-2023		**TLM1**	

7.	Design of IIR Analog filter using Chebyshev Approximations	1	01-05-2023		**TLM1**	
8.	Problems on Chebyshev Filetr	1	03-05-2023		**TLM1**	
9.	Analog Frequency Transformation	1	04-05-2023		**TLM1**	
10.	Problems on Frequency Transformations	1	05-05-2023		**TLM1**	
11.	Revision	1	08-05-2023		**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	10-05-2023		**TLM1**	
2.	Frequency Response Linear Phase FIR filters	1	11-05-2023		**TLM1**	
3.	Frequency Response Linear Phase FIR filters		12-05-2023		**TLM1**	
4.	Design of FIR filters using Fourier series method	1	15-05-2023		**TLM1**	
5.	Problems	1	17-05-2023		**TLM1**	
6.	Design of FIR filters using window method and various window(s) characteristics	1	18-05-2023		**TLM1**	
7.	Design of FIR filters using window method and various window(s) characteristics	1	19-05-2023		**TLM1**	
8.	Design of FIR filters using window method and various window(s) characteristics	1	22-05-2023		**TLM1**	
9.	Problems	1	24-05-2023		**TLM1**	
10.	Revision		25-05-2023		**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**	26-05-2023		**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
Mr. V V Rama Krishna	Dr.E.V.KrishnaRao	Dr. G L N Murthy	Dr. Y. Amar Babu

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Smt. M V L Bhavani
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 : 2022-23

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	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.	General Interaction	1	30.01.2023		TLM1	
2.	Introduction to Course. Course Outcomes	1	01.02.2023		TLM1	
3.	Elements of a communication system, Need for modulation, Classification of Modulation	1	02.02.2023		TLM1	
4.	Amplitude Modulation: Definition, Time and Frequency Domain Representation	1	03.02.2023		TLM1	
5.	Power relations in AM wave, Generation of AM waves using square law modulator, Switching modulator.	1	06.02.2023		TLM1	
6.	Demodulation of AM waves using square law Demodulator, Envelop Detector,	1	08.02.2023		TLM1	
7.	Tutorial -1	1	09.02.2023		TLM3	
8.	Introduction to DSBSC -AM, Time and Frequency domain Representation	1	10.02.2023		TLM1	
9.	Generation of DSBSC wave using Balanced Modulator	1	13.02.2023		TLM1	
10.	Generation of DSBSC using Ring Modulator	1	15.02.2023		TLM1	
11.	Coherent Detection of DSBSC wave	1	16.02.2023		TLM1	
12.	Effect of Phase and frequency Errors	1	17.02.2023		TLM1	
13.	Costas Loop	1	20.02.2023		TLM1	
14.	Tutorial -2	1	22.2.2023		TLM3	
No. of classes required to complete UNIT-I :		14	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
15.	Single Side band Modulation: Definition, Time and Frequency domain representation	1	23.02.2023		TLM1	
16.	Generation of SSB wave: Filter Method,	1	24.02.2023		TLM1	
17.	Phase Discrimination method	1	27.02.2023		TLM1	
18.	Coherent detection of SSB wave	1	01.03.2023		TLM1	
19.	Effect of Phase and Frequency Error in the detection	1	02.03.2023		TLM1	
20.	Tutorial-3	1	03.03.2023		TLM3	
21.	Vestigial Side band Modulation: Definition, Time and frequency domain representation	1	06.03.2023		TLM1	
22.	Generation of VSB wave	1	08.03.2023		TLM1	
23.	Envelope detection of VSB wave plus carrier	1	09.03.2023		TLM1	
24.	Comparisons of amplitude modulation techniques, Applications of different AM systems	1	10.03.2023		TLM1	
25.	Tutorial-4	1	13.3.2023		TLM3	
No. of classes required to complete UNIT-II		11	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
26.	Types of Angle Modulation Frequency Modulation: Time domain representation,	1	15.03.2023		TLM1	
27.	Single tone Frequency Modulation	1	16.03.2023		TLM1	

