	LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32) NAAC Accredited with CGPA of 3.20 on 4-point scale at 'A' Grade NIRF-2022 (Positioned in the Band of 251-300 in the Engineering Category) NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category) NBA Accredited under Tier-I (ECE, EEE, CSE, IT, ME, CIV, ASE) Recognized as Scientific Industrial Research Organization(SIRO) by DSIR Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.
	Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section - A
Course Instructor : Mr. Sasi Bhushan. K Assoc. Professor of ECE
Course Name & Code : Probability Theory and Stochastic Processes – 23FE12
L-T-P-Cr Structure : 3-0-0-3
Academic Year : 2024-25

Course Objectives:

1	To get basic understanding of random variables and operations that can be performed on them
2	To know the Spectral and temporal characteristics of Random Process.
3	To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics

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

CO1	Summarize the concepts of Probability and random processes. (Understand-L2)
CO2	Examine the Temporal and Spectral characteristics of Random Signals. (Apply-L3)
CO3	Analyze Linear Time Invariant systems driven by stationary random process by using Auto correlation function and Power spectral Density.
CO4	Interpret the concepts of Noise and Information theory in Communication systems. (Understand-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	3	2	1	-	-	-	-	-	-	-	-	1	1	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	2	2	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	2	1	-	-
CO4	3	3	1	1	-	-	-	-	-	-	-	2	3	-	-

Correlation Levels: 1.Slight(Low),2-Moderate(Medium), 3-Substantial (High).

Textbooks (T):

T1	Peyton Z. Peebles, Jr, "Probability, Random Variables and Random Signal Principles", Tata Mc Graw-Hill, 4 th edition, New Delhi.
T2	Taub and Schilling - Principles of Communication systems, TMH, 2008

Reference Books(R)

R1	B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003
R2	Y Mallikarjuna Reddy, "Probability theory and Stochastic Processes", Universities Press (India), Pvt Ltd.
R3	Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002

PART-B: Course Delivery Plan (Lesson Plan): B.Tech., ECE., III-Sem., Section - A**UNIT-I: Probability & Random Variable**

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 PTSP Course	1	16-07-24			
2.	Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces	1	18-07-24			
3.	Discrete and Continuous Sample Spaces,	1	19-07-24			
4.	Events, Probability Definitions and Axioms,	1	20-07-24			
5.	Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events,	1	23-07-24			
6.	Concept of Random Variable, Conditions for a function to be a Random Variable	1	25-07-24			
7.	Classification of Random Variable , Cumulative Distribution Function (CDF) and Properties	1	26-07-24			
8.	Probability Density Function (PDF) and Properties	1	27-07-24			
9.	Pre-Defined Distributions	1	30-07-24			
10.	Pre-Defined Distributions	1	01-08-24			
11.	Tutorial-I	1	02-08-24			
No. of classes required to complete UNIT-I:11			No. of classes taken:			

UNIT-II: Operations on Single & Multiple Random Variables-Expectations

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin	1	03-08-24			
13.	Central Moments, Variance and Skew	1	06-08-24			
14.	Chebychev's Inequality (Derivations not expected), Characteristic Function	1	08-08-24			
15.	Moment Generating Function, Vector random variables	1	09-08-24			
16.	Joint Distribution Function and Properties, Marginal Distribution Function	1	10-08-24			
17.	Joint Density Function and Properties, Marginal Density Function	1	13-08-24			
18.	Statistical Independence, Sum of Two Random Variables, Distribution and Density of Sum of Random Variables	1	16-08-24			
19.	Central Limit Theorem ,Unequal Distribution, Equal Distributions.	1	17-08-24			
20.	Expected Value of Function of Random Variables, Joint Moment about the Origin	1	20-08-24			
21.	Joint Central Moments	1	22-08-24			
22.	Joint Characteristic Functions	1	23-08-24			
23.	Tutorial-II	1	24-08-24			
No. of classes required to complete UNIT-II :12			No. of classes taken:			

UNIT-III: Random Processes-Temporal Characteristics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes	1	27-08-24			
25.	Distribution and Density Functions, concept of Stationarity and Statistical Independence.	1	29-08-24			
26.	First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity,	1	30-08-24			
27.	Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes	1	31-08-24			
28.	Problem Solving Session	1	10-09-24			
29.	Time Averages and Ergodicity	1	12-09-24			
30.	Autocorrelation Function and Its Properties	1	13-09-24			
31.	Cross-Correlation Function and Its Properties	1	14-09-24			
32.	Covariance Functions	1	17-09-24			
33.	Convolution, Mean and Mean-squared Value of System Response	1	19-09-24			
34.	autocorrelation Function of Response, Cross-Correlation Functions of Input and Output	1	20-09-24			
35.	Tutorial-II	1	21-09-24			
No. of classes required to complete UNIT-III:12			No. of classes taken:			

UNIT-IV: Random Processes – Spectral Characteristics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	The Power Spectrum: Properties	1	24-09-24			
37.	Relationship between Power Spectrum and Autocorrelation Function	1	26-09-24			
38.	The Cross-Power Density Spectrum, Properties	1	27-09-24			
39.	Relationship between Cross-Power Spectrum and Cross-Correlation Function	1	28-09-24			
40.	Spectral Characteristics of System Response: Power Density Spectrum of Response	1	01-10-24			
41.	Cross-Power Density Spectrums of Input and Output		03-10-24			
42.	Cross-Power Density Spectrums of Input and Output	1	04-10-24			
43.	Tutorial-III	1	05-10-24			
No. of classes required to complete UNIT-IV:8			No. of classes taken:			

UNIT-V: Noise Sources & Information Theory

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Resistive/Thermal Noise Source, Arbitrary Noise Sources	1	08-10-24			
45.	Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures	2	10-10-24			
46.	Average Noise Figure of cascaded networks, Narrow Band noise	1	17-10-24			
47.	Quadrature representation of narrow band noise & its properties	1	18-10-24			
48.	Entropy, Information rate	1	19-10-24			
49.	Source coding: Huffman coding, Shannon Fano coding	1	22-10-24			
50.	Mutual information	1	24-10-24			
51.	Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR	2	26-10-24			
52.	Tutorial-V	1	29-10-24			
53.	Problem Solving Session	1	31-10-24			
No. of classes required to complete UNIT-V:11			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
54.	Stochastic Signal Processing (SSP)	1	01-11-24			
55.	Applications of SSP	1	02-11-24			

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
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: ROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

- 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.
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- 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	Mr.Sasi Bhushan.K	Dr. G L N Murthy	Dr. G L N Murthy	Dr.G.Srinivasulu
15.07.2024	Course Instructor	Course Coordinator	Module Coordinator	HOD



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Program	: B.Tech. III-Sem., ECE., Section–A
Academic Year	: 2024-25
Course Name & Code	: Universal Human Values - II: Understanding Harmony (23HS01)
L-T-P-Cr	: 2-1-0-3
Course Instructure	: Dr.A.Narendra Babu

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

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

CO1	Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)
CO2	Identify one's self, and one's surroundings (family, society nature) (L2)
CO3	Relate human values with human relationship and human society. (L2)
CO4	Illustrate the need for universal human values and harmonious existence (L2)
CO5	Develop as socially and ecologically responsible engineers (L3)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO2								2							
CO3			2					3							2
CO4						2		3	2						
CO5						1		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: Introduction to Value Education**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Cos and Syallabus overview	1	16-07-24		TLM2	
2.	Process for self exploration: Natural Acceptance	1	18-07-24		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	1	19-07-24		TLM2	
4.	Understanding Value Education	1	20-07-24		TLM2	
5.	self-exploration as the Process for Value Education	1	23-07-24		TLM2	
6.	Continuous Happiness and Prosperity	1	25-07-24		TLM2	
7.	Happiness and Prosperity	1	26-07-24		TLM2	
8.	Happiness and Prosperity	1	27-07-24		TLM2	
9.	Method to Fulfill the Basic Human Aspirations	1	30-07-24		TLM2	
10.	Method to Fulfill the Basic Human Aspirations	1	01-08-24		TLM2	
11.	Tutorial - 1	1	02-08-24		TLM3	
No. of classes required to complete UNIT-I: 11				No. of classes taken:		

UNIT-II: Harmony in the Human Being

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Understanding Human being as the Co-existence of the self and the body	1	03-08-24		TLM2	
13.	Distinguishing between the Needs of the self and	1	06-08-24		TLM2	

	the body					
14.	Distinguishing between the Needs of the self and the body	1	08-08-24		TLM2	
15.	The body as an Instrument of the self	1	09-08-24		TLM2	
16.	Understanding Harmony in the self	1	13-08-24		TLM2	
17.	Understanding Harmony in the self	1	16-08-24		TLM2	
18.	Harmony of the self with the body	1	17-08-24		TLM2	
19.	Programme to ensure self-regulation and Health	1	20-08-24		TLM2	
20.	Programme to ensure self-regulation and Health	1	22-08-24		TLM2	
21.	Tutorial -2	1	23-08-24		TLM3	

No. of classes required to complete UNIT-II: 10			No. of classes taken:			
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UNIT III: Harmony in the Family and Society

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.	Harmony in the Family	2	24-08-24 27-08-24		TLM2	
23.	'Trust' – the Foundational Value in Relationship	2	29-08-24 30-08-24		TLM2	
24.	Practice Session PS7 Exploring the Feeling of Trust	2	31-08-24 10-09-24		TLM2	
25.	'Respect' – as the Right Evaluation	2	12-09-24 13-09-24		TLM1	
26.	Practice Session PS8 Exploring the Feeling of Respect	2	14-09-24 17-09-24		TLM2	
27.	Other Feelings, Justice in Human-to-Human Relationship	2	19-09-24 20-09-24		TLM2	
28.	Understanding Harmony in the Society	2	21-09-24 24-09-24		TLM2	
29.	Vision for the Universal Human Order	2	26-09-24 27-09-24 28-09-24		TLM2	
30.	Tutorial-3	1	01-10-24		TLM3	

No. of classes required to complete UNIT-III: 17				No. of classes taken:		
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UNIT-IV: Harmony in the Nature/Existence

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Understanding Harmony in the Nature	2	03-10-24 04-10-24		TLM2	
32.	Interconnectedness, self-regulation	2	05-10-24 08-10-24		TLM2	
33.	Mutual Fulfilment among the Four Orders of Nature	1	10-10-24		TLM2	
34.	Realizing Existence as Co-existence at All Levels	2	15-10-24 17-10-24		TLM2	
35.	The Holistic Perception of Harmony in Existence	2	18-10-24 15-10-24		TLM2	
36.	Tutorial -4	1	17-10-24		TLM3	
No. of classes required to complete UNIT-IV: 10				No. of classes taken:		

UNIT-V: Implications of the Holistic Understanding

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.	Natural acceptance of human values	1	18-10-24		TLM2	
38.	Definitiveness of ethical human conduct	1	19-10-24		TLM2	
39.	Basis for humanistic education	1	20-10-24		TLM2	
40.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human	2	22-10-24 24-10-24		TLM2	
41.	Competence in professional ethics	2	25-10-24 26-10-24		TLM2	
42.	Strategy for transition from the present state to universal human order	1	29-10-24		TLM2	
43.	Holistic Technologies, Production Systems and Management Models- Typical Case	2	01-11-24 02-11-24		TLM2	
44.	Tutorial -5	1	05-11-24		TLM3	
45.	Review	1	07-11-24		TLM2	
46.	Review	1	08-11-24		TLM2	
47.	Review	1	09-11-24		TLM2	
No. of classes required to complete UNIT-V: 14				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)	A1=5
I-Descriptive Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	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.A.Narendra Babu	Dr. B. SRINIVASA RAO	Dr. G.Srinivasulu
Signature				



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE., Section-A
Academic Year	: 2024-25
Course Name & Code	: Signals and Systems – 23EC02
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Dr. B. Ramesh Reddy

Course Objectives:

1	To study about signals and systems
2	To analyze the spectral characteristics of signals
3	To understand the characteristics of systems
4	To introduce the concept of sampling process
5	To know various transform techniques to analyze the signals and systems

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

CO 1	Summarize the basic concepts of signals, systems and sampling	L2
CO 2	Examine the operations on signals and approximate using orthogonal functions	L3
CO 3	Apply the concept of impulse response to analyze the LTI systems	L3
CO 4	Analyze both continuous time and discrete time signals and systems using Fourier series, Fourier transform, Laplace transforms and Z-Transforms	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	1	1	1	-	-	-	-	-	-	1	2	-	3
CO 2	3	3	3	2	2	-	-	-	-	-	-	1	2	-	3
CO 3	3	3	3	2	2	-	-	-	-	-	-	1	2	-	3
CO 4	3	3	3	2	2	-	-	-	-	-	-	1	2	-	3

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

Textbooks (T) and References (R):

T1: B P Lathi, Signals, Systems and Communications, BSP, 3rd Edition, 2003.

T2: AV Oppenheim, AS Wilsky and IT Young, Signals and Systems, PHI, 2nd Edition, 1997.

T3: Simon Haykin and Van Veen, Signals and Systems, Wiley, 2nd Edition 2007.

R1: B P Lathi, Principles of Linear Systems and Signals, Oxford University Press, 2015.

R2: TK Rawat, Oxford University Press, 2011.

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Introduction

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	16-07-2024			
2.	Definition and Classification of signals	1	19-07-2024			
3.	Definition and Classification of systems	1	20-07-2024			
4.	Singularity and Related signals	1	23-07-2024			
5.	Complex exponential and sinusoidal signals	1	24-07-2024			
6.	Operations on signals	1	26-07-2024			
7.	Properties of signals	1	27-07-2024			
8.	Problem Solving Session	1	30-07-2024			
9.	Analogy between vectors and signals, orthogonal signal space	1	31-07-2024			
10.	Signal approximation using orthogonal functions	1	02-08-2024			
11.	orthogonal signal space, closed or complete set of orthogonal functions	1	03-08-2024			
12.	Orthogonality in complex functions	1	06-08-2024			
13.	Problem Solving Session	1	07-08-2024			
No. of classes required to complete UNIT-I : 13			No. of classes taken :			

UNIT-II: Fourier Series & Fourier Transforms

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.	Fourier series representation of continuous time periodic signals	1	09-08-2024			
2.	properties of Fourier series, Dirichlet's conditions	1	13-08-2024			
3.	Trigonometric Fourier series and Exponential Fourier series	1	14-08-2024			
4.	Relation between Trigonometric and Exponential Fourier series	1	16-08-2024			
5.	Complex Fourier spectrum, Deriving Fourier transform from Fourier series	1	17-08-2024			
6.	Fourier transform of arbitrary signals	1	20-08-2024			
7.	Fourier transform of standard signals	1	21-08-2024			
8.	Fourier transform of periodic signals	1	23-08-2024			
9.	properties of Fourier transforms	1	24-08-2024			
10.	Fourier transforms involving impulse function and Signum function.	1	27-08-2024			
11.	Introduction to Hilbert Transform and Problem Solving Session	1	30-08-2024			
12.	Problem Solving Session	1	31-08-2024			
No. of classes required to complete UNIT-II : 12			No. of classes taken :			

UNIT-III: Analysis of Linear 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.	Linear system, impulse response, Response of a linear system	1	10-09-2024			
2.	Linear time invariant (LTI) system, Linear time variant (LTV) system	1	11-09-2024			
3.	Concept of convolution in time domain and frequency domain, Graphical representation of convolution	1	13-09-2024			
4.	Problem Solving Session	1	17-09-2024			
5.	Transfer function of a LTI system, Filter characteristics of linear systems	1	18-09-2024			
6.	Distortion less transmission through a system, Signal band width, system band width	1	20-09-2024			
7.	Ideal LPF, HPF and BPF characteristics	1	21-09-2024			
8.	Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time	1	24-09-2024			
9.	Problem Solving Session	1	25-09-2024			
No. of classes required to complete UNIT-III : 9			No. of classes taken :			

UNIT-IV : Signal Transmission Through Linear 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.	Auto-correlation function and properties	1	27-09-2024			
2.	Energy density spectrum, Power density spectrum, Parseval's theorem	1	28-09-2024			
3.	Cross-correlation function and properties	1	01-10-2024			
4.	Relation between Convolution and correlation	1	04-10-2024			
5.	Detection of periodic signals in the presence of noise by correlation	1	05-10-2024			
6.	Extraction of signal from noise by filtering	1	08-10-2024			
7.	Sampling Theorem-Graphical and analytical proof for Band Limited Signals	1	09-10-2024			
8.	Impulse sampling, Natural and Flat top Sampling	1	11-10-2024			
9.	Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling	1	15-10-2024			
10.	Problem Solving Session	1	16-10-2024			
No. of classes required to complete UNIT-IV : 10			No. of classes taken :			

UNIT-V : Laplace Transforms and Z-Transforms

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 Laplace Transforms	1	18-10-2024			
2.	Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals	1	19-10-2024			
3.	Properties of L.T's	1	22-10-2024			
4.	Inverse Laplace transform	1	23-10-2024			
5.	Relation between L.T's, and F.T. of a signal, Laplace transform of certain signals using waveform synthesis	1	25-10-2024			
6.	Concept of Z-Transform of a discrete sequence	1	26-10-2024			
7.	Region of convergence in Z- Transform, constraints on ROC for various classes of signals	1	29-10-2024			
8.	Inverse Z- transform	1	30-10-2024			
9.	Properties of Z-transforms	1	01-11-2024			
10.	Distinction between Laplace, Fourier and Z-transforms	1	02-11-2024			
11.	Problem Solving Session	1	05-11-2024			
No. of classes required to complete UNIT-V : 11			No. of classes taken :			

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Transform Techniques	1	06-11-2024			
2.	Signal Processing	1	08-11-2024			

Teaching Learning Methods

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

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

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

Program Specific Outcomes (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
Dr. B. Ramesh Reddy

Course Coordinator
Dr. B. Ramesh Reddy

Module Coordinator
Dr. G L N Murthy

HOD
Dr. G. Srinivasulu



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech.III-Sem., ECE., Section-A
Academic Year	: 2024-25
Course Name & Code	: Electronic Devices and Circuits –23EC03
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Dr.K.Rani Rudrama

Course Objectives:

1	To learn and understand the basic concepts of semiconductor physics.
2	Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
3	To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
4	Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
5	To learn and understand the purpose of transistor biasing and its significance
6	Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

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

CO 1	Recall the fundamentals of semiconductor physics necessary for electronic devices and circuits (Remember)	L1
CO 2	Illustrate the structure and operation of Diodes, Bipolar Junction Transistors, Field Effect Transistors and biasing of BJT & FET using fundamental circuits. (Understand)	L2
CO 3	Apply the knowledge of Diodes, Transistors and Filters for designing the Rectifiers, Regulators and Amplifier circuits using basic components. (Apply)	L3
CO 4	Analyze the characteristics of Diodes, Bipolar Junction Transistors, Field Effect Transistors and their equivalent models using V-I Characteristics. (Analyze)	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

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

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

Textbooks(T)andReferences(R):

T1: Millman's Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015..

T2:Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.

T3:Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

R1:Basic Electronics-Principles and Applications, Chinmoy Saha, Arindam Halder, Debarati Ganguly Cambridge University Press, 1st edition, 2018.

R2: Electronics devices & circuit theory- Robert L.Boylestad and Louis Nashelsky, Pearson, 11th edition, 2015.

R3: Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.

Online Learning Resources:

1. <https://nptel.ac.in/courses/108108112>
2. <https://nptel.ac.in/courses/108101091>
3. <https://nptel.ac.in/courses/108102095>

PART-B:COURSE DELIVERY PLAN (LESSONPLAN)**UNIT-I:Review of Semiconductor Physics**

S.No.	Topicstobecovered	No. ofClassesR equired	Tentative Date of Completion	Actual Dateof Completion	Teaching Learning Methods	HOD SignWe ekly
1.	Introduction to Course Objectives and Outcomes. Unit-I Introduction	1	15-07-2024			
2.	Review of Semiconductor Physics: Mobility and Conductivity	1	16-07-2024			
3.	Intrinsic and Extrinsic Semiconductors	1	20-07-2024			
4.	Continuity Equation, Law of Junction.	1	22-07-2024			
5.	Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction	1	23-07-2024			
6.	p-n junction diode, Current components in p-n junction Diode	1	24-07-2024			
7.	Diode equation, V-I Characteristics	1	27-07-2024			
8.	Temperature dependence on V-I characteristics	1	29-07-2024			
9.	Diode resistance, Diode capacitance.	1	30-07-2024			
10.	Special Semiconductor Devices: Zener Diode, Breakdown Mechanisms and Applications	1	31-07-2024			
11.	Varactor Diode, LED	1	03-08-2024			
12.	Photodiode, Tunnel Diode	1	05-08-2024			
13.	UJT, PNP Diode	1	06-08-2024			
14.	SCR, Construction, Operation and V-I characteristics	1	07-08-2024			
No.ofclassesrequiredtocompleteUNIT-I:14			No.ofclassestaken:			

UNIT-II: Diode Circuits

S.No.	Topic to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Diode Circuits: The Diode as a circuit element. The Load-Line concept.	1	10-08-2024			
2.	The Piecewise Linear Diode Model, Clipping (limiting) Circuits.	1	12-08-2024			
3.	Clipping at Two Independent Levels.	1	13-08-2024			
4.	Peak Detector, Clamping circuits	1	14-08-2024			
5.	Basic Rectifier Setup, Half Wave Rectifier	1	17-08-2024			
6.	Full Wave Rectifier, Bridge Rectifier	1	19-08-2024			
7.	Derivations of Characteristics of Rectifiers	1	20-08-2024			
8.	Filters, Inductor Filter	1	23-08-2024			
9.	Capacitor Filter, π -Section Filter	1	24-08-2024			
10.	Comparison of various Filter Circuits in terms of Ripple Factors.	1	27-08-2024			
No. of classes required to complete UNIT-II: 10			No. of classes taken:			

UNIT-III: Transistor Characteristics & Transistor Biasing and Thermal Stabilization

S.No.	Topic to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Transistor Characteristics: Junction transistor, Transistor current components, CB configuration	1	28-08-2024			
2.	Transistor as an amplifier,	1	31-08-2024			
3.	characteristics of transistor in CB, CE, CC configurations	1	09-09-2024			
4.	Ebers-Moll model of a transistor,	1	10-09-2024			
5.	punch through/ reach through,	1	11-09-2024			
6.	Photo transistor, typical transistor junction voltage values.	1	14-09-2024			
7.	Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis,	1	17-09-2024			
8.	BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias.	1	18-09-2024			
9.	Stabilization against variations in V_{BE} , I_c , and β , Stability factors, (S, S', S'') ,	1	21-09-2024			
10.	Bias compensation, Thermal runaway, Thermal stability.	1	23-09-2024			
No. of classes required to complete UNIT-II: 10			No. of classes taken:			

UNIT-IV: Small Signal Low Frequency Transistor Amplifier Models

S.No.	Topic to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	BJT: Two port network, Transistor hybrid model	1	24-09-2024			
2.	Determination of h-parameters for a BJT amplifier	1	25-09-2024			
3.	Conversion of h-parameters	1	28-09-2024			
4.	generalized analysis of transistor amplifier model using h-parameters	1	30-10-2024			
5.	Analysis of CB amplifiers using exact and approximate analysis.	1	01-10-2024			
6.	Analysis of CE amplifiers using exact and approximate analysis	1	03-10-2024			
7.	Analysis of CC amplifiers using exact and approximate analysis	1	05-10-2024			
8.	Comparison of transistor amplifiers	1	07-10-2024			
9.	generalized analysis of transistor amplifier model using h-parameters	1	08-10-2024			
10.	Problem Solving Session	1	16-10-2024			
No. of classes required to complete UNIT-IV: 10			No. of classes taken:			

UNIT- V: FET

S.No.	Topic to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	FET types, JFET operation.	1	19-10-2024			
2.	Characteristics, small signal model of JFET					
3.	MOSFET Structure, Operation of MOSFET in triode region	1	21-10-2024			
4.	Operation in saturation region, MOSFET as a variable resistor,	1	22-10-2024			
5.	Derivation of V-I characteristics of MOSFET		23-10-2024			
6.	Channel length modulation, MOS transconductance	1	26-10-2024			
7.	MOS device models: MOS small signal model, PMOS Transistor,	1	28-10-2024			
8.	CMOS Technology, Comparison of Bipolar and MOS devices.	1	29-10-2024			
9.	CMOS amplifiers: General Considerations	1	30-10-2024			
10.	Common Source Stage ,Common Gate Stage.	1	02-11-2024			
	Source Follower, comparison of FET amplifiers.	1	04-11-2024			
No. of classes required to complete UNIT-IV: 11			No. of classes taken:			

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Realization of Universal gates with CMOS transistor	1	05-11-2024			
2.	TTL logic Family	1	06-11-2024			
3	ECL logic Family	1	09-11-2024			

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
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: ROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Coordinator
Dr.B.V.N.R. Siva kumar

ModuleCoordinator
Dr.T.Satyanarayana

HOD
Dr.G.Srinivasulu



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE., Section-A
Academic Year	: 2024-25
Course Name & Code	: Switching Theory and Logic Design- 23EC04
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Mr. Ch Siva Rama Krishna

Course Objectives:

1	To solve a typical number base conversion and analyze new error coding techniques.
2	To understand the behavior of logic gates by using theorems and functions of Boolean algebra.
3	To optimize logic gates for digital circuits using various techniques.
4	To perform Boolean function simplification using Karnaugh maps and Quine-McCluskey methods.
5	To understand concepts of combinational circuits.
6	To develop advanced sequential circuits

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

CO 1	Summarize the key differences between number systems and their usage in Digital Circuits.	L2
CO 2	Identify the minimization techniques of Boolean expressions to implement Digital Circuits using basic logic gates and logic circuits	L3
CO 3	Apply the minimization and realization methods for designing the Combinational & Sequential logic circuits	L3
CO 4	Analyze the Combinational, Sequential, Finite State Machines for implementation of digital logic circuits	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	1	-	-	-	-	2	-	-	-	1	-	3	-
CO 2	2	3	3	-	-	-	-	2	-	-	-	1	-	3	-
CO 3	2	3	3	1	-	-	-	2	-	-	-	1	-	3	-
CO 4	2	3	3	2	-	-	-	2	-	-	-	3	-	3	-

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

Textbooks (T) and References (R):

T1: Switching and finite automata theory Zvi.KOHAVI, Niraj. K. Jha 3rd Edition, Cambridge University Press, 2009.

T2: Digital Design by M. Morris Mano, Michael D Ciletti, 4th edition PHI publication, 2008.

T3: Switching theory and logic design by Hill and Peterson, Mc-Graw Hill TMH edition, 2012.

R1: Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 2006

R2: Digital electronics by R S Sedha. S. Chand & company limited, 2010

R3 : Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvt ltd, 2016.

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)

PART A: BASIC ELECTRICAL ENGINEERING

UNIT-I: REVIEW OF NUMBER SYSTEMS & CODES, BOOLEAN THEOREMS AND LOGIC OPERATIONS

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, cos.	1	15-07-2024		TLM1	
2.	Number systems	1	16-07-2024		TLM1	
3.	Conversions from one radix to other radix	1	19-07-2024		TLM1	
4.	Complement representation	1	22-07-2024		TLM1	
5.	Binary codes, 2421 and 8421 codes.	1	23-07-2024		TLM1	
6.	Error detecting & Error correcting codes	1	24-07-2024		TLM1	
7.	Hamming codes.	1	26-07-2024		TLM1	
8.	Fundamental postulates of Boolean Algebra	1	29-07-2024		TLM1	
9.	Basic theorems and properties	1	30-07-2024		TLM1	
10.	Canonical and Standard forms	1	31-07-2024		TLM1	
11.	Universal Logic operations, EX-OR and EX-NOR.	1	02-08-2024		TLM1	
12.	Properties of gates-Multilevel NAND/NOR realizations	1	05-08-2024		TLM1	
13.	Realization of three level logic circuits.	1	06-08-2024		TLM1	
No. of classes required to complete UNIT-I : 13			No. of classes taken :			

UNIT-II: MINIMIZATION TECHNIQUES, COMBINATIONAL LOGIC CIRCUITS DESIGN.

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Minimization of switching function	1	07-08-2024		TLM1	
2.	Prime implicants	1	09-08-2024		TLM1	
3.	Don't care combinations	1	12-08-2024		TLM1	
4.	Tabulation Method	1	13-08-2024		TLM1	
5.	Prime -Implicant chart, simplification rules	1	16-08-2024		TLM2	
6.	Design of Full Adder	1	19-08-2024		TLM1	
7.	Design of half subtractor and full subtractor	1	20-08-2024		TLM1	
8.	applications of full adders; 4- bit adders Subtractor circuit, complete circuit diagrams	1	21-08-2024		TLM1	
9.	BCD adder circuit,	1	23-08-2024		TLM1	
10.	Excess 3 adder circuit.	1	27-08-2024		TLM2	
11.	carry look-ahead adder circuit	1	28-08-2024		TLM2	
12.	Design code converts	1	30-08-2024		TLM2	
No. of classes required to complete UNIT-II : 12			No. of classes taken :			

**UNIT-III: COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI & LSI,
INTRODUCTION OF PLD's**

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.	Design of Encoder, Decoder	1	09-09-2024		TLM1	
2.	Design of Multiplexer, De-Multiplexer	1	10-09-2024		TLM1	
3.	Implementation of higher order circuits using lower order circuits	1	11-09-2024		TLM1	
4.	Realization of Boolean functions using decoders	1	13-09-2024		TLM1	
5.	Realization of Boolean functions using multiplexers	1	17-09-2024		TLM1	
6.	Design of Priority encoder	1	18-09-2024		TLM1	
7.	Design of 4-bit digital comparator and seven segment decoder	1	20-09-2024		TLM1	
8.	Basic PLD's-ROM, PROM	1	23-09-2024		TLM1	
9.	PLA, PLD, Realization of Switching functions using PLD's	1	24-09-2024		TLM2	
No. of classes required to complete UNIT-III : 9			No. of classes taken :			

UNIT-IV: SEQUENTIAL CIRCUITS-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Classification of sequential circuits	1	25-09-2024	TLM1		
2.	Latches and flip-flops	1	27-09-2024	TLM1		
3.	RS flip-flop, D flip-flop	1	30-09-2024	TLM1		
4.	JK flip- flop, T flip-flop	1	01-10-2024	TLM1		
5.	Conversion from one flip-flop to another flip- flop	1	04-10-2024	TLM1		
6.	Design of ripple counters and synchronous counters	1	07-10-2024	TLM1		
7.	Design of Johnson counter, ring counter	1	08-10-2024	TLM1		
8.	Design of registers – Buffer, control buffer, shift register	1	14-10-2024	TLM1		
9.	Design of Bidirectional shift register, universal shift	1	15-10-2024	TLM2		
10.	ICs and their relevant functions 7474, 7475, 7476, 7490, 7493,74121	1	17-10-2024	TLM2		
No. of classes required to complete UNIT-IV : 10			No. of classes taken :			

UNIT-V : SEQUENTIAL CIRCUITS-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Finite state machine	1	18-10-2024		TLM1	
2.	State diagrams and state tables	1	21-10-2024		TLM1	
3.	Reduction of state tables	1	22-10-2024		TLM1	
4.	Reduction of state tables	1	23-10-2024		TLM1	
5.	Analysis of clocked sequential circuits Mealy to Moore conversion	1	25-10-2024		TLM1	
6.	Analysis of clocked sequential circuits Moore to Mealy to conversion	1	28-10-2024		TLM1	

7.	Realization of sequence generator	1	29-10-2024		TLM1
8.	Design of Clocked Sequential Circuit to detect the given sequence (with overlapping)	1	30-10-2024		TLM5
9.	Design of Clocked Sequential Circuit to detect the given sequence (without overlapping)	1	04-11-2024		TLM1
10.	Problems solving Session	1	05-11-2024		TLM1
No. of classes required to complete UNIT-V : 11			No. of classes taken :		

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Design of 32-bit Adder	1	06-11-2024		TLM2	
2.	Introduction to HDL, Verilog HDL	1	08-11-2024		TLM2	

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

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

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

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

Program Specific Outcomes (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
Mr.Ch.SivaRamaKrishna

Course Coordinator
Mr.Ch.SivaRamaKrishna

Module Coordinator
Dr.P.Lachi Reddy

HOD
Dr. G. Srinivasulu



COURSE HANDOUT

PART-A

Name of Course Instructor	: Dr.K.RaniRudrama, Dr.B.Rambabu, Mr.T.Anil Raju
Course Name & Code	: Electronic Devices and Circuits Lab -23EC52
L-T-P Structure	: 0-0-3 Credits : 1.5
Program/Sem/Sec	: B.Tech., ECE., III-Sem., Section- A A.Y. : 2024-25

COURSE OBJECTIVES : This course introduces the characteristics and applications of semiconductor devices. Emphasis is placed on characteristics and testing practically to strengthen the knowledge.