28.	Narrow Band Frequency Modulation: Time and Frequency domain representation	1	17.03.2023		TLM1	
29.	Wide band Frequency Modulation Time and Frequency Domain representation	1	20.03.2023		TLM1	
30.	Transmission power and Band width of FM wave	1	23.03.2023		TLM1	
31.	Tutorial-5	1	24.03.2023		TLM3	
32.	Generation of FM wave: Direct method	1	03.04.2023		TLM1	
33.	Generation of FM wave: Indirect method	1	05.04.2023		TLM1	
34.	Demodulation of FM – frequency Discrimination methods: simple slope detector, Balanced slope detector	1	06.04.2023		TLM1	
35.	Phase Discrimination methods: Foster Seeley Discrimination method	1	07.04.2023		TLM1	
36.	Ratio Detector, PLL	1	10.04.2023		TLM1	
37.	Tutorial -6	1	12.04.2023		TLM3	
No. of classes required to complete UNIT-III		12	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
38.	Radio transmitter introduction and classification AM transmitters-low level and high level	1	13.04.2023		TLM1	
39.	FM Transmitter: Reactance tube method	1	14.04.2023		TLM1	
40.	FM Transmitter: Armstrong method	1	17.04.2023		TLM1	
41.	Tutorial-7		19.04.2023		TLM3	
42.	Radio Receiver introduction and classification	1	20.04.2023		TLM1	
43.	Tuned Radio Frequency receiver and its limitations	1	21.04.2023		TLM1	
44.	Need of heterodyning AM Super heterodyne Receiver,	1	24.04.2023		TLM1	
45.	Frequency Changing and Tracking, Concept of IF		26.04.2023		TLM1	

46.	Significance of AGC in AM Radio Receivers, Simple AGC,	1	27.04.2023		TLM1	
47.	Delayed AGC		28.04.2023		TLM1	
48.	FM receiver	1	01.05.2023		TLM1	
49.	Tutorial-8	1	03.05.2023		TLM3	
No. of classes required to complete UNIT-IV		12	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
50.	Definition of Noise in communication system Signal to Noise ratio calculations in AM	1	0.05.2023		TLM1	
51.	Signal to Noise ratio calculations in DSBSC, and SSBSC receivers	1	05.05.2023		TLM1	
52.	Signal to Noise ratio calculations in FM receivers		08.05.2023		TLM1	
53.	Threshold Effect, Pre-Emphasis and De Emphasis circuits	1	10.05.2023		TLM1	
54.	Introduction to Carrier to Noise Ratio Signal to Interference plus Noise Ratio	1	11.05.2023		TLM1	
55.	Tutorial-9	1	12.05.2023		TLM3	
56.	Analog Pulse Modulation: Need for Pulse Modulation Types of Pulse analog Modulation,	1	15.05.2023		TLM1	
57.	Pulse Amplitude Modulation Generation and Demodulation	1	17.05.2023		TLM2	
58.	Pulse Amplitude Demodulation.		18.05.2023		TLM1	
59.	Pulse Width, Pulse Position Modulation	1	18.05.2023		TLM2	
60.	Generation and Demodulation	1	19.05.2023		TLM2	
61.	**Multiplexing:** Frequency Division Multiplexing, Time Division Multiplexing	2	22.05.2023 24.05.2023		TLM1	
62.	Tutorial-10	1	25.05.2023		TLM3	
No. of classes required to complete UNIT-V:		13	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
63.	Recent Trends and application areas in Communication	1	26.05.2023		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

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
Mrs.M.V.L.Bhavani	Mrs.M.V.L.Bhavani	Dr.M.V.Sudhakar	Dr.Y.Amar Babu