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

CO1	Demonstrate the characteristics of BJT, FET, SCR, UJT and applications of diode. (Apply-L3)
CO2	Model the Rectifiers, filters and Amplifiers used in electronic circuits. (Apply-L3)
CO3	Analyze the device parameters of Diodes, Bipolar Junction Transistors, and Field Effect Transistors for its electrical parameters using VI characteristics. (Analyze – L4).
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	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	-	-	1	1	-	2	-
CO3	3	1	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): BATCH-I

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to EDC Lab experiments, COs, POs and PSOs.	3	15-07-2024		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	22-07-2024		TLM4	
3.	Design of Clipper circuit using diode.	3	29-07-2024		TLM4	
4.	Design of Clamping circuit using diode	3	05-08-2024		TLM4	
5.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier	3	12-08-2024		TLM4	
6.	Determination of h-parameter of a BJT in CE configuration	3	19-08-2024		TLM4	
7.	Determination of Break over voltage of SCR using V-I Characteristics	3	02-09-2024		TLM4	
8.	UJT Characteristics	3	23-09-2024		TLM4	
9.	Estimation of Stability factor for a transistor self-biasing circuit	3	30-09-2024		TLM4	
10.	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	3	07-10-2024		TLM4	
11.	Design of Emitter Follower-CC Amplifier,	3	14-10-2024		TLM4	
12.	Design of FET-CS Amplifier	3	21-10-2024		TLM4	
13.	Revision	3	28-10-2024			
14.	Lab Internal examination	3	04-11-2024			
No. of classes required: 42				No. of classes taken:		

COURSE DELIVERY PLAN (LESSON PLAN): BATCH-II

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
01	Introduction to EDC Lab experiments, COs, POs and PSOs.	3	18-07-2024		TLM4	
02	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	25-07-2024		TLM4	
03	Design of Clipper circuit using diode.	3	01-08-2024		TLM4	
04	Design of Clamping circuit using diode	3	08-08-2024		TLM4	
05	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier	3	22-08-2024		TLM4	
06	Determination of h-parameter of a BJT in CE configuration	3	29-08-2024		TLM4	
07	Determination of Break over voltage of SCR using V-I Characteristics	3	05-09-2024		TLM4	
08	UJT Characteristics	3	19-09-2024		TLM4	
09	Estimation of Stability factor for a transistor self-biasing circuit	3	26-09-2024		TLM4	
10	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	3	03-10-2024		TLM4	
11	Design of Emitter Follower-CC Amplifier,	3	10-10-2024		TLM4	
12	Design of FET-CS Amplifier	3	17-10-2024		TLM4	
13	Revision	3	24-10-2024			
14	Lab Internal examination	3	07-11-2024			
No. of classes required: 42				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10
Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

PART-D: ROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

- 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.

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

Dr. K. Rani Rudrama

Course Coordinator

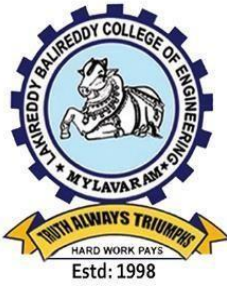
Dr. K. Rani Rudrama

Module Coordinator

Dr. T. Satyanarayana

Head of the Department

Dr. G. Srinivasulu



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)

NAAC Accredited with CGPA of 3.20 on 4-point scale at 'A' Grade NIRF-2022 (Positioned in the Band of 251-300 in the Engineering Category) NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)

NBA Accredited under Tier-I (ECE, EEE, CSE, IT, ME, CIV, ASE)

Recognized as Scientific Industrial Research Organization (SIRO) by DSIR
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech.,ECE.,III-Sem.,Section-A
Academic Year	: 2024-25
Course Name & Code	: Switching Theory and Logic Design Lab – 23EC53
L-T-P-Cr	: 0-0-3-1.5
Course Instructure	: Mr.Ch.Siva Rama Krishna, Mr.M.Siva Sankara Rao, Ms G.Asha

Course Objectives:

This course gives the ability to design and verify digital logic circuits like; logic gates, combinational and sequential logic circuits using discrete components and Integrated Circuits.

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

CO 1	Demonstrate the functionality of Logic gates, Flip-flops, Shift registers and Counters	L2
CO 2	Apply the Boolean minimization methods to implement Combinational and Sequential logic circuits using logic gates	L3
CO 3	Analyze the behavior of Combinational and Sequential logic circuits	L4
CO 4	Adapt effective Communication, presentation and report writing skills	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
CO 1	2	3	3	1	2	3	-	2	-	-	-	1	-	3	-
CO 2	2	1	1	1	1	3	-	2	-	-	-	1	-	3	-
CO 3	2	1	1	-	1	3	-	2	-	-	-	1	-	3	-
CO 4	-	-	-	-	-	-	-	-	-	3	-	3	-	3	-

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

PART-B: COURSE DELIVERY PLAN (LESSON PLAN):Batch-I

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Implementation of the following Logic gates using Universal Gates: Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR	3	15.7.2024		TLM4	
2.	Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.	3	22.7.2024		TLM4	
3.	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	29.7.2024		TLM4	
4.	4 variable logic function verification using 8 to1 multiplexer.	3	5.8.2024		TLM4	
5.	Design full adder circuit and verify its functional table.	3	12.8.2024		TLM4	
6.	Verification of functional tables of (i) JK Master Slave Flip-Flop (ii) D Flip-Flop	3	19.8.2024		TLM4	
7.	Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output	3	2.9.2024		TLM4	
8.	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	23.9.2024		TLM4	
9.	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	30.09.2024		TLM4	
10.	Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip- Flops and Test It with a low frequency clock and sketch the output waveforms	3	07.10.2024		TLM4	
11.	Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	14.10.2024		TLM4	
12.	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.	3	21.10.2024		TLM4	
13.	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	28.10.2024		TLM4	
14.	Lab Internal Examination	3	4.11.2024		TLM4	
No. of classes required:39				No. of classes taken:		

PART-B: COURSE DELIVERY PLAN (LESSON PLAN):Batch-II

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Implementation of the following Logic gates using Universal Gates: Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR	3	18.7.2024		TLM4	
2	Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.	3	25.7.2024		TLM4	
3	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	1.8.2024		TLM4	
4	4 variable logic function verification using 8 to1 multiplexer.	3	1.8.2024		TLM4	
5	Design full adder circuit and verify its functional table.	3	8.8.2024		TLM4	
6	Verification of functional tables of (i) JK Master Slave Flip-Flop (ii) D Flip-Flop	3	22.8.2024		TLM4	
7	Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output	3	29.8.2024		TLM4	
8	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	12.9.2024		TLM4	
9	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	19.9.2024		TLM4	
10	Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip- Flops and Test It with a low frequency clock and sketch the output waveforms	3	26.9.2024		TLM4	
11	Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	3.10.2024		TLM4	
12	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.	3	17.10.2024		TLM4	
13	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	24.10.2024		TLM4	
14	Lab Internal Examination	3	7.11.2024		TLM4	
No. of classes required:39				No. of classes taken:		

Teaching Learning Methods

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10
Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

PART-D

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

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

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

Program Specific Outcomes (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

Dt: 15.07.2024

Course Instructor
Mr.CH.SivaRamaKrishna
Mr.M Siva Sanakara Rao
Ms.G.Asha

Course Coordinator
M.K.Linga Murthy

Module Coordinator
Dr. P.Lachi Reddy

HOD
Dr. G. Srinivasulu

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms. P. Sarala/ Mr. Y. Babu / Mr. Praveen Kumar

Course Name & Code : Data Structures using C & 23CS53

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

Credits: 2

Program/Sem/Sec : B.Tech/III/A-Sec.

A.Y.: 2024-25

PREREQUISITE: Introduction to Programming

COURSE OBJECTIVES: The main objectives of the course are to

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

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

CO1: Implement Various Searching & Sorting Techniques. (**Apply - L3**)

CO2: Implement Linked List, Stack & Queue data structures. (**Apply - L3**)

CO3: Design and implement algorithms for operations on binary trees and binary search trees. (**Apply - L3**)

CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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													
CO2	3	2													
CO3	3	2													
CO4								2	2	2					

Note: 1- Slight (Low), 2 - Moderate (Medium), 3 - Substantial (High)

PART-B:**COURSE DELIVERY PLAN (LESSON PLAN):**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Method	HOD Sign
1.	Introduction to Arrays, Searching Techniques	4	16-07-2024		TLM3	
			23-07-2024		TLM3	
			24-07-2024		TLM4	
2.	Sorting Techniques	4	30-07-2024		TLM3	
			31-07-2024		TLM4	
			06-08-2024		TLM3	
3.	Linked List Programs	5	07-08-2024		TLM4	
			13-08-2024		TLM3	
			14-08-2024		TLM4	
4.	Circular Double Linked List Program	4	20-08-2024		TLM3	
			21-08-2024		TLM4	
			27-08-2024		TLM3	
5.	Stack using Arrays and Linked List	5	28-08-2024		TLM4	
			10-09-2024		TLM3	
			11-09-2024		TLM4	
6.	Infix to Postfix, Evaluation of Postfix Expression using Stack	4	17-09-2024		TLM3	
			18-09-2024		TLM4	
			24-09-2024		TLM3	
7.	Queue using Arrays and Linked List	4	25-09-2024		TLM4	
			01-10-2024		TLM3	
			08-10-2024		TLM3	
8.	Circular Queue using Arrays and Linked List Dequeue using Linked List	5	09-10-2024		TLM4	
			15-10-2024		TLM3	
			16-10-2024		TLM4	

9.	Binary Search Tree	3	22-10-2024 23-10-2024		TLM3 TLM4	
10.	Binary Tree Traversals	3	30-10-2024 05-11-2024		TLM4 TLM3	
11.	Lab Internal Exam	3	06-11-2024			

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and 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	The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Ms. P. Sarala	Ms. P. Sarala	Dr. Y. V. Bhaskar Reddy	Dr. D. Veeraiah



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L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE., Section-A
Academic Year	: 2024-25
Course Name & Code	: Environmental Science – 23MC01
L-T-P-Cr	: 2-0-0
Course Instructure	: Dr. Shaheda Niloufer

Course Objectives:

1	To enlighten the learners in the concept of differential equations and multivariable calculus
2	To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

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

CO 1	The necessity of resources, their exploitation and sustainable management	L2
CO 2	The interactions of human and ecosystems and their role in the food web in the natural world and the global biodiversity, threats to biodiversity and its conservation.	L2
CO 3	Environmental problems like pollution, disasters and possible solutions.	L1
CO 4	The importance of environmental decision making in organizations through understanding the environmental law and environmental audits.	L2
CO 5	Environmental issues like over population, human health etc related to local, regional and global levels.	L2

Course Articulation Matrix - Correlation between COs, POs & PSOs

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

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

Textbooks (T) and References (R):

- T1:** Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
- T2:** Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
- T3:** S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
- T4:** K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.
- R1.** KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.
- R2.** Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
- R3.** M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication, 2014.
- R4.** J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
- R5.** J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
- R6.** G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
- R7.** Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Multidisciplinary Nature of Environmental studies

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 the course	1	15-07-2024			
2.	Multidisciplinary Nature of Environmental Studies	1	18-07-2024			
3.	Natural Resources – Forest resources	1	20-07-2024			
4.	Water resources	1	22-07-2024			
5.	Mineral resources & Food resources	1	25-07-2024			
6.	Energy resources	1	29-07-2024			
No. of classes required to complete UNIT-I : 6			No. of classes taken :			

UNIT-II: Ecosystems & 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
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1.	Ecosystems – Structure & Functions	1	05-08-2024			
2.	Ecological succession & Food chains, Food webs & Ecological Pyramids	1	08-08-2024			
3.	Types of ecosystems	1	12-08-2024			
4.	Biodiversity – introduction, levels, biogeographic classification	1	19-08-2024			
5.	Values of Biodiversity, India as mega diversity nation	1	22-08-2024			
6.	Threats to biodiversity & Conservation of biodiversity	1	29-08-2024			
No. of classes required to complete UNIT-II : 6			No. of classes taken :			

UNIT-III: 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.	Environmental pollution -Air pollution	1	09-09-2024			
2.	Water pollution, Marine pollution, Thermal pollution	1	13-09-2024			
3.	Soil pollution	1	16-09-2024			
4.	Noise pollution & Nuclear Hazards	1	19-09-2024			
5.	Solid waste management	1	23-09-2024			
6.	Disaster management	1	26-09-2024			
No. of classes required to complete UNIT-III : 6			No. of classes taken :			

UNIT-IV : Social issues & Environment

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.	From Unsustainable to Sustainable development	1	30-09-2024			
2.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	01-10-2024			
3.	Environmental ethics, Climate change	1	03-10-2024			
4.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	08-10-2024			
5.	Environmental Acts	1	15-10-2024			

6.	Environmental Acts	1	22-10-2024		
No. of classes required to complete UNIT-IV : 6			No. of classes taken :		

UNIT-V : Human population & Environment

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.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	24-10-2024			
2.	Environment and human health –Human Rights – Value Education	1	03-11-2024			
3.	HIV/AIDS – Women and Child Welfare	1	07-11-2024			
4.	Role of information Technology in Environment and human health	1	10-11-2024			
No. of classes required to complete UNIT-V : 4			No. of classes taken :			

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Case studies	1	13-09-2024			
2.	Case studies	1	03-10-2024			

Teaching Learning Methods

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

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 12:	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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

Course Instructor
Dr. Shaheda Niloufer

Course Coordinator
Dr. Shaheda Niloufer

Module Coordinator
Dr. Shaheda Niloufer

HOD
Dr. A. Rami Reddy



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Department of Electronics and Communication Engineering

COURSE HANDOUT

Name of Course Instructors: Mr.Ch Siva Rama Krishna/ Dr.P Lachi Reddy

Course Name: Association

Program/Sem/Sec :B.Tech./ECE III-Sem-A-Sec

A.Y:2024-2025

COURSE DELIVERY PLAN (LESSON PLAN):

S.No	Topic to be covered	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Discussion about Association Activities by course instructors and Self-Introduction.	19.07.2024		
2.	JAM on Mission GAGANYAAN	26.07.2024		
5.	Group Discussion on India's Energy Evolution : A Shift Towards Renewables.	02.08.2024		
6.	Exploring Block chain technology	09.08.2024		
7.	Debate on Trends and Threats of Artificial Intelligence.	16.08.2024		
8.	Group Discussion on Ethical Dilemmas in Modern Society	23.08.2024		
9.	Presentation on 5G Antennas.	30.08.2024		
10.	Presentation on Small Satellite Launch Vehicle (SSLV).	13.09.2024		
11.	Seminar on Agni-V Missile	20.09.2024		
12.	Discussion on role of AI in medical science.	27.09.2024		
13.	Exploring the opportunities in core company Jobs	04.10.2024		
14.	Technical Quiz on competitive exam topics.	18.10.2024		
15.	Discussion on Technical Magazines	25.10.2024		
16.	Technical Quiz.	01.11.2024		
17.	QUIZ on Current Affairs.	01.11.2024		

Course Instructors

Mr.Ch Siva Rama Krishna
Dr.P Lachi Reddy

HOD

Dr.G.Srinivasulu



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LESSON PLAN

Faculty Name : **T.Balakrishna**

Dept& Section : ECE-A

Subject : Quantitative Aptitude

Date: 15-07-2024

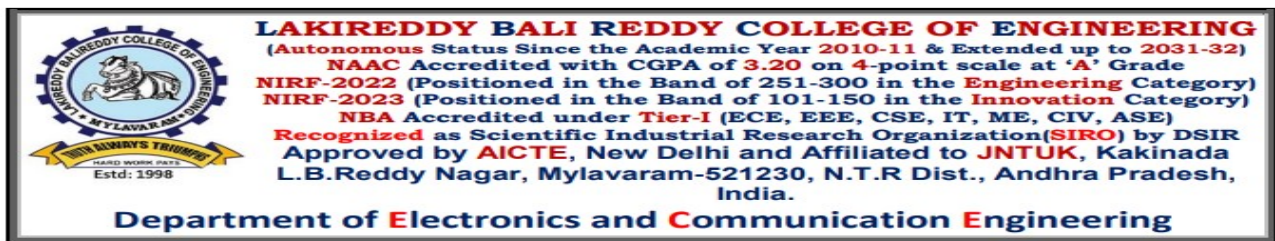
Semester: III

A.Y.: 2024-2025

S.No.	No. of Lecture Hours	Date	Planned Topics	Actual Date	Remarks
1	1	20-07-24	Introduction to Number System		
2	1	27-07-24	Unit Places		
3	1	03-08-24	LCM & HCF		
4	1	10-08-24	Coding and Decoding		
5	1	17-08-24	Mixed Letter and Number Coding		
6	1	24-08-24	Matrix Coding		
7	1	31-08-24	Averages		
8	1	14-09-24	Problems on Ages		
9	1	21-09-24	Problems on Numbers		
10	1	28-09-24	Ratio & Proportions		
11	1	05-10-24	Partnership		
12	1	12-10-24	Permutation and Combination		
13	1	19-10-24	Rank-Repetition, without repetition of letters		
14	1	26-10-24	Clocks-Angle, reflex angle		
15	1	02-11-24	Clocks-Mirror Image		

Signature of Faculty

Signature of HOD



COURSE HANDOUT

PART-A:

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section - B
Course Instructor : Dr. G. L. N. Murthy, Professor of ECE
Course Name & Code : Probability Theory and Stochastic Processes – 23FE12
L-T-P-Cr Structure : 3-0-0-3
Academic Year : 2024-25

Course Objectives:

1	To get basic understanding of random variables and operations that can be performed on them
2	To know the Spectral and temporal characteristics of Random Process.
3	To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics

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

CO1	Summarize the concepts of Probability and random processes.	L2
CO2	Examine the Temporal and Spectral characteristics of Random Signals.	L3
CO3	Analyze Linear Time Invariant systems driven by stationary random process by using Auto correlation function and Power spectral Density.	L4
CO4	Interpret the concepts of Noise and Information theory in Communication systems.	L2

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

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

Correlation Levels: 1.Slight(Low),2-Moderate(Medium), 3-Substantial (High).

Textbooks (T):

- T1** Peyton Z. Peebles, Jr, “Probability, Random Variables and Random Signal Principles”, Tata Mc Graw-Hill, 4th edition, New Delhi.
T2 Taub and Schilling - Principles of Communication systems, TMH, 2008

Reference Books(R)

- R1** B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003
R2 Y Mallikarjuna Reddy, “Probability theory and Stochastic Processes”, Universities Press (India), Pvt Ltd.
R3 Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002

PART-B: Course Delivery Plan (Lesson Plan): B.Tech., ECE., III-Sem., Section - B**UNIT-I: Probability & Random Variable**

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 PTSP Course	1	15-07-24			
2.	Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces	1	19-07-24			
3.	Discrete and Continuous Sample Spaces	1	20-07-24			
4.	Events, Probability Definitions and Axioms	1	22-07-24			
5.	Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events	1	24-07-24			
6.	Concept of Random Variable, Conditions for a function to be a Random Variable	1	26-07-24			
7.	Classification of Random Variable, Cumulative Distribution Function (CDF) and Properties	1	27-07-24			
8.	Probability Density Function (PDF) and Properties	1	29-07-24			
9.	Pre-Defined Distributions	1	31-07-24			
10.	Pre-Defined Distributions	1	02-08-24			
11.	Tutorial-I	1	03-08-24			
No. of classes required to complete UNIT-I:11			No. of classes taken:			

UNIT-II: Operations on Single & Multiple Random Variables-Expectations

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin	1	05-08-24			
13.	Central Moments, Variance and Skew	1	07-08-24			
14.	Chebychev's Inequality, Characteristic Function	1	09-08-24			
15.	Moment Generating Function, Vector random variables	1	12-08-24			
16.	Joint Distribution Function and Properties, Marginal Distribution Function	1	14-08-24			
17.	Joint Density Function and Properties, Marginal Density Function	1	16-08-24			
18.	Statistical Independence, Sum of Two Random Variables, Distribution and Density of Sum of Random Variables	1	17-08-24			
19.	Central Limit Theorem, Unequal Distribution, Equal Distributions	1	19-08-24			
20.	Expected Value of Function of Random Variables, Joint Moment about the Origin	1	21-08-24			
21.	Joint Central Moments	1	23-08-24			
22.	Joint Characteristic Functions	1	24-08-24			

23.	Tutorial-II	1	28-08-24			
No. of classes required to complete UNIT-II :12			No. of classes taken:			

UNIT-III: Random Processes-Temporal Characteristics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes	1	30-08-24			
25.	Distribution and Density Functions, concept of Stationarity and Statistical Independence	1	31-08-24			
26.	First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity	1	09-09-24			
27.	Time Averages and Ergodicity	1	11-09-24			
28.	Mean-Ergodic Processes, Correlation-Ergodic Processes	1	13-09-24			
29.	Problem Solving session	1	18-09-24			
30.	Autocorrelation Function and Its Properties	1	20-09-24			
31.	Cross-Correlation Function and Its Properties	1	21-09-24			
32.	Covariance Functions	1	23-09-24			
33.	Convolution, Mean and Mean-squared Value of System Response	1	25-09-24			
34.	Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output	1	27-09-24			
35.	Tutorial-II	1	28-09-24			
No. of classes required to complete UNIT-III:12			No. of classes taken:			

UNIT-IV: Random Processes – Spectral Characteristics

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	The Power Spectrum: Properties	1	30-09-24			
37.	Relationship between Power Spectrum and Autocorrelation Function	1	04-10-24			
38.	The Cross-Power Density Spectrum, Properties	1	05-10-24			
39.	Relationship between Cross-Power Spectrum and Cross-Correlation Function	1	07-10-24			
40.	Spectral Characteristics of System Response: Power Density Spectrum of Response	1	08-10-24			
41.	Cross-Power Density Spectrums of Input and Output		11-10-24			

42.	Problem Solving Session	1	14-10-24			
43.	Tutorial-III	1	16-10-24			
No. of classes required to complete UNIT-IV:8			No. of classes taken:			

UNIT-V: Noise Sources & Information Theory

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Resistive/Thermal Noise Source, Arbitrary Noise Sources	1	18-10-24			
45.	Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures	1	19-10-24			
46.	Average Noise Figure of cascaded networks, Narrow Band noise	1	21-10-24			
47.	Quadrature representation of narrow band noise & its properties	1	23-10-24			
48.	Entropy, Information rate	1	25-10-24			
49.	Source coding: Huffman coding, Shannon Fano coding	1	26-10-24			
50.	Mutual information	1	28-10-24			
51.	Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR	1	30-10-24			
52.	Tutorial-V	1	02-11-24			
53.	Problem Solving Session	1	04-11-24			
No. of classes required to complete UNIT-V:11			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
54.	Stochastic Signal Processing (SSP)	1	06-11-24			
55.	Applications of SSP	1	08-11-24			

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

PART-C: EVALUATION PROCESS:

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

II- Descriptive Examination (UNIT-III , IV & V)	M2=15
II-Quiz Examination (UNIT-III,IV & V)	Q2=10
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:

Program Educational Objectives (PEOs):

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

Program Outcomes(POs):

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

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

Program Specific Outcomes (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 15.07.2024
Dr. G L N Murthy
Dr. G L N Murthy
Dr. G L N Murthy
Dr.G.Srinivasulu
Course Instructor
Course Coordinator
Module Coordinator
HOD



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Program	: B.Tech. III-Sem., ECE., Section-B
Academic Year	: 2024-25
Course Name & Code	: Universal Human Values - II: Understanding Harmony (23HS01)
L-T-P-Cr	: 2-1-0-3
Course Instructure	: Dr.A.Narendra Babu

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

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

CO1	Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)
CO2	Identify one's self, and one's surroundings (family, society nature) (L2)
CO3	Relate human values with human relationship and human society. (L2)
CO4	Illustrate the need for universal human values and harmonious existence (L2)
CO5	Develop as socially and ecologically responsible engineers (L3)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO2								2							
CO3			2					3							2
CO4						2		3	2						
CO5						1		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: Introduction to Value Education**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Cos and Syallabus overview	1	15-07-24		TLM2	
2.	Process for self exploration: Natural Acceptance	1	18-07-24		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	1	20-07-24		TLM2	
4.	Understanding Value Education	1	22-07-24		TLM2	
5.	self-exploration as the Process for Value Education	1	24-07-24		TLM2	
6.	Continuous Happiness and Prosperity	1	25-07-24		TLM2	
7.	Happiness and Prosperity	1	27-07-24		TLM2	
8.	Happiness and Prosperity	1	29-07-24		TLM2	
9.	Method to Fulfill the Basic Human Aspirations	1	31-07-24		TLM2	
10.	Method to Fulfill the Basic Human Aspirations	1	01-08-24		TLM2	
11.	Tutorial - 1	1	03-08-24		TLM3	
No. of classes required to complete UNIT-I: 11				No. of classes taken:		

UNIT-II: Harmony in the Human Being

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Understanding Human being as the Co-existence of the self and the body	1	05-08-24		TLM2	
13.	Distinguishing between the Needs of the self and the body	1	07-08-24		TLM2	

14.	Distinguishing between the Needs of the self and the body	1	08-08-24		TLM2	
15.	The body as an Instrument of the self	1	12-08-24		TLM2	
16.	Understanding Harmony in the self	1	14-08-24		TLM2	
17.	Understanding Harmony in the self Harmony of the self with the body	1	17-08-24		TLM2	
18.	Programme to ensure self-regulation and Health	1	19-08-24		TLM2	
19.	Programme to ensure self-regulation and Health	1	21-08-24		TLM2	
20.	Tutorial -2	1	22-08-24		TLM3	
No. of classes required to complete UNIT-II: 9				No. of classes taken:		

UNIT III: Harmony in the Family and Society

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.	Harmony in the Family	1	24-08-24		TLM2	
22.	'Trust' – the Foundational Value in Relationship	1	28-08-24		TLM2	
23.	Practice Session PS7 Exploring the Feeling of Trust	1	29-08-24		TLM2	
24.	'Respect' – as the Right Evaluation	1	31-08-24		TLM1	
25.	Practice Session PS8 Exploring the Feeling of Respect	2	09-09-24 11-09-24		TLM2	
26.	Other Feelings, Justice in Human-to-Human Relationship	2	12-09-24 14-09-24		TLM2	
27.	Understanding Harmony in the Society	2	18-09-24 19-09-24		TLM2	
28.	Vision for the Universal Human Order	2	21-09-24 23-09-24		TLM2	
29.	Tutorial-3	1	25-09-24		TLM3	
No. of classes required to complete UNIT-III: 13				No. of classes taken:		

UNIT-IV: Harmony in the Nature/Existence

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.	Understanding Harmony in the Nature	2	26-09-24		TLM2	
31.	Interconnectedness, self-regulation	2	28-09-24 30-09-24		TLM2	

32.	Mutual Fulfilment among the Four Orders of Nature	2	03-10-24 05-10-24		TLM2	
33.	Realizing Existence as Co-existence at All Levels	2	07-10-24 09-10-24		TLM2	
34.	The Holistic Perception of Harmony in Existence	2	10-10-24		TLM2	
35.	Tutorial -4	1	14-10-24		TLM3	
No. of classes required to complete UNIT-IV: 11				No. of classes taken:		

UNIT-V: Implications of the Holistic Understanding

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Natural acceptance of human values	1	16-10-24		TLM2	
37.	Definitiveness of ethical human conduct	1	17-10-24		TLM2	
38.	Basis for humanistic education	1	19-10-24		TLM2	
39.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human	2	21-10-24 23-10-24		TLM2	
40.	Competence in professional ethics	2	24-10-24 26-10-24		TLM2	
41.	Strategy for transition from the present state to universal human order	2	28-10-24 30-10-24		TLM2	
42.	Holistic Technologies, Production Systems and Management Models- Typical Case	2	02-11-24 04-11-24		TLM2	
43.	Tutorial -5	1	06-11-24		TLM3	
44.	Review	1	07-11-24		TLM2	
45.	Review	1	09-11-24		TLM2	
No. of classes required to complete UNIT-V: 14				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)	A1=5
I-Descriptive Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	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.A.Narendra Babu	Dr. B. SRINIVASA RAO	Dr. G.Srinivasulu
Signature				



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE., Section-B
Academic Year	: 2024-25
Course Name & Code	: Signals and Systems – 23EC02
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Mr. M K Linga Murthy

Course Objectives:

1	To study about signals and systems
2	To analyze the spectral characteristics of signals
3	To understand the characteristics of systems
4	To introduce the concept of sampling process
5	To know various transform techniques to analyze the signals and systems

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

CO 1	Summarize the basic concepts of signals, systems and sampling	L2
CO 2	Examine the operations on signals and approximate using orthogonal functions	L3
CO 3	Apply the concept of impulse response to analyze the LTI systems	L3
CO 4	Analyze both continuous time and discrete time signals and systems using Fourier series, Fourier transform, Laplace transforms and Z-Transforms	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	1
CO 2	2	1	1	-	-	-	-	-	-	-	-	-	1	-	2
CO 3	3	1	1	1	-	-	-	-	-	-	-	1	-	-	2
CO 4	3	2	1	1	-	-	-	-	-	-	-	2	2	-	3

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

Textbooks (T) and References (R):

T1: B P Lathi, Signals, Systems and Communications, BSP, 3rd Edition, 2003.

T2: AV Oppenheim, AS Wilsky and IT Young, Signals and Systems, PHI, 2nd Edition, 1997.

T3: Simon Haykin and Van Veen, Signals and Systems, Wiley, 2nd Edition 2007.

R1: B P Lathi, Principles of Linear Systems and Signals, Oxford University Press, 2015.

R2: TK Rawat, Oxford University Press, 2011.

PART-B: Course Delivery Plan (Lesson Plan): B.Tech., ECE., III-Sem., Section - B**UNIT-I: Introduction**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	15.07.2024			
2.	Definition and Classification of signals	1	18.07.2024			
3.	Definition and Classification of systems	1	19.07.2024			
4.	Singularity and Related signals	1	22.07.2024			
5.	Complex exponential and sinusoidal signals	1	24.07.2024			
6.	Operations on signals	1	25.07.2024			
7.	Properties of signals	1	26.07.2024			
8.	Problem Solving Session	1	29.07.2024			
9.	Analogy between vectors and signals, orthogonal signal space	1	31.07.2024			
10.	Signal approximation using orthogonal functions	1	01.08.2024			
11.	orthogonal signal space, closed or complete set of orthogonal functions	1	02.08.2024			
12.	Orthogonality in complex functions	1	05.08.2024			
13.	Problem Solving Session	1	07.08.2024			
No. of classes required to complete UNIT-I : 13			No. of classes taken :			

UNIT-II: Fourier Series & Fourier Transforms

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.	Fourier series representation of continuous time periodic signals	1	08.08.2024			
2.	properties of Fourier series, Dirichlet's conditions	1	09.08.2024			
3.	Trigonometric Fourier series and Exponential Fourier series	1	12.08.2024			
4.	Relation between Trigonometric and Exponential Fourier series	1	14.08.2024			
5.	Complex Fourier spectrum, Deriving Fourier transform from Fourier series	1	16.08.2024			
6.	Fourier transform of arbitrary signals	1	19.08.2024			
7.	Fourier transform of standard signals	1	21.08.2024			
8.	Fourier transform of periodic signals	1	22.08.2024			
9.	properties of Fourier transforms	1	23.08.2024			
10.	Fourier transforms involving impulse function and Signum function.	1	28.08.2024			
11.	Introduction to Hilbert Transform and Problem Solving Session	1	29.08.2024			
12.	Problem Solving Session	1	30.08.2024			
No. of classes required to complete UNIT-II : 12			No. of classes taken :			

UNIT-III: Analysis of Linear 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.	Linear system, impulse response, Response of a linear system	1	09.09.2024			
2.	Linear time invariant (LTI) system, Linear time variant (LTV) system	1	11.09.2024			
3.	Concept of convolution in time domain and frequency domain, Graphical representation of convolution	1	12.09.2024			
4.	Problem Solving Session	1	13.09.2024			
5.	Transfer function of a LTI system, Filter characteristics of linear systems	1	18.09.2024			
6.	Distortion less transmission through a system, Signal band width, system band width	1	19.09.2024			
7.	Ideal LPF, HPF and BPF characteristics	1	20.09.2024			
8.	Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time	1	23.09.2024			
9.	Problem Solving Session	1	25.09.2024			
No. of classes required to complete UNIT-III : 9			No. of classes taken :			

UNIT-IV : Signal Transmission Through Linear 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.	Auto-correlation function and properties	1	26.09.2024			
2.	Energy density spectrum, Power density spectrum, Parseval's theorem	1	27.09.2024			
3.	Cross-correlation function and properties	1	30.09.2024			
4.	Relation between Convolution and correlation	1	03.10.2024			
5.	Detection of periodic signals in the presence of noise by correlation	1	04.10.2024			
6.	Extraction of signal from noise by filtering	1	07.10.2024			
7.	Sampling Theorem-Graphical and analytical proof for Band Limited Signals	1	14.10.2024			
8.	Impulse sampling, Natural and Flat top Sampling	1	16.10.2024			
9.	Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling	1	17.10.2024			
10.	Problem Solving Session	1	18.10.2024			
No. of classes required to complete UNIT-IV : 10			No. of classes taken :			

UNIT-V : Laplace Transforms and Z-Transforms

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 Laplace Transforms	1	21.10.2024			
2.	Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals	1	23.10.2024			
3.	Properties of L.T's	1	24.10.2024			
4.	Inverse Laplace transform	1	25.10.2024			
5.	Relation between L.T's, and F.T. of a signal, Laplace transform of certain signals using waveform synthesis	1	28.10.2024			
6.	Concept of Z-Transform of a discrete sequence	1	30.10.2024			
7.	Region of convergence in Z- Transform, constraints on ROC for various classes of signals	1	01.11.2024			
8.	Inverse Z- transform	1	04.11.2024			
9.	Properties of Z-transforms	1	06.11.2024			
10.	Distinction between Laplace, Fourier and Z-transforms	1	07.11.2024			
11.	Problem Solving Session	1	08.11.2024			
No. of classes required to complete UNIT-V : 11			No. of classes taken :			

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Transform Techniques	1	08.11.2024			
2.	Signal Processing	1	08.11.2024			

Teaching Learning Methods

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

PART-C: Evaluation Process (R23)

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

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

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

Program Specific Outcomes (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
Mr. M K Linga Murthy

Course Coordinator
Dr. B. Rambabu

Module Coordinator
Dr. G.L.N Murthy

HOD
Dr. G. Srinivasulu



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New Delhi and Affiliated to JNTUK, Kakinada L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE., Section– B
Academic Year	: 2024-25
Course Name & Code	: Electronic Devices and Circuits – 23EC03
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Dr. B.V.N.R.Siva Kumar

Course Objectives:

1	To learn and understand the basic concepts of semiconductor physics.
2	Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
3	To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
4	Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
5	To learn and understand the purpose of transistor biasing and its significance
6	Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

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

CO 1	Recall the fundamentals of semiconductor physics necessary for electronic devices and circuits (Remember)	L1
CO 2	Illustrate the structure and operation of Diodes, Bipolar Junction Transistors, Field Effect Transistors and biasing of BJT & FET using fundamental circuits. (Understand)	L2
CO 3	Apply the knowledge of Diodes, Transistors and Filters for designing the Rectifiers, Regulators and Amplifier circuits using basic components. (Apply)	L3
CO 4	Analyze the characteristics of Diodes, Bipolar Junction Transistors, Field Effect Transistors and their equivalent models using V-I Characteristics. (Analyze)	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	1	-	-	3	1	-	-	-	1	2	1	1	-
CO 2	2	1	2	1	-	3	1	-	-	-	-	1	1	1	-
CO 3	3	1	1	-	-	-	1	-	-	-	-	-	2	2	-
CO 4	1	3	-	-	-	-	-	-	-	-	1	1	2	2	-

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

Textbooks (T) and References (R):

- T1:** Millman’s Electronic Devices and Circuits- J. Millman, C. C. Halkias and SatyabrataJit, Mc-Graw Hill Education, 4th edition, 2015..
- T2:** Millman’s Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.
- T3:** Fundamentals of Microelectronics-BehzadRazavi, Wiley, 3rd edition, 2021.
- R1:** Basic Electronics-Principles and Applications, ChinmoySaha, ArindamHalder, DebaratiGanguly Cambridge University Press, 1st edition, 2018.
- R2:** Electronics devices & circuit theory- Robert L.Boylestad and Louis Nashelsky, Pearson, 11th edition, 2015.
- R3:** Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.