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Department of ECE

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B Siva Hari Prasad

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 : 2022-23

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-C

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	30-1-2023			
2.	Introduction to Unit-I	1	31-1-2023			
3.	Vector Algebra, Coordinate System	1	01-2-2023			
4.	Vector Calculus	1	02-2-2023			
5.	Coulombs Law & Electric Field Intensity	1	06-2-2023			
6.	Electric Field due to continuous charge distributions	1	07-2-2023			
7.	Electric Flux & Electric Flux Density	1	08-2-2023			
8.	Gauss's Law and Applications	1	09-2-2023			
9.	Electric Potential and Potential Gradient	1	13-2-2023			
10.	Maxwell's two equations for Electrostatic Fields	1	14-2-2023			
11.	Electric Dipole and Dipole Moment	1	15-2-2023			
12.	Electrostatic Energy and Energy Density	1	16-2-2023			
13.	Poisson's and Laplace's Equations	1	20-2-2023			
14.	Capacitance and Different Capacitors	1	21-2-2023			
15.	Problem Solving	1	22-2-2023			
16.	Problem Solving	1	23-2-2023			
No. of classes required to complete UNIT-I		16	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
17.	Magnetic Field Intensity & Biot-Savart's Law	1	27-2-2023			
18.	Ampere's Circuit Law & Applications	1	28-2-2023			
19.	Magnetic Flux & Magnetic Flux Density	1	01-3-2023			
20.	Maxwell's two equations for Magnetostatic Fields	1	02-3-2023			
21.	Magnetic Scalar & Vector Potentials	1	06-3-2023			
22.	Force Due to Magnetic Field	1	07-3-2023			
23.	Magnetic Energy and Energy Density	1	09-3-2023			
24.	Concept of Inductance	1	13-3-2023			
25.	Problem Solving	1	14-3-2023			
26.	Problem Solving	1	15-3-2023			
No. of classes required to complete UNIT-II		10	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
27.	Time varying Fields, Faradays Law, Continuity Equation	1	16-3-2023			
28.	Inconsistency of Ampere's Law, Displacement Current Density	1	20-3-2023			
29.	Time Varying Four Maxwell's Equations	1	21-3-2023			
30.	Boundary Conditions	1	23-3-2023			
No. of classes required to complete UNIT-III(First Half - 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
31.	Introduction to EM Waves-Scalar, Vector Form, Solution of EM Wave Equations	1	03-4-2023			
32.	Intrinsic Impedance, Attenuation and Phase Constants, Loss Tangent, Velocity and Wavelength of EM Wave	1	04-4-2023			
33.	Wave Propagation in Lossy Dielectrics	1	06-4-2023			
34.	Wave Propagation in Lossless Dielectrics	1	10-4-2023			
35.	Wave Propagation in Free Space	1	11-4-2023			
36.	Wave Propagation in Good Conductors	1	12-4-2023			
37.	Polarization-Linear, Circular & Elliptical	1	13-4-2023			
38.	Problem Solving	1	17-4-2023			
39.	Problem Solving	1	18-4-2023			
40.	Problem Solving	1	19-4-2023			
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
41.	Poynting Vector-Time Average Power, Power Loss in a Plane Conductor	1	20-4-2023			
42.	Poynting Theorem	1	24-4-2023			
43.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Dielectric	1	25-4-2023			
44.	Reflection of a Plane Wave at Normal Incidence – Dielectric-Conductor	1	26-4-2023			
45.	Reflection of a Plane Wave at Oblique Incidence– Parallel Polarization	1	27-4-2023			
46.	Reflection of a Plane Wave at Oblique Incidence–Perpendicular Polarization	1	01-5-2023			
47.	Brewster Angle, Critical Angle and Total Internal reflection, Surface Impedance	1	02-5-2023			
48.	Problem Solving	1	03-5-2023			
49.	Problem Solving	1	04-5-2023			
50.	Problem Solving	1	08-5-2023			
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
51.	Types of Transmission Lines, Transmission Lines Equations	1	09-5-2023			
52.	Primary and Secondary Constants of a Transmission Line	1	10-5-2023			
53.	Lossless, Distortion less, Low loss Transmission lines, Concept of Loading	1	11-5-2023			
54.	Input Impedance of a Transmission Line, Reflection Coefficient, VSWR	1	15-5-2023			
55.	Short Circuit, Open Circuit and Matched Lines	1	16-5-2023			
56.	Smith Chart and Applications	1	17-5-2023			
57.	Problem Solving	1	18-5-2023			
58.	Problem Solving	1	22-5-2023			
59.	Problem Solving	1	23-5-2023			
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
60.	Antenna and Wave Propagation	1	24-5-2023			
61.	Microwaves	1	25-5-2023			

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. Siva Hari Prasad	Dr. B. Siva Hari Prasad	Dr. B. Y.V.N.R.Swamy	Dr.Y.Amar Babu