Online Learning Resources:

1. <https://nptel.ac.in/courses/108108112>
2. <https://nptel.ac.in/courses/108101091>
3. <https://nptel.ac.in/courses/108102095>

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Review of Semiconductor Physics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course Objectives and Outcomes. Unit-I Introduction	1	16-07-2024			
2.	Review of Semiconductor Physics: Mobility and Conductivity	1	18-07-2024			
3.	Intrinsic and Extrinsic Semiconductors	1	19-07-2024			
4.	Continuity Equation, Law of Junction.	1	20-07-2024			
5.	Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction	1	23-07-2024			
6.	p-n junction diode, Current components in p-n junction Diode	1	25-07-2024			
7.	Diode equation, V-I Characteristics	1	26-07-2024			
8.	Temperature dependence on V-I characteristics	1	27-07-2024			
9.	Diode resistance, Diode capacitance.	1	30-07-2024			
10.	Special Semiconductor Devices: Zener Diode, Breakdown Mechanisms and Applications	1	01-08-2024			
11.	Varactor Diode, LED	1	02-08-2024			
12.	Photodiode, Tunnel Diode	1	03-08-2024			
13.	UJT, PNP Diode	1	06-08-2024			
14.	SCR, Construction, Operation and V-I characteristics	1	08-08-2024			
No. of classes required to complete UNIT-I : 14			No. of classes taken :			

UNIT-II: Diode Circuits

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Diode Circuits: The Diode as a circuit element. The Load-Line concept.	1	09-08-2024			
2.	The Piecewise Linear Diode Model, Clipping (limiting) Circuits.	1	12-08-2024			
3.	Clipping at Two Independent Levels.	1	13-08-2024			
4.	Peak Detector, Clamping circuits	1	16-08-2024			
5.	Basic Rectifier Setup, Half Wave Rectifier	1	17-08-2024			
6.	Full Wave Rectifier, Bridge Rectifier	1	20-08-2024			
7.	Derivations of Characteristics of Rectifiers	1	22-08-2024			
8.	Filters, Inductor Filter	1	23-08-2024			
9.	Capacitor Filter, π -Section Filter	1	24-08-2024			
10.	Comparison of various Filter Circuits in terms of Ripple Factors.	1	27-08-2024			
No. of classes required to complete UNIT-II : 10			No. of classes taken :			

UNIT-III: Transistor Characteristics & Transistor Biasing and Thermal Stabilization

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.	Transistor Characteristics: Junction transistor, Transistor current components, CB configuration	1	29-08-2024			
2.	Transistor as an amplifier,	1	30-08-2024			
3.	characteristics of transistor in CB, CE,CC configurations	1	31-08-2024			
4.	Ebers-Moll model of a transistor,	1	10-09-2024			
5.	punch through/ reach through,	1	12-09-2024			
6.	Photo transistor, typical transistor junction voltage values.	1	13-09-2024			
7.	Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis,	1	14-09-2024			
8.	BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias.	1	17-09-2024			
9.	Stabilization against variations in V_{BE} , I_c , and β , Stability factors, (S, S', S'') ,	1	19-09-2024			
10.	Bias compensation, Thermal runaway, Thermal stability.	1	20-09-2024			
No. of classes required to complete UNIT-III : 10			No. of classes taken :			

UNIT-IV : Small Signal Low Frequency Transistor Amplifier Models

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	BJT: Two port network, Transistor hybrid model	1	21-09-2024			
2.	Determination of h-parameters for a BJT amplifier	1	24-09-2024			
3.	Conversion of h-parameters	1	26-09-2024			
4.	generalized analysis of transistor amplifier model using h-parameters	1	27-09-2024			
5.	Analysis of CB amplifiers using exact and approximate analysis.	1	28-09-2024			
6.	Analysis of CE amplifiers using exact and approximate analysis	1	01-10-2024			
7.	Analysis of CC amplifiers using exact and approximate analysis	1	03-10-2024			
8.	Comparison of transistor amplifiers	1	04-10-2024			
9.	generalized analysis of transistor amplifier model using h-parameters	1	05-10-2024			
10.	Problem Solving Session	1	08-10-2024			
No. of classes required to complete UNIT-IV : 10			No. of classes taken :			

UNIT- V: FET

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.	FET types, JFET operation.	1	15-10-2024			
2.	Characteristics, small signal model of JFET					
3.	MOSFET Structure, Operation of MOSFET in triode region	1	16-10-2024			
4.	Operation in saturation region, MOSFET as a variable resistor,	1	17-10-2024			
5.	Derivation of V-I characteristics of MOSFET		21-10-2024			
6.	Channel length modulation, MOS transconductance	1	22-10-2024			
7.	MOS device models: MOS small signal model, PMOS Transistor,	1	23-10-2024			
8.	CMOS Technology, Comparison of Bipolar and MOS devices.	1	24-10-2024			
9.	CMOS amplifiers: General Considerations	1	28-10-2024			
10.	Common Source Stage ,Common Gate Stage.	1	02-11-2024			
11.	Source Follower, comparison of FET amplifiers.	1	04-11-2024			
No. of classes required to complete UNIT V :		No. of classes taken:				

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Realization of Universal gates with CMOS transistor	1	05-11-2024			
2.	TTL logic Family	1	06-11-2024			
3	ECL logic Family	1	07-11-2024			

Teaching Learning Methods

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

PART-C: Evaluation Process (R23)

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

Program Educational Objectives (PEOs):

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

Program Specific Outcomes (PSOs):

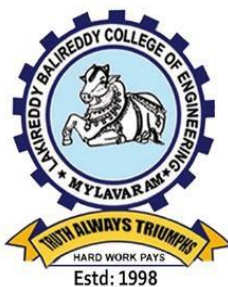
PSO 1:	Communication: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	VLSI and Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and implement real time applications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

Course Instructor
Dr.B.V.N.R.Sivakumar

Course Coordinator
Dr. B.V.N.R. Sivakumar

Module Coordinator
Dr. T.Satyanarayana

HOD
Dr. G. Srinivasulu



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 L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART: A

Program/Sem/Sec	: B.Tech., ECE., III-Sem., Section – B
Academic Year	: 2024-25
Course Name & Code	: Switching Theory and Logic Design – 23EC04
L-T-P-Cr Structure	: 3-0-0-3
Course Instructor	: Dr. G.Srinivasulu

Course Objectives:

1	To solve a typical number base conversion and analyze new error coding techniques.
2	To understand the behavior of logic gates by using theorems and functions of Boolean algebra.
3	To optimize logic gates for digital circuits using various techniques .
4	To perform Boolean function simplification using Karnaugh maps and Quine-McCluskey methods .
5	To understand concepts of combinational circuits.
6	To develop advanced sequential circuits.

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

CO 1	Summarize the key differences between number systems and their usage in Digital Circuits.	L2
CO 2	Identify the minimization techniques of Boolean expressions to implement Digital Circuits using basic logic gates and logic circuits	L3
CO 3	Apply the minimization and realization methods for designing the Combinational & Sequential logic circuits	L3
CO 4	Analyze the Combinational, Sequential, Finite State Machines for implementation of digital logic circuits	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	1	-	-	-	-	2	-	-	-	1	-	3	-
CO 2	2	3	3	-	-	-	-	2	-	-	-	1	-	3	-
CO 3	2	3	3	1	-	-	-	2	-	-	-	1	-	3	-
CO 4	2	3	3	2	-	-	-	2	-	-	-	3	-	3	-

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

Textbooks (T) and References (R):

T1: Switching and finite automata theory Zvi.KOHAVI, Niraj. K. Jha 3rd Edition, Cambridge University Press, 2009.

T2: Digital Design by M. Morris Mano, Michael D Ciletti, 4th edition PHI publication, 2008.

T3: Switching theory and logic design by Hill and Peterson, Mc-Graw Hill TMH edition, 2012.

R1: Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 2006

R2: Digital electronics by R S Sedha. S. Chand & company limited, 2010

R3 : Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvt ltd, 2016.

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)**UNIT-I: REVIEW OF NUMBER SYSTEMS & CODES, BOOLEAN THEOREMS AND LOGIC OPERATIONS**

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, Representation of numbers of different radix.	1	15-07-2024		TLM1	
2.	conversion from one radix to another radix	1	16-07-2024		TLM1	
3.	r- 1's compliments and r's compliments of signed numbers	1	20-07-2024		TLM1	
4.	2421 & 84-2-1 code	1	22-07-2024		TLM1	
5.	Error detection codes: parity checking, even parity, odd parity	1	23-07-2024		TLM1	
6.	Error correction codes: Hamming code.	1	24-07-2024		TLM1	
7.	Boolean theorems	1	27-07-2024		TLM1	
8.	Principle of complementation & duality, De-Morgan theorems.	1	29-07-2024		TLM1	
9.	Logic operations; Universal Logic operations, EX-OR, EX- NOR operations.	1	30-07-2024		TLM1	
10.	Standard SOP and POS Forms	1	31-07-2024		TLM1	
11.	NAND-NAND and NOR-NOR realizations	1	03-08-2024		TLM1	
12.	Realization of three level logic circuits.	1	05-08-2024		TLM1	
No. of classes required to complete UNIT-I : 12			No. of classes taken :			

UNIT-II: MINIMIZATION TECHNIQUES, COMBINATIONAL LOGIC CIRCUITS DESIGN.

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Minimization and realization of switching functions using Boolean theorems	1	06-08-2024		TLM1	
2.	Minimization and realization of switching functions using Boolean theorems	1	07-08-2024		TLM1	
3.	K-Map(2,3 variables)	1	12-08-2024		TLM1	
4.	K-Map(4,5 variables)	1	13-08-2024		TLM1	
5.	K-Map(6 variables)	1	14-08-2024		TLM2	

6.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	17-08-2024		TLM1
7.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	19-08-2024		TLM1
8.	Design of Full Adder, half subtractor	1	20-08-2024		TLM1
9.	full subtractor, applications of full adders	1	21-08-2024		TLM1
10.	4- bit adder-sub tractor circuit	1	24-08-2024		TLM1
11.	BCD adder circuit ,Excess 3 adder circuit	1	27-08-2024		TLM1
12.	carry look-a- head adder circuit	1	28-08-2024		TLM2
13.	Design code converts using Karnaugh method and draw the complete circuit diagrams	1	31-08-2024		TLM1
No. of classes required to complete UNIT-II : 13			No. of classes taken :		

UNIT-III: COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI & LSI, INTRODUCTION OF PLD's

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.	Design of encoder, decoder	1	09-09-2024		TLM1	
2.	multiplexer and de-multiplexers	1	10-09-2024		TLM1	
3.	Implementation of higher order circuits using lower order circuits	1	11-09-2024		TLM1	
4.	Realization of Boolean functions using decoders	1	17-09-2024		TLM1	
5.	Realization of Boolean functions using multiplexers	1	18-09-2024		TLM1	
6.	Design of Priority encoder, 4-bit digital comparator	1	21-09-2024		TLM1	
7.	seven segment decoder	1	23-09-2024		TLM1	
8.	PROM-Basics structures, realization of Boolean functions, Programming table.	1	24-09-2024		TLM1	
9.	PAL -Basics structures, realization of Boolean functions, Programming table.	1	25-09-2024		TLM2	
10	PLA -Basics structures, realization of Boolean functions, Programming table.	1	28-09-2024		TLM1	
No. of classes required to complete UNIT-III : 10			No. of classes taken :			

UNIT-IV : SEQUENTIAL CIRCUITS-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Classification of sequential circuits (synchronous and asynchronous),operation of NAND & NOR Latches	1	30-09-2024		TLM1	
2.	Flip-Flops: Truth tables and excitation tables of RS flip-flop, JK flip- flop, with reset and clear terminals	1	01-10-2024		TLM1	
3.	Flip-Flops: Truth tables and excitation tables of T- flip-flop, D flip- flop, with reset and clear terminals	1	05-10-2024		TLM1	
4.	Conversion from one flip-flop to another flip- flop.	1	07-10-2024		TLM1	
5.	Conversion from one flip-flop to another flip- flop.	1	08-10-2024		TLM1	
6.	Design of ripple counters, design of synchronous counters	1	09-10-2024		TLM1	
7.	Johnson counter, ring counter.	1	14-10-2024		TLM1	

8.	Design of registers - Buffer register, control buffer register, shift register.	1	15-10-2024		TLM1
9.	Bi- directional shift register, universal shift, register.	1	16-10-2024		TLM2
10.	Study the following relevant ICs and their relevant functions 7474, 7475, 7476	1	19-10-2024		TLM1
11.	Study the following relevant ICs and their relevant functions 7490, 7493, 74121.	1	21-10-2024		TLM1
No. of classes required to complete UNIT-IV : 11			No. of classes taken :		

UNIT-V : SEQUENTIAL CIRCUITS-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Finite state machine: state diagrams, state tables	1	22-10-2024		TLM1	
2.	Reduction of state tables	1	23-10-2024		TLM1	
3.	Reduction of state tables	1	26-10-2024		TLM1	
4.	Analysis of clocked sequential circuits Mealy to Moore conversion	1	28-10-2024		TLM1	
5.	Analysis of clocked sequential circuits Moore to Mealy to conversion	1	29-10-2024		TLM1	
6.	Realization of sequence generator	1	30-10-2024		TLM1	
7.	Design of Clocked Sequential Circuit to detect the given sequence (with overlapping)	1	02-11-2024		TLM5	
8.	Design of Clocked Sequential Circuit to detect the given sequence (without overlapping)	1	04-11-2024		TLM1	
No. of classes required to complete UNIT-V : 08			No. of classes taken :			

Content beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Design of 32-bit Adder	1	05-11-2024		TLM2	
2.	Introduction to HDL, Verilog HDL	1	06-11-2024		TLM2	

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10

Assignment-II (III,IV & V)	A2=5
II- Descriptive Examination (Unit-III,IV & V)	M2=15
II-Quiz Examination (Unit-III,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

Program Educational Objectives(PEOs):

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

Program Outcomes (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3:	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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PO 12:	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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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

Dt:15.07.2024

Course Instructor
Dr. G.Srinivasulu

Course Coordinator
Mr.Ch.Sivaramakrishna

Module Coordinator
Dr.P.Lachi Reddy

HOD
Dr. G. Srinivasulu



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Date: 13-07-2024

Name of Course Instructor	: Dr. B.V.N.R. Siva Kumar, Dr K Rani Rudrama, Mrs. B. Rajeswari
Course Name & Code	: Electronic Devices and Circuits Lab -23EC52
L-T-P Structure	: 0-0-3
Program/Sem/Sec	: B.Tech., ECE. /III/ B
	Credits: 1.5
	A.Y. : 2024-25

Course Objectives: This course introduces the characteristics and applications of semiconductor devices. Emphasis is placed on characteristics and testing practically to strengthen the knowledge.