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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 : 2022-23

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	30-01-2023		2	
2.	Population explosion and variations among Nations.	1	01-02-2023		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	06-02-2023		2	
4.	Environmental Hazards	1	08-02-2023		2	
5.	Role of Information Technology in environmental management and human health.	1	13-02-2023		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	15-02-2023		2	
2.	Water Resources	1	20-02-2023		2	
3.	Mineral Resources	1	22-02-2023		2	
4.	Food Resources	1	27-02-2023		2	
5.	Food Resources	1	01-03-2023		2	
6.	Food Resources	1	06-03-2023		2	
7.	Energy Resources	1	08-03-2023		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	13-03-2023		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids,	1	15-03-2023		2	
3.	Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species, Bio-	1	20-03-2023		2	

	geographical classification of India. India as a mega diversity nation					
4.	Bio-geo-chemical cycles	1	22-03-2023			
5.	**I MID EXAMINATION**	1	27-03-2023			
6.	**I MID EXAMINATION**	1	29-03-2023			
7.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Assignment in Unit II	1	03-04-2023		2	
8.	Man and wild life conflicts. Endangered and endemic species of India	1	05-04-2023		2,3	
9.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	10-04-2023		2	
No. of classes required to complete UNIT-III: 7				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	12-04-2023		2	
2.	Causes, effects and control measures of: Water Pollution	1	17-04-2023		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	19-04-2023			
4.	Noise Pollution		24-04-2023			
5.	Solid Waste Management	1	26-04-2023		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	01-05-2023		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	03-05-2023		2	
2.	Climate disruption-Greenhouse effect, ozone layer depletion and acid rain.	1	08-05-2023		2,3	
3.	Stockholm conference	1	10-05-2023		2	
4.	Environmental Impact Assessment (EIA)		15-05-2023		2	
5.	Green building	1	17-05-2023		2	
6.	Environmental Law	1	22-05-2023		2	
7.	Revision	1	24-05-2023		2,3	
8.	II MID EXAMINATIONS	1	05-06-2023			
9.	II MID EXAMINATIONS	1	07-06-2023			
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 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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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.P.Lachi Reddy / Dr.K.Ravi kumar
Mr.P.Venkateswara Rao /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-C Sec **A.Y.:** 2022-23

PRE REQUISITE: 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

THEORY

S.No	Topics to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CO's, Introduction, Language basics	1	31-01-2023		TLM1	
2.	Variables, Operators, data types, Constructs	2	31-01-2023		TLM1	
3.	Language Basics and Example programs on data types usage	2	07-02-2023		TLM1	
4.	Language Basics and Example programs on loops	1	07-02-2023		TLM1	
5.	Lists in python- introduction, methods and built in functions	1	21-02-2023		TLM1	
6.	Tuples in python- introduction, methods, examples	1	28-02-2023		TLM1	
7.	Sets in python- union, intersection, difference, comparisons, examples	1	07-03-2023		TLM1	
8.	Dictionaries in python- sorting, keys, concatenation, mapping, examples	1	14-03-2023		TLM1	
9.	Functions & Recursions- defining functions in python, examples	1	21-03-2023		TLM1	
10.	Strings in python- different string operations, string length comparisons, examples	2	04-04-2023 11-04-2023		TLM1	
11.	Regular expressions in python- checking the validity of string/password, examples	2	18-04-2023 25-04-2023		TLM1	
12.	Matplotlib Library in python- line, plot, multiple plots, bar chart, examples,pie chart, scatter plot, examples	1	02-05-2023		TLM1	
Number of classes required:		16	No. of classes conducted:			

LAB

COURSE DELIVERY PLAN (LESSON PLAN)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction: Language Basics and Example Problems	3	14-02-2023		TLM1	
2.	Introduction: Language Basics and Example Problems	2	21-02-2023		TLM4	
3.	Module 1: Exercise Programs on Lists	2	28-02-2023		TLM4	
4.	Module 2: Exercise Programs on Tuples	2	07-03-2023		TLM4	
5.	Module 3: Exercise Programs on Sets	2	14-03-2023		TLM4	
6.	Module 4: Exercise Programs on Dictionaries	2	21-03-2023		TLM4	
7.	Module 5: Exercise Programs on Functions and Recursion	4	04-04-2023 11-04-2023		TLM4	
8.	Module 6: Exercise Programs on Strings	4	18-04-2023 25-04-2023		TLM4	
9.	Module 7: Exercise Programs on Regular Expressions	2	02-05-2023		TLM4	
10.	Module 8: Exercise Programs on Matplot Library	3	09-05-2023		TLM4	
11.	Internal Lab Exam	3	23-05-2023		-	
No. of classes required to complete - 29				**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.	Signal processing application using python	3	16-05-2023		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:

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	**Dr.P.Lachi Reddy**	**Dr.K.Ravi Kumar**	**Dr. B.Poornaiah**	**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. M V Sudhakar / Mr. M K Linga Murthy / Mrs. B Rajeswari Mr. M Siva Sankara Rao / Prof. B Ramesh Reddy

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 :** 2022-23

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-A
Wednesday – 21761A04D0 to 21761A04J4 & 22765A0416 to 22765A0423

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	04.02.2023			
Cycle – I – MATLAB Software							
1	Generation of Discrete Time (DT) signals and Operations on DT signals	CO1	3	18.02.2023			
2, 3	Linear Convolution and Circular Convolution	CO2	3	25.02.2023			
4	Computation of N-Point DFT and IDFT.	CO2	3	04.03.2023			
5,6	Linear and Circular Convolution Using DFT & IDFT, Power Spectral Density for sinusoidal signal.	CO2	3	18.03.2023			
7	Design of Digital IIR butter worth filter using Bi-linear Transformation.	CO3	3	25.03.2023			
8	Design of Digital IIR Chebyshev filter using Bi-linear Transformation	CO3	3	15.04.2023			
9	Design of FIR filters using window techniques	CO3	3	29.04.2023			
Cycle – II - Code Composer Studio Simulation Software and DSPProcessors							
10, 11	Linear Convolution and Circular Convolution	CO2	3	06.05.2023			
12	Computation DFT & Content Beyond the Experiment	CO2	3	20.05.2023			
--	Internal Lab Examination	--	3	27.05.2023			
No. of classes required to complete Lab			**33**	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: 01.02.2023

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

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE HANDOUT

Part-A

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

ACADEMIC YEAR : 2022-23

COURSE NAME & CODE : Analog Communications Lab – 20EC56

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

COURSE CREDITS : 1

COURSE INSTRUCTOR : Mrs. M. V. L. Bhavani / Mr. Ch. Siva Rama Krishna/ Ms. G. Asha/ Dr. A. Narendra Babu

COURSE COORDINATOR : Dr. G. L. N. 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	03.02.2023		-	TLM1	
2.	Experiment-1	3	10.02.2023		COs 1,4	TLM4	
3.	Experiment-2	3	17.02.2023		COs 1,4	TLM4	
4.	Experiment-3	3	24.02.2023		COs 1,4	TLM4	
5.	Experiment -4	3	03.03.2023		COs1,2,4	TLM4	
6.	Experiment-9	3	10.03.2023		COs 3,4	TLM4	
7.	Experiment-10	3	17.03.2023		COs 3,4	TLM4	
8.	Experiment-5	3	24.03.2023		COs2,4	TLM4	
9.	Experiment-6	3	07.04.2023		COs1,4	TLM4	
10.	Experiment-7	3	14.04.2023		COs 1,4	TLM4	
11.	Experiment-8	3	21.04.2023		COs 2,4	TLM4	
12.	Experiment-11	3	28.04.2023		COs 3,4	TLM4	
13.	Experiment-12	3	05.05.2023		COs 3,4	TLM4	
14.	Revision	3	12.05.2023		-	-	
15.	Revision	3	19.05.2023		-	-	
16.	Internal exam	3	26.05.2023		-	-	