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

CO1	Demonstrate the characteristics of BJT, FET, SCR, UJT and applications of diode. (Apply-L3)
CO2	Model the Rectifiers, filters and Amplifiers used in electronic circuits. (Apply-L3)
CO3	Analyze the device parameters of Diodes, Bipolar Junction Transistors, and Field Effect Transistors for its electrical parameters using VI characteristics. (Analyze - L4).
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	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	-	-	1	1	-	2	-
CO3	3	1	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): BATCH-I

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to EDC Lab experiments, COs, POs and PSOs.	3	16-07-2024		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	23-07-2024		TLM4	
3.	Design of Clipper circuit using diode.	3	30-07-2024		TLM4	
4.	Design of Clamping circuit using diode	3	06-08-2024		TLM4	
5.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier	3	13-08-2024		TLM4	
6.	Determination of h-parameter of a BJT in CE configuration	3	20-08-2024		TLM4	
7.	Determination of Break over voltage of SCR using V-I Characteristics	3	27-08-2024		TLM4	
8.	UJT Characteristics	3	10-09-2024		TLM4	
9.	Estimation of Stability factor for a transistor self-biasing circuit	3	17-09-2024		TLM4	
10.	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	3	24-09-2024		TLM4	
11.	Design of Emitter Follower-CC Amplifier, Design of FET-CS Amplifier	3	01-10-2024		TLM4	
12.	Revision	3	08-10-2024		TLM4	
13.	Lab Internal examination	3	15-10-2024			
No. of classes required: 39				No. of classes taken:		

COURSE DELIVERY PLAN (LESSON PLAN): BATCH-II

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to EDC Lab experiments, COs, POs and PSOs.	3	20-07-2024		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	27-07-2024		TLM4	
3.	Design of Clipper circuit using diode.	3	03-08-2024		TLM4	
4.	Design of Clamping circuit using diode	3	17-08-2024		TLM4	
5.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier	3	24-08-2024		TLM4	
6.	Determination of h-parameter of a BJT in CE configuration	3	31-08-2024		TLM4	
7.	Determination of Break over voltage of SCR using V-I Characteristics	3	21-09-2024		TLM4	
8.	UJT Characteristics, Estimation of Stability factor for a transistor self-biasing circuit	3	28-09-2024		TLM4	
9.	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	3	05-10-2024		TLM4	
10.	Design of Emitter Follower-CC Amplifier, Design of FET-CS Amplifier	3	19-10-2024		TLM4	
11.	Lab Internal examination	3	02-11-2024			
No. of classes required: 33				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10
Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE): (A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

PART-D

Program Educational Objectives (PEOs):

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Program Outcomes (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 12:	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program 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.

Course Instructor
Dr. B.V.N.R.Sivakumar

Course Coordinator
Dr. K.RaniRudrama

Module Coordinator
Dr. T. Satyanarayana

HOD
Dr. G. Srinivasulu



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE., Section-B
Academic Year	: 2024-25
Course Name & Code	: Switching Theory and Logic Design Lab – 23EC53
L-T-P-Cr	: 0-0-3-1.5
Course Instructure	: CH. Mallikharjuna Rao, M.K.Linga Murthy, G.Asha

Course Objectives:

This course gives the ability to design and verify digital logic circuits like; logic gates, combinational and sequential logic circuits using discrete components and Integrated Circuits.

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

CO 1	Demonstrate the functionality of Logic gates, Flip-flops, Shift registers and Counters	L2
CO 2	Apply the Boolean minimization methods to implement Combinational and Sequential logic circuits using logic gates	L3
CO 3	Analyze the behavior of Combinational and Sequential logic circuits	L4
CO 4	Adapt effective Communication, presentation and report writing skills	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
CO 1	2	3	3	1	2	3	-	2	-	-	-	1	-	3	-
CO 2	2	1	1	1	1	3	-	2	-	-	-	1	-	3	-
CO 3	2	1	1	-	1	3	-	2	-	-	-	1	-	3	-
CO 4	-	-	-	-	-	-	-	-	-	3	-	3	-	3	-

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

PART-B: COURSE DELIVERY PLAN (LESSON PLAN):Batch-I

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to STLD Lab experiments,COs,Pos and PSOs.	3	16.7.2024		TLM4	
2.	Implementation of the following Logic gates using Universal Gates: Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR	3	23.7.2024		TLM4	
3.	Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.	3	30.7.2024		TLM4	
4.	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	6.8.2024		TLM4	
5.	4 variable logic function verification using 8 to 1 multiplexer.	3	13.8.2024		TLM4	
6.	Design full adder circuit and verify its functional table.	3	20.8.2024		TLM4	
7.	Verification of functional tables of (i) JK Master Slave Flip-Flop (ii) D Flip-Flop	3	27.8.2024		TLM4	
8.	Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output	3	10.9.2024		TLM4	
9.	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	17.9.2024		TLM4	
10.	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	24.9.2024		TLM4	
11.	Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms	3	1.10.2024		TLM4	
12.	Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	8.10.2024		TLM4	
13.	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.	3	15.10.2024		TLM4	
14.	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	22.10.2024		TLM4	
15.	Makeup Lab	3	29.10.2024		TLM4	
16.	Lab Internal Examination	3	5.11.2024		TLM4	
No. of classes required:42				No. of classes taken:		

PART-B: COURSE DELIVERY PLAN (LESSON PLAN):Batch-II

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to STLD Lab experiments,COs,Pos and PSOs.	3	12.7.2024		TLM4	
2	Implementation of the following Logic gates using Universal Gates: Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR	3	19.7.2024		TLM4	
3	Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.	3	26.7.2024		TLM4	
4	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	9.8.2024		TLM4	
5	4 variable logic function verification using 8 to 1 multiplexer.	3	16.8.2024		TLM4	
6	Design full adder circuit and verify its functional table.	3	23.8.2024		TLM4	
7	Verification of functional tables of (i) JK Master Slave Flip-Flop (ii) D Flip-Flop	3	30.8.2024		TLM4	
8	Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output	3	13.9.2024		TLM4	
9	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	20.9.2024		TLM4	
10	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	27.9.2024		TLM4	
11	Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms	3	4.10.2024		TLM4	
12	Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	18.10.2024		TLM4	
13	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.	3	25.10.2024		TLM4	
14	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	1.11.2024		TLM4	
15	Lab Internal Examination	3	8.11.2024		TLM4	
No. of classes required:42				No. of classes taken:		

Teaching Learning Methods

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10
Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

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PO 4:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (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
CH.Mallikharjuna Rao
M.K.Linga Murthy
G.Asha

Course Coordinator
M.K.Linga Murthy

Module Coordinator
Dr. P.Lachi Reddy

HOD
Dr. G. Srinivasulu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. Y. Babu / Mrs.B.Nirosha/ Mr. Ch.Srinivasarao

Course Name & Code : Data Structures using C & 23CS53

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

Credits: 2

Program/Sem/Sec : B.Tech/III/B-Sec.

A.Y.: 2024-25

PREREQUISITE: Introduction to Programming

COURSE OBJECTIVES: The main objectives of the course are to

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

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

CO1: Implement Various Searching & Sorting Techniques. (Apply - L3)

CO2: Implement Linked List, Stack & Queue data structures. (Apply - L3)

CO3: Design and implement algorithms for operations on binary trees and binary search trees. (Apply - L3)

CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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													
CO2	3	2													
CO3	3	2													
CO4								2	2	2					

Note: 1- Slight (Low), 2 - Moderate (Medium), 3 - Substantial (High)

PART-B:**COURSE DELIVERY PLAN (LESSON PLAN):**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Method	HOD Sign
1.	Introduction to Arrays, Searching Techniques	4	18-07-2024 20-07-2024 25-07-2024		TLM4 TLM3 TLM4	
2.	Sorting Techniques	4	27-07-2024 01-08-2024 03-08-2024		TLM3 TLM4 TLM3	
3.	Linked List Programs	5	08-08-2024 10-08-2024 17-08-2024		TLM4 TLM3 TLM3	
4.	Circular Double Linked List Program	4	22-08-2024 24-08-2024 29-08-2024		TLM4 TLM3 TLM4	
5.	Stack using Arrays and Linked List	5	31-08-2024 12-09-2024 14-09-2024		TLM3 TLM4 TLM3	
6.	Infix to Postfix, Evaluation of Postfix Expression using Stack	4	19-09-2024 21-09-2024 26-09-2024		TLM4 TLM3 TLM4	
7.	Queue using Arrays and Linked List	4	28-09-2024 03-10-2024		TLM3 TLM4	
8.	Circular Queue using Arrays and Linked List Dequeue using Linked List	5	05-10-2024 17-10-2024 19-10-2024		TLM3 TLM4 TLM3	
9.	Binary Search Tree	3	24-10-2024		TLM4	

10.	Binary Tree Traversals	3	26-10-2024 02-11-2024		TLM3 TLM3	
11.	Lab Internal Exam	3	07-11-2024		TLM4	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and 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	The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.Y.Babu	Ms. P. Sarala	Dr. Y. V. Bhaskar Reddy	Dr. D. Veeraiah
Signature				



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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM	: II B. Tech., III-Sem., ECE-B
ACADEMIC YEAR	: 2024-25
COURSE NAME & CODE	: Environmental Science
L-T-P STRUCTURE	: 2-0-0
COURSE CREDITS	: 0
COURSE INSTRUCTOR	: Dr. ShahedaNiloufer
COURSE COORDINATOR	: Dr. ShahedaNiloufer
PRE-REQUISITES	: biology, chemistry, geology, mathematics or physics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

COURSE OUTCOMES (COs)

In this course the student will learn about

CO1: The necessity of resources, their exploitation and sustainable management (**Understand – L2**)

CO2: The interactions of human and ecosystems and their role in the food web in the natural world and the global biodiversity, threats to biodiversity and its conservation. (**Understand – L2**)

CO3: Environmental problems like pollution, disasters and possible solutions. (**Remember – L1**)

CO4: The importance of environmental decision making in organizations through understanding the environmental law and environmental audits. (**Remember – L1**)

CO5: Environmental issues like over population, human health etc related to local, regional and global levels. (**Understand – L2**)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	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).

BOS APPROVED TEXT BOOKS:

T1.Erach Bharucha,Text book of Environmental Studies for Undergraduate Courses,Universities Press (India) Private Limited, 2019.

T2.Palaniswamy,EnvironmentalStudies,2/e,Pearsoneducation,2014.

T3.S.AzeemUnnisa,EnvironmentalStudies,AcademicPublishingCompany,2021.

T4.K.RaghavanNambiar,“TextbookofEnvironmentalStudiesforUndergraduate

Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.

ReferenceBooks:

R1.KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.

R2.DeekshaDaveandE.SaiBabaReddy,TextbookofEnvironmentalScience,2/e, Cengage Publications, 2012.

R3.M.AnjiReddy,“TextbookofEnvironmentalSciencesandTechnology”,BSPublication, 2014.

R4.J.P.Sharma,ComprehensiveEnvironmentalstudies,Laxmipublications,2006.

R5.J.GlynnHenryandGaryW.Heinke,EnvironmentalSciencesandEngineering, Prentice Hall of India Private limited, 1988.

R6.G.R.Chatwal,ATextBookofEnvironmentalStudies,HimalayaPublishingHouse, 2018.

R7. GilbertM.MastersandWendellP.Ela,IntroductiontoEnvironmentalEngineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

OnlineLearningResources:

- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- <https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2->

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	16-07-2024		TLM2			
2.	Multidisciplinary Nature of Environmental Studies	1	23-07-2024		TLM2			

UNIT-I: Differential Equations of first order and first degree

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Natural Resources – Forest resources	1	24-07-2024		TLM1	CO1	T1,T2	
4.	Water resources	1	30-07-2024		TLM1	CO1	T1,T2	
5.	Mineral resources	1	31-07-2024		TLM1	CO1	T1,T2	
6.	Food resources	1	06-08-2024		TLM1	CO1	T1,T2	
7.	Energy resources	1	07-08-2024		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-I		07			No. of classes taken:			

UNIT-II: Linear Differential equations of higher order (Constant Coefficients)

S. No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	Learning Outcome	Text Book	HOD Sign
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		Required	Completion	Completion	Methods	COs	followed	Weekly
8.	Ecosystems – Structure & Functions	1	09-08-2024		TLM1	CO1	T1,T2	
9.	Ecological succession & Food chains, Food webs & Ecological Pyramids	1	14-08-2024		TLM1	CO1	T1,T2	
10.	Types of ecosystems	1	16-08-2024		TLM1	CO1	T1,T2	
11.	Biodiversity – introduction, levels, biogeographic classification	1	21-08-2024		TLM1	CO1	T1,T2	
12.	Values of Biodiversity, India as mega diversity nation	1	27-08-2024		TLM1	CO1	T1,T2	
13.	Threats to biodiversity & Conservation of biodiversity	1	28-08-2024		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-II		06			No. of classes taken:			

I MID EXAMINATIONS (02-09-2024 TO 09-09-2024)

UNIT-III: Partial Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Environmental pollution -Air pollution	1	10-09-2024		TLM1	CO2	T1,T2	
15.	Water pollution, Marine pollution, Thermal pollution	1	11-09-2024		TLM1	CO2	T1,T2	
16.	Soil pollution	1	17-09-2024		TLM1	CO2	T1,T2	
17.	Noise pollution & Nuclear Hazards	1	18-09-2024		TLM1	CO2	T1,T2	
18.	Solid waste management	1	24-09-2024		TLM1	CO2	T1,T2	
19.	Disaster management	1	25-09-2024		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Vector Differentiation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
20.	From Unsustainable to Sustainable development	1	01-10-2024		TLM1	CO3	T1,T2	
21.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	08-10-2024		TLM1	CO3	T1,T2	
22.	Environmental ethics, Climate change	1	09-10-2024		TLM1	CO3	T1,T2	

23.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	15-10-2024		TLM1	CO3	T1,T2	
24.	Environmental Acts	1	16-10-2024		TLM1	CO3	T1,T2	
25.	Environmental Acts	1	22-10-2024		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-IV		06			No. of classes taken:			

UNIT-V: Vector Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	23-10-2024		TLM1	CO4	T1,T2	
27.	Environment and human health –Human Rights – Value Education	1	29-10-2024		TLM1	CO4	T1,T2	
28.	HIV/AIDS – Women and Child Welfare	1	30-10-2024		TLM1	CO4	T1,T2	
29.	Role of information Technology in Environment and human health	1	05-11-2024		TLM1	CO4	T1,T2	
30.	Case Studies	1	05-11-2024		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-V		04			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
31.	Case studies	2	18-09-2024 30-10-2024		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (11-11-2024 TO 16-11-2024)								

Teaching Learning Methods

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

PART-C EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15

I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE):	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.
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PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
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Dr. ShahedaNiloufer	Dr. ShahedaNiloufer	Dr. ShahedaNiloufer	Dr. A. RAMI REDDY
Course Instructor	Course Coordinator	Module Coordinator	HOD



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NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)

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L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. M K Linga Murthy / Dr. T. Satyanarayana

Course Name & Code : AECEL

Program/Sem/Sec : B.Tech., ECE., III-Sem, B Sec

A.Y : 2024-25

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	Roll. No. of Participants	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Discussion about Association Activities by teacher & Schedule	***	15.07.2024		
2.	IEEE Spectrum Magazine-Any Topic from Latest Editions (Presentation/Group Discussion)	23761A0467 TO 23761A0472	22.07.2024		
3.	Smart India Hakathon /Ideation (Presentation/Group Discussion)	23761A0473 TO 23761A0478	29.07.2024		
4.	Current Affairs/Technical Talks	23761A0479 TO 23761A0484	05.08.2024		
5.	Technical Quiz	23761A0485 TO 23761A0490	12.08.2024		
6.	Debate on Latest Technologies	23761A0491 TO 23761A0496	19.08.2024		
7.	IEEE Spectrum Magazine-Any Topic from Latest Editions (Presentation/Group Discussion)	23761A0497 TO 23761A04A2	09.09.2024		
8.	Smart India Hakathon /Ideation (Presentation/Group Discussion)	23761A04A3 TO 23761A04A8	23.09.2024		
9.	Current Affairs/Technical Talks	23761A04A9 TO 23761A04B4	30.09.2024		
10.	Technical Quiz	23761A04B5 TO 23761A04C0	07.10.2024		
11.	Debate on Latest Technologies	23761A04C2 TO 23761A04C7	14.10.2024		
12.	IEEE Spectrum Magazine-Any Topic from Latest Editions (Presentation/Group Discussion)	23761A04C8 TO 23761A04D2	21.10.2024		
13.	Smart India Hakathon /Ideation (Presentation/Group Discussion)	24765A0406 TO 24765A0412	28.10.2024		
14.	Conclusion / Closing Remarks by Association Coordinator	***	04.11.2024		

Course Instructor

1. Mr. M K Linga Murthy
2. Dr. T Satyanarayana

HOD

(Dr. G Srinivasulu)



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 L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh,
 India.
 Department of **Electronics and Communication Engineering**

LESSON PLAN

Faculty Name : **T.Balakrishna** Date: 15-07-2024

Dept& Section : ECE-B

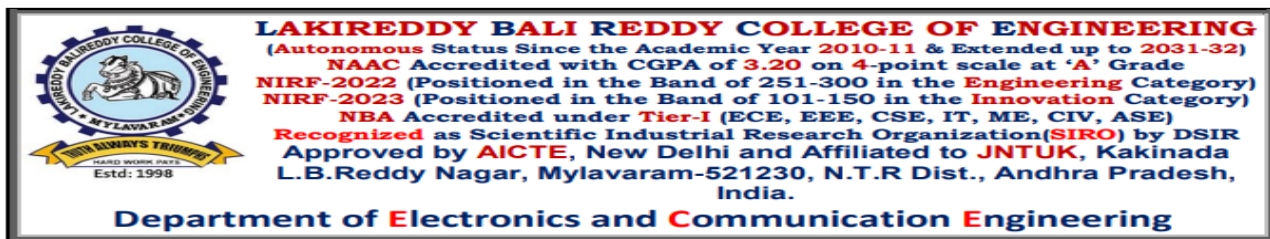
Semester: III

Subject : Quantitative Aptitude A.Y.: 2024-2025

S.No.	No. of Lecture Hours	Date	Planned Topics	Actual Date	Remarks
1	1	24-07-24	Introduction to Number System		
2	1	31-07-24	Unit Places		
3	1	07-08-24	LCM & HCF		
4	1	14-08-24	Coding and Decoding		
5	1	21-08-24	Mixed Letter and Number Coding		
6	1	28-08-24	Matrix Coding		
7	1	11-09-24	Averages		
8	1	18-09-24	Problems on Ages		
9	1	25-09-24	Problems on Numbers		
10	1	09-10-24	Ratio & Proportions		
11	1	16-10-24	Partnership		
12	1	23-10-24	Permutation and Combination		
13	1	30-10-24	Rank-Repetition		
14	1	06-11-24	Clocks-Angle, reflex angle & Mirror image		

Signature of Faculty

Signature of HOD



COURSE HANDOUT

PART-A:

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section – C
Academic Year : 2024-25
Course Name & Code : Probability Theory and Stochastic Processes – 23FE12
L-T-P-Cr Structure : 3-0-0-3
Course Instructor : Dr. G. L. N. Murthy

Course Objectives:

1	To get basic understanding of random variables and operations that can be performed on them.
2	To know the Spectral and temporal characteristics of Random Process.
3	To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

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

CO1	Summarize the concepts of Probability and random processes.	L2
CO2	Examine the Temporal and Spectral characteristics of Random Signals.	L3
CO3	Analyze Linear Time Invariant systems driven by stationary random process by using Auto correlation function and Power spectral Density.	L4
CO4	Interpret the concepts of Noise and Information theory in Communication systems.	L2

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

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

Correlation Levels: 1.Slight(Low),2-Moderate(Medium), 3-Substantial (High).

Textbooks (T):

- T1** Peyton Z. Peebles, Jr, “Probability, Random Variables and Random Signal Principles”, Tata Mc Graw-Hill, 4th edition, New Delhi.
T2 Taub and Schilling - Principles of Communication systems, TMH, 2008

Reference Books(R)

- R1** B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003
R2 Y Mallikarjuna Reddy, “Probability theory and Stochastic Processes”, Universities Press (India), Pvt Ltd.
R3 Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002

PART-B: Course Delivery Plan (Lesson Plan): B.Tech., ECE., III-Sem., Section - C**UNIT-I: Probability & Random Variable:**

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 PTSP Course	1	15-07-24			
2.	Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces	1	16-07-24			
3.	Discrete and Continuous Sample Spaces	1	19-07-24			
4.	Events, Probability Definitions and Axioms	1	20-07-24			
5.	Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events	1	22-07-24			
6.	Concept of Random Variable, Conditions for a function to be a Random Variable	1	23-07-24			
7.	Classification of Random Variable, Cumulative Distribution Function (CDF) and Properties	1	25-07-24			
8.	Probability Density Function (PDF) and Properties	1	27-07-24			
9.	Pre-Defined Distributions	1	29-07-24			
10.	Pre-Defined Distributions	1	30-07-24			
11.	Tutorial-I	1	01-08-24			
No. of classes required to complete UNIT-I:11			No. of classes taken:			

UNIT-II: Operations on Single & Multiple Random Variables-Expectations:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin	1	03-08-24			
13.	Central Moments, Variance and Skew	1	05-08-24			
14.	Chebychev's Inequality, Characteristic Function	1	06-08-24			
15.	Moment Generating Function, Vector random variables	1	08-08-24			
16.	Joint Distribution Function and Properties, Marginal Distribution Function	1	12-08-24			
17.	Joint Density Function and Properties, Marginal Density Function	1	13-08-24			
18.	Statistical Independence, Sum of Two Random Variables, Distribution and Density of Sum of Random Variables	1	17-08-24			
19.	Central Limit Theorem, Unequal Distribution, Equal Distributions	1	19-08-24			
20.	Expected Value of Function of Random Variables, Joint Moment about the Origin	1	20-08-24			
21.	Joint Central Moments	1	22-08-24			

22.	Joint Characteristic Functions	1	24-08-24			
23.	Tutorial-II	1	27-08-24			
No. of classes required to complete UNIT-II :12			No. of classes taken:			

UNIT-III: Random Processes-Temporal Characteristics:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes	1	29-08-24			
25.	Distribution and Density Functions, concept of Stationarity and Statistical Independence	1	31-08-24			
26.	First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity	1	09-09-24			
27.	Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes	1	10-09-24			
28.	Problem Solving Session	1	12-09-24			
29.	Time Averages and Ergodicity	1	17-09-24			
30.	Autocorrelation Function and Its Properties	1	19-09-24			
31.	Cross-Correlation Function and Its Properties	1	21-09-24			
32.	Covariance Functions	1	23-09-24			
33.	Convolution, Mean and Mean-squared Value of System Response	1	24-09-24			
34.	autocorrelation Function of Response, Cross-Correlation Functions of Input and Output	1	26-09-24			
35.	Tutorial-III	1	28-09-24			
No. of classes required to complete UNIT-III:12			No. of classes taken:			

UNIT-IV: Random Processes – Spectral Characteristics:

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	The Power Spectrum: Properties	1	30-09-24			
37.	Relationship between Power Spectrum and Autocorrelation Function	1	01-10-24			
38.	The Cross-Power Density Spectrum, Properties	1	03-10-24			
39.	Relationship between Cross-Power Spectrum and Cross-Correlation Function	1	05-10-24			
40.	Spectral Characteristics of System Response: Power Density Spectrum of	1	07-10-24			

	Response					
41.	Cross-Power Density Spectrums of Input and Output		08-10-24			
42.	Cross-Power Density Spectrums of Input and Output	1	10-10-24			
43.	Tutorial-IV	1	14-10-24			
44.	Problem solving	1	15-10-24			
No. of classes required to complete UNIT-IV:8			No. of classes taken:			

UNIT-V: Noise Sources & Information Theory

S.No.	Topic/s	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	Resistive/Thermal Noise Source, Arbitrary Noise Sources	1	17-10-24			
46.	Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures	1	19-10-24			
47.	Average Noise Figure of cascaded networks, Narrow Band noise	1	21-10-24			
48.	Quadrature representation of narrow band noise & its properties	1	22-10-24			
49.	Entropy, Information rate	1	24-10-24			
50.	Source coding: Huffman coding, Shannon Fano coding	1	26-10-24			
51.	Mutual information	1	28-10-24			
52.	Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR	1	29-10-24			
53.	Tutorial-V	1	02-11-24			
54.	Problem Solving Session	1	04-11-24			
No. of classes required to complete UNIT-V:12			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
55.	Stochastic Signal Processing (SSP)	1	05-11-24			
56.	Applications of SSP	1	07-11-24			

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15

I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (UNIT-III , IV & V)	M2=15
II-Quiz Examination (UNIT-III,IV & V)	Q2=10
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:

Program Educational Objectives(PEOs):

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

Program Outcomes(POs):

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

	engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (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 15.07.2024
Dr. G L N Murthy
Course Instructor
Dr. G L N Murthy
Course Coordinator
Dr. G L N Murthy
Module Coordinator
Dr.G.Srinivasulu
HOD



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B. Tech. III-Sem., ECE., Section– C
Academic Year	: 2024-25
Course Name & Code	: Universal Human Values - II: Understanding Harmony (23HS01)
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Dr. P. Lachi Reddy

Course Objectives:

1	To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature

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

CO 1	Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)	L2
CO 2	Identify one's self, and one's surroundings (family, society nature) (L2)	L2
CO 3	Relate human values with human relationship and human society. (L2)	L2
CO 4	Illustrate the need for universal human values and harmonious existence (L2)	L2
CO5	Develop as socially and ecologically responsible engineers (L3)	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
CO 1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO 2	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-
CO 3	-	-	-	-	-	2	-	3	2	-	-	-	-	-	-
CO 4	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	2	3	-	-	-	1	-	-	-

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

Textbooks (T) and References (R):

T1: R R Gaur, r singal, G P Bagaria, “Human values and Professional Ethics”, Excel Books, New Delhi,2010..

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.

Online Learning Resources:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3- S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3- S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

PART – B: COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Introduction to Value Education

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	15-07-2024		TLM2	
2.	Process for self-exploration: Natural Acceptance	1	16-07-2024		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	1	18-07-2024		TLM2	
4.	Understanding Value Education	1	20-07-2024		TLM2	
5.	self-exploration as the Process for Value Education	1	22-07-2024		TLM2	
6.	Continuous Happiness and Prosperity	1	23-07-2024		TLM2	
7.	Happiness and Prosperity	2	25-07-2024 27-07-2024		TLM2	
8.	Method to Fulfill the Basic Human Aspirations	2	29-07-2024 30-07-2024		TLM2	
9.	Tutorial	1	01-08-2024		TLM2	
No. of classes required to complete UNIT-I: 11				No. of classes taken:		

UNIT-II: Harmony in the Human Being

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 Human being as the Co-existence of the self and the body	1	03-08-2024		TLM2	
2.	Distinguishing between the Needs of the self and the body	2	05-08-2024 06-08-2024		TLM2	
3.	The body as an Instrument of the self	1	08-08-2024		TLM2	
4.	Understanding Harmony in the self	2	12-08-2024 13-08-2024		TLM2	
5.	Harmony of the self with the body	2	17-08-2024 19-08-2024		TLM2	
6.	Programme to ensure self-regulation and Health	2	20-08-2024 22-08-2024		TLM2	
7.	Tutorial	1	24-08-2024		TLM2	
No. of classes required to complete UNIT-II: 11				No. of classes taken:		

UNIT III: Harmony in the Family and Society

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.	Harmony in the Family	2	27-08-2024 29-08-2024		TLM2	
2.	'Trust' – the Foundational Value in Relationship	1	31-08-2024		TLM2	
3.	Practice Session PS7 Exploring the Feeling of Trust	1	09-09-2024		TLM2	
4.	'Respect' – as the Right Evaluation	2	10-09-2024 12-09-2024		TLM1	
5.	Practice Session PS8 Exploring the Feeling of Respect	1	17-09-2024		TLM2	
6.	Other Feelings, Justice in Human-to-Human Relationship	2	19-09-2024 21-09-2024		TLM2	
7.	Understanding Harmony in the Society	2	23-09-2024 24-09-2024		TLM2	
8.	Vision for the Universal Human Order	2	26-09-2024 28-09-2024		TLM2	
9.	Tutorial	1	30-09-2024			
No. of classes required to complete UNIT-III: 14				No. of classes taken:		

UNIT-IV: Harmony in the Nature/Existence

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 Harmony in the Nature	2	01-10-2024 03-10-2024		TLM2	
2.	Interconnectedness, self-regulation	2	05-10-2024 07-10-2024		TLM2	
3.	Mutual Fulfilment among the Four Orders of Nature	2	08-10-2024 10-10-2024		TLM2	
4.	Realizing Existence as Co-existence at All Levels	2	14-10-2024 15-10-2024		TLM2	
5.	The Holistic Perception of Harmony in Existence	2	17-10-2024 19-10-2024		TLM2	
6.	Tutorial	1	21-10-2024		TLM2	
No. of classes required to complete UNIT-IV: 11				No. of classes taken:		

UNIT-V: Implications of the Holistic Understanding

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	1	22-10-2024		TLM2	
2.	Definitiveness of ethical human conduct	1	24-10-2024		TLM2	
3.	Basis for humanistic education	1	26-10-2024		TLM2	
4.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human	2	28-10-2024 29-10-2024		TLM2	
5.	Competence in professional ethics	2	02-11-2024 04-11-2024		TLM2	
6.	Strategy for transition from the present state to universal human order	1	05-11-2024		TLM2	
7.	Holistic Technologies, Production Systems and Management Models- Typical Case	1	07-11-2024		TLM2	
No. of classes required to complete UNIT-V: 9				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

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

Course Instructor
Dr. P. Lachi Reddy

Course Coordinator
Dr. A. Narendra Babu

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HOD
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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech. III-Sem., ECE, Section-C
Academic Year	: 2024-25
Course Name & Code	: Signals and Systems – 23EC02
L-T-P-Cr	: 3-0-0-3
Course Instructure	: Dr. B. Rambabu

Course Objectives:

1	To study about signals and systems
2	To analyze the spectral characteristics of signals
3	To understand the characteristics of systems
4	To introduce the concept of sampling process
5	To know various transform techniques to analyze the signals and systems

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

CO 1	Summarize the basic concepts of signals, systems and sampling	L2
CO 2	Examine the operations on signals and approximate using orthogonal functions	L3
CO 3	Apply the concept of impulse response to analyze the LTI systems	L3
CO 4	Analyze both continuous time and discrete time signals and systems using Fourier series, Fourier transform, Laplace transforms and Z-Transforms	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	1
CO 2	2	1	1	-	-	-	-	-	-	-	-	-	1	-	2
CO 3	3	1	1	1	-	-	-	-	-	-	-	1	-	-	2
CO 4	3	2	1	1	-	-	-	-	-	-	-	2	2	-	3

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

Textbooks (T):

T1: B P Lathi, Signals, Systems and Communications, BSP, 3rd Edition, 2003.

T2: AV Oppenheim, AS Wilsky and IT Young, Signals and Systems, PHI, 2nd Edition, 1997.

T3: Simon Haykin and Van Veen, Signals and Systems, Wiley, 2nd Edition 2007.

References (R):

R1: B P Lathi, Principles of Linear Systems and Signals, Oxford University Press, 2015.

R2: TK Rawat, Oxford University Press, 2011.

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Introduction

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	15-07-2024			
2.	Definition and Classification of signals	1	16-07-2024			
3.	Definition and Classification of systems	1	19-07-2024			
4.	Singularity and Related signals	1	20-07-2024			
5.	Complex exponential and sinusoidal signals	1	22-07-2024			
6.	Operations on signals	1	23-07-2024			
7.	Properties of signals	1	26-07-2024			
8.	Problem Solving Session	1	27-07-2024			
9.	Analogy between vectors and signals, orthogonal signal space	1	29-07-2024			
10.	Signal approximation using orthogonal functions	1	30-07-2024			
11.	orthogonal signal space, closed or complete set of orthogonal functions	1	03-08-2024			
12.	Orthogonality in complex functions	1	05-08-2024			
13.	Problem Solving Session	1	06-08-2024			
No. of classes required to complete UNIT-I : 13			No. of classes taken :			

UNIT-II: Fourier Series & Fourier Transforms

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.	Fourier series representation of continuous time periodic signals	1	09-08-2024			
2.	properties of Fourier series, Dirichlet's conditions	1	12-08-2024			
3.	Trigonometric Fourier series and Exponential Fourier series	1	13-08-2024			
4.	Relation between Trigonometric and Exponential Fourier series	1	16-08-2024			
5.	Complex Fourier spectrum, Deriving Fourier transform from Fourier series	1	17-08-2024			
6.	Fourier transform of arbitrary signals	1	19-08-2024			
7.	Fourier transform of standard signals	1	20-08-2024			
8.	Fourier transform of periodic signals	1	23-08-2024			
9.	properties of Fourier transforms	1	24-08-2024			
10.	Fourier transforms involving impulse function and Signum function.	1	27-08-2024			
11.	Introduction to Hilbert Transform and Problem Solving Session	1	30-08-2024			
12.	Problem Solving Session	1	31-08-2024			
No. of classes required to complete UNIT-II : 12			No. of classes taken :			

UNIT-III: Analysis of Linear 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.	Linear system, impulse response, Response of a linear system	1	09-09-2024			
2.	Linear time invariant (LTI) system, Linear time variant (LTV) system	1	10-09-2024			
3.	Concept of convolution in time domain and frequency domain, Graphical representation of convolution	1	13-09-2024			
4.	Problem Solving Session	1	17-09-2024			
5.	Transfer function of a LTI system, Filter characteristics of linear systems	1	20-09-2024			
6.	Distortion less transmission through a system, Signal band width, system band width	1	21-09-2024			
7.	Ideal LPF, HPF and BPF characteristics	1	23-09-2024			
8.	Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time	1	24-09-2024			
9.	Problem Solving Session	1	27-09-2024			
No. of classes required to complete UNIT-III : 9			No. of classes taken :			

UNIT-IV : Signal Transmission Through Linear 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.	Auto-correlation function and properties	1	28-09-2024			
2.	Energy density spectrum, Power density spectrum, Parseval's theorem	1	30-09-2024			
3.	Cross-correlation function and properties	1	01-10-2024			
4.	Relation between Convolution and correlation	1	04-10-2024			
5.	Detection of periodic signals in the presence of noise by correlation	1	05-10-2024			
6.	Extraction of signal from noise by filtering	1	07-10-2024			
7.	Sampling Theorem-Graphical and analytical proof for Band Limited Signals	1	08-10-2024			
8.	Impulse sampling, Natural and Flat top Sampling	1	11-10-2024			
9.	Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling	1	14-10-2024			
10.	Problem Solving Session	1	15-10-2024			
No. of classes required to complete UNIT-IV : 10			No. of classes taken :			

UNIT-V : Laplace Transforms and Z-Transforms

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 Laplace Transforms	1	18-10-2024			
2.	Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals	1	19-10-2024			
3.	Properties of L.T's	1	21-10-2024			
4.	Inverse Laplace transform	1	22-10-2024			
5.	Relation between L.T's, and F.T. of a signal, Laplace transform of certain signals using waveform synthesis	1	25-10-2024			
6.	Concept of Z-Transform of a discrete sequence	1	26-10-2024			
7.	Region of convergence in Z- Transform, constraints on ROC for various classes of signals	1	28-10-2024			
8.	Inverse Z- transform	1	29-10-2024			
9.	Properties of Z-transforms	1	02-11-2024			
10.	Distinction between Laplace, Fourier and Z-transforms	1	04-11-2024			
11.	Problem Solving Session	1	05-11-2024			
No. of classes required to complete UNIT-V : 11			No. of classes taken :			

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Transform Techniques	1	08-11-2024			
2.	Signal Processing	1	09-11-2024			

Teaching Learning Methods

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

PART-C EVALUATION PROCESS

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

Program Educational Objectives (PEOs):

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PEO 4:	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner.