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, Experiment-1	3	04.02.2023		COs 1,4	TLM1	
2.	Experiments-2	3	25.02.2023		COs 1,4	TLM4	
3.	Experiment-3,4	3	04.03.2023		COs 1,4	TLM4	
4.	Experiment-9,10	3	18.03.2023		COs 3,4	TLM4	
5.	Experiment-5,6	3	25.03.2023		Cos 2,4	TLM4	
6.	Experiment-7	3	15.04.2023		COs 1,4	TLM4	
7.	Experiment-8	3	29.04.2023		COs 2,4	TLM4	
8.	Experiment-11,12	3	06.05.2023		COs 3,4	TLM4	
9.	Revision	3	20.05.2023		-	-	
10.	Internal exam	3	27.05.2023		-	-	

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	**Cos**	**Marks**
Day to Day Work	1,2,3,4	A=10
Record	1,2,3,4	B=10
Viva Voce	1,2,3,4	C=5
Internal Exam	1,2,3,4	D=10
Attendance	-	E=5
Cumulative Internal Examination :	1,2,3,4	**A+B+C+D+E=40**
Semester End Examinations	1,2,3,4	**F=60**
Total Marks: A+B+C+D+E+F	**1,2,3,4**	**100**

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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PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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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
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Mrs. M V L Bhavani	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 : Dr. T. Satyanarayana

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 : 2022-23

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

Course Educational Objectives: In this course, students 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 (Monday)

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	06-02-2023		TLM2	
2.	VI and Data operations	1	13-02-2023		TLM2	
3.	VI front and block panel	1	20-02-2023		TLM2	
4.	Data flow programming	1	27-02-2023		TLM2	
5.	Graph programming	1	06-03-2023		TLM2	
6.	Loops, Arrays applications	1	13-03-2023		TLM2	
7.	Concepts of VI& Sub VIs	1	20-03-2023		TLM2	
8.	Applications of sequence structures	1	03-04-2023		TLM2	
9.	Waveforms and Graphs	1	10-04-2023		TLM2	
10.	Applications	1	17-04-2023		TLM2	
11.	Modules	1	24-04-2023		TLM2	
12.	NI Hardware	1	01-05-2023		TLM2	
13.	DAQ Installation and configuration	1	08-05-2023		TLM2	
14.	Applications	1	15-05-2023		TLM2	
15.	DAQ Hardware & Conclusion	1	22-05-2023		TLM2	

PART – B: Friday Batch

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	03-02-2023		TLM2	
2.	Boolean and compound operations	3	10-02-2023		TLM4	
3.	For and while loops	3	17-02-2023		TLM4	
4.	Structures, Timers	3	24-02-2023		TLM4	
5.	Arrays & Clusters	3	03-03-2023		TLM4	
6.	Formula node, Sub VI	3	10-03-2023		TLM4	
7.	Files	3	17-03-2023		TLM4	
8.	DAQ – installation, Application	3	24-03-2023		TLM4	
9.	Analog applications	3	21-04-2023		TLM4	
10.	Digital applications	3	28-04-2023		TLM4	
11.	Discussion of Models & Demo	3	05-05-2023		TLM2	

12.	Discussion of Models & Demo	3	12-05-2023		TLM2	
13.	Discussion of Models & Demo	3	19-05-2023		TLM2	
14.	Discussion of Models, Conclusion & Reports	3	26-05-2023		TLM6	

PART B – Saturday Batch

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion		HOD Sign Weekly
1.	Virtual Instruments, Cos, Numeric	3	04-02-2023		TLM4	
2.	Boolean and compound operations	3	11-02-2023		TLM4	
3.	For and while loops	3	25-02-2023		TLM4	
4.	Structures, Timers	3	04-03-2023		TLM4	
5.	Arrays & Clusters	3	11-03-2023		TLM4	
6.	Formula node, Sub VI	3	18-03-2023		TLM4	
7.	Files	3	25-03-2023		TLM4	
8.	DAQ – installation, Application	3	08-04-2023		TLM4	
9.	Analog applications	3	15-04-2023		TLM4	
10.	Digital applications	3	29-04-2023		TLM2	
11.	Discussion of Models & Demo	3	06-05-2023		TLM2	
12.	Discussion of Models & Demo	3	13-05-2023		TLM2	
13.	Conclusion of Models	3	20-05-2023		TLM2	
14.	Documentation Verification & Reports	3	27-05-2023		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):

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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. T. Satyanarayana	Dr P. Rakesh Kumar	Dr B. Poornaiah	Dr Y Amar Babu