PART-D PROGRAMME OUTCOMES (POs):

Program Outcomes (POs):

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

Program Specific Outcomes (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
Dr. B. Rambabu

Course Coordinator
Dr. B. Rambabu

Module Coordinator
Dr. G L N Murthy

HOD
Dr. G. Srinivasulu



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L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART - A

Program	: B.Tech. III-Sem., ECE., Section- C	Date: 13-07-2024
Academic Year	: 2024-25	
Course Name & Code	: Electronic Devices and Circuits – 23EC03	
L-T-P-Cr	: 3-0-0-3	
Course Instructure	: Dr. T. Satyanarayana	

Course Objectives:

1	To learn and understand the basic concepts of semiconductor physics.
2	Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
3	To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
4	Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
5	To learn and understand the purpose of transistor biasing and its significance
6	Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

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

CO 1	Recall the fundamentals of semiconductor physics necessary for electronic devices and circuits (Remember)	L1
CO 2	Illustrate the structure and operation of Diodes, Bipolar Junction Transistors, Field Effect Transistors and biasing of BJT & FET using fundamental circuits. (Understand)	L2
CO 3	Apply the knowledge of Diodes, Transistors and Filters for designing the Rectifiers, Regulators and Amplifier circuits using basic components. (Apply)	L3
CO 4	Analyze the characteristics of Diodes, Bipolar Junction Transistors, Field Effect Transistors and their equivalent models using V-I Characteristics. (Analyze)	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	1	-	-	3	1	-	-	-	1	2	1	1	-
CO 2	2	1	2	1	-	3	1	-	-	-	-	1	1	1	-
CO 3	3	1	1	-	-	-	1	-	-	-	-	-	2	2	-
CO 4	1	3	-	-	-	-	-	-	-	-	1	1	2	2	-

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

Textbooks (T) and References (R):

- T1:** Millman's Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015..
- T2:** Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.
- T3:** Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

- R1:** Basic Electronics-Principles and Applications, Chinmoy Saha, Arindam Halder, Debarati Ganguly Cambridge University Press, 1st edition, 2018.
- R2:** Electronics devices & circuit theory- Robert L. Boylestad and Louis Nashelsky, Pearson, 11th edition, 2015.
- R3:** Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.

Online Learning Resources:

1. <https://nptel.ac.in/courses/108108112>
2. <https://nptel.ac.in/courses/108101091>
3. <https://nptel.ac.in/courses/108102095>

PART – B: COURSE DELIVERY PLAN

UNIT-I: REVIEW OF SEMICONDUCTOR PHYSICS, JUNCTION DIODE CHARACTERISTICS & SPECIAL SEMICONDUCTOR DEVICES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course Objectives and Outcomes. Unit-I Introduction	1	15-07-2024			
2.	Review of Semiconductor Physics: Mobility and Conductivity	1	16-07-2024			
3.	Intrinsic and Extrinsic Semiconductors	1	18-07-2024			
4.	Continuity Equation, Law of Junction.	1	22-07-2024			
5.	Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction	1	23-07-2024			
6.	p-n junction diode, Current components in p-n junction Diode	1	24-07-2024			
7.	Diode equation, V-I Characteristics	1	25-07-2024			
8.	Temperature dependence on V-I characteristics	1	29-07-2024			
9.	Diode resistance, Diode capacitance.	1	30-07-2024			
10.	Special Semiconductor Devices: Zener Diode, Breakdown Mechanisms and Applications	1	31-07-2024			
11.	Varactor Diode, LED	1	01-08-2024			
12.	Photodiode, Tunnel Diode	1	05-08-2024			
13.	UJT, PNP Diode	1	06-08-2024			
14.	SCR, Construction, Operation and V-I characteristics	1	07-08-2024			
No. of classes required to complete UNIT-I: 14			No. of classes taken:			

UNIT-II: DIODE CIRCUITS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Diode Circuits: The Diode as a circuit element. The Load-Line concept.	1	08-08-2024			
2.	The Piecewise Linear Diode Model, Clipping (limiting) Circuits.	1	12-08-2024			
3.	Clipping at Two Independent Levels.	1	13-08-2024			
4.	Peak Detector, Clamping circuits	1	14-08-2024			
5.	Basic Rectifier Setup, Half Wave Rectifier	1	19-08-2024			
6.	Full Wave Rectifier, Bridge Rectifier	1	20-08-2024			
7.	Derivations of Characteristics of Rectifiers	1	21-08-2024			
8.	Filters, Inductor Filter	1	22-08-2024			
9.	Capacitor Filter, π -Section Filter	1	27-08-2024			
10.	Comparison of various Filter Circuits in terms of Ripple Factors.	1	28-08-2024			
No. of classes required to complete UNIT-II: 10			No. of classes taken:			

UNIT-III: TRANSISTOR CHARACTERISTICS & TRANSISTOR BIASING AND THERMAL STABILIZATION

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.	Transistor Characteristics: Junction transistor, Transistor current components, CB configuration	1	29-08-2024			
2.	Transistor as an amplifier,	1	09-09-2024			
3.	characteristics of transistor in CB, CE, CC configurations	1	10-09-2024			
4.	Ebers-Moll model of a transistor,	1	11-09-2024			
5.	punch through/ reach through,	1	12-09-2024			
6.	Photo transistor, typical transistor junction voltage values.	1	17-09-2024			
7.	Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis,	1	18-09-2024			
8.	BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias.	1	19-09-2024			
9.	Stabilization against variations in V_{BE} , I_c , and β , Stability factors, (S, S', S''),	1	23-09-2024			
10.	Bias compensation, Thermal runaway, Thermal stability.	1	24-09-2024			
No. of classes required to complete UNIT-III: 10			No. of classes taken :			

UNIT-IV: Small Signal Low Frequency Transistor Amplifier Models

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	BJT: Two port network, Transistor hybrid model	1	25-09-2024			
2.	Determination of h-parameters for a BJT amplifier	1	26-09-2024			
3.	Conversion of h-parameters	1	30-09-2024			
4.	generalized analysis of transistor amplifier model using h-parameters	1	01-10-2024			
5.	Analysis of CB amplifiers using exact and approximate analysis.	1	03-10-2024			
6.	Analysis of CE amplifiers using exact and approximate analysis	1	07-10-2024			
7.	Analysis of CC amplifiers using exact and approximate analysis	1	08-10-2024			
8.	Comparison of transistor amplifiers	1	09-10-2024			
9.	generalized analysis of transistor amplifier model using h-parameters	1	10-10-2024			
10.	Problem Solving Session	1	14-10-2024			
No. of classes required to complete UNIT-IV: 10			No. of classes taken:			

UNIT- V: FET, MOSFET & CMOS Amplifiers

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.	FET types, JFET operation.	1	15-10-2024			
2.	Characteristics, small signal model of JFET					
3.	MOSFET Structure, Operation of MOSFET in triode region	1	16-10-2024			
4.	Operation in saturation region, MOSFET as a variable resistor,	1	17-10-2024			
5.	Derivation of V-I characteristics of MOSFET	1	21-10-2024			
6.	Channel length modulation, MOS transconductance	1	22-10-2024			
7.	MOS device models: MOS small signal model, PMOS Transistor,	1	23-10-2024			
8.	CMOS Technology, Comparison of Bipolar and MOS devices.	1	24-10-2024			
9.	CMOS amplifiers: General Considerations	1	28-10-2024			
10.	Common Source Stage, Common Gate Stage.	1	02-11-2024			
11.	Source Follower, comparison of FET amplifiers.	1	04-11-2024			
No. of classes required to complete UNIT V:		No. of classes taken:				

Content Beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Realization of Universal gates with CMOS transistor	1	05-11-2024			
2.	TTL logic Family	1	06-11-2024			
3	ECL logic Family	1	07-11-2024			

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
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PSO 3:	Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor
Dr. T. Satyanarayana

Course Coordinator
Dr. B.V.N.R. Sivakumar

Module Coordinator
Dr. T. Satyanarayana

HOD
Dr. G. Srinivasulu



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L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART: A

Program/Sem/Sec	: B.Tech., ECE., III-Sem., Section – C
Academic Year	: 2024-25
Course Name & Code	: Switching Theory and Logic Design – 23EC04
L-T-P-Cr Structure	: 3-0-0-3
Course Instructor	: Mr.CH.Mallikharjuna Rao

Course Objectives:

1	To solve a typical number base conversion and analyze new error coding techniques.
2	To understand the behavior of logic gates by using theorems and functions of Boolean algebra.
3	To optimize logic gates for digital circuits using various techniques
4	To perform Boolean function simplification using Karnaugh maps and Quine-McCluskey methods.
5	To understand concepts of combinational circuits.
6	To develop advanced sequential circuits.

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

CO 1	Summarize the key differences between number systems and their usage in Digital Circuits.	L2
CO 2	Identify the minimization techniques of Boolean expressions to implement Digital Circuits using basic logic gates and logic circuits	L3
CO 3	Apply the minimization and realization methods for designing the Combinational & Sequential logic circuits	L3
CO 4	Analyze the Combinational, Sequential, Finite State Machines for implementation of digital logic circuits	L4

Course Articulation Matrix - Correlation between COs, POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	1	-	-	-	-	2	-	-	-	1	-	3	-
CO 2	2	3	3	-	-	-	-	2	-	-	-	1	-	3	-
CO 3	2	3	3	1	-	-	-	2	-	-	-	1	-	3	-
CO 4	2	3	3	2	-	-	-	2	-	-	-	3	-	3	-

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

Textbooks (T) and References (R):

T1: Switching and finite automata theory Zvi.KOHAVI, Niraj. K. Jha 3rd Edition, Cambridge University Press, 2009.

T2: Digital Design by M. Morris Mano, Michael D Ciletti, 4th edition PHI publication, 2008.

T3: Switching theory and logic design by Hill and Peterson, Mc-Graw Hill TMH edition, 2012.

R1: Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 2006

R2: Digital electronics by R S Sedha. S. Chand & company limited, 2010

R3 : Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvt ltd, 2016.

PART-B: COURSE DELIVERY PLAN (LESSON PLAN)**UNIT-I: REVIEW OF NUMBER SYSTEMS & CODES, BOOLEAN THEOREMS AND LOGIC OPERATIONS**

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, Representation of numbers of different radix.	1	15-07-2024		TLM1	
2.	conversion from one radix to another radix	1	18-07-2024		TLM1	
3.	r- 1's compliments and r's compliments of signed numbers	1	19-07-2024		TLM1	
4.	2421 & 84-2-1 code	1	22-07-2024		TLM1	
5.	Error detection codes: parity checking, even parity, odd parity	1	24-07-2024		TLM1	
6.	Error correction codes: Hamming code.	1	25-07-2024		TLM1	
7.	Boolean theorems	1	26-07-2024		TLM1	
8.	Principle of complementation & duality, De-Morgan theorems.	1	29-07-2024		TLM1	
9.	Logic operations; Universal Logic operations, EX-OR, EX- NOR operations.	1	31-07-2024		TLM1	
10.	Standard SOP and POS Forms	1	01-08-2024		TLM1	
11.	NAND-NAND and NOR-NOR realizations	1	02-08-2024		TLM1	
12.	Realization of three level logic circuits.	1	05-08-2024		TLM1	
No. of classes required to complete UNIT-I : 12			No. of classes taken :			

UNIT-II: MINIMIZATION TECHNIQUES, COMBINATIONAL LOGIC CIRCUITS DESIGN.

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Minimization and realization of switching functions using Boolean theorems	1	07-08-2024		TLM1	
2.	Minimization and realization of switching functions using Boolean theorems	1	08-08-2024		TLM1	
3.	K-Map(2,3 variables)	1	09-08-2024		TLM1	
4.	K-Map(4,5 variables)	1	12-08-2024		TLM1	
5.	K-Map(6 variables)	1	14-08-2024		TLM2	
6.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	16-08-2024		TLM1	

7.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	19-08-2024		TLM1
8.	Design of Full Adder, half subtractor	1	21-08-2024		TLM1
9.	full subtractor, applications of full adders	1	22-08-2024		TLM1
10.	4- bit adder-sub tractor circuit	1	23-08-2024		TLM1
11.	BCD adder circuit ,Excess 3 adder circuit	1	28-08-2024		TLM1
12.	carry look-a- head adder circuit	1	29-08-2024		TLM2
13.	Design code converts using Karnaugh method and draw the complete circuit diagrams	1	30-08-2024		TLM1
No. of classes required to complete UNIT-II : 13			No. of classes taken :		

UNIT-III: COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI & LSI, INTRODUCTION OF PLD's

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.	Design of encoder, decoder	1	09-09-2024		TLM1	
2.	multiplexer and de-multiplexers	1	11-09-2024		TLM1	
3.	Implementation of higher order circuits using lower order circuits	1	12-09-2024		TLM1	
4.	Realization of Boolean functions using decoders	1	13-09-2024		TLM1	
5.	Realization of Boolean functions using multiplexers	1	18-09-2024		TLM1	
6.	Design of Priority encoder, 4-bit digital comparator	1	19-09-2024		TLM1	
7.	seven segment decoder	1	20-09-2024		TLM1	
8.	PROM-Basics structures, realization of Boolean functions, Programming table.	1	23-09-2024		TLM1	
9.	PAL -Basics structures, realization of Boolean functions, Programming table.	1	25-09-2024		TLM2	
10	PLA -Basics structures, realization of Boolean functions, Programming table.	1	26-09-2024		TLM1	
No. of classes required to complete UNIT-III : 10			No. of classes taken :			

UNIT-IV : SEQUENTIAL CIRCUITS-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Classification of sequential circuits (synchronous and asynchronous),operation of NAND & NOR Latches	1	27-09-2024		TLM1	
2.	Flip-Flops: Truth tables and excitation tables of RS flip-flop, JK flip- flop, with reset and clear terminals	1	30-09-2024		TLM1	
3.	Flip-Flops: Truth tables and excitation tables of T- flip-flop, D flip- flop, with reset and clear terminals	1	03-10-2024		TLM1	
4.	Conversion from one flip-flop to another flip- flop.	1	04-10-2024		TLM1	
5.	Conversion from one flip-flop to another flip- flop.	1	07-10-2024		TLM1	
6.	Design of ripple counters, design of synchronous counters	1	09-10-2024		TLM1	
7.	Johnson counter, ring counter.	1	10-10-2024		TLM1	
8.	Design of registers - Buffer register, control buffer register, shift register.	1	14-10-2024		TLM1	
9	Bi- directional shift register, universal shift,	1	16-10-2024		TLM2	

	register.				
10.	Study the following relevant ICs and their relevant functions 7474, 7475, 7476	1	17-10-2024		TLM1
11.	Study the following relevant ICs and their relevant functions 7490, 7493, 74121.	1	18-10-2024		TLM1
No. of classes required to complete UNIT-IV : 11			No. of classes taken :		

UNIT-V : SEQUENTIAL CIRCUITS-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Finite state machine: state diagrams, state tables	1	21-10-2024		TLM1	
2.	Reduction of state tables	1	23-10-2024		TLM1	
3.	Reduction of state tables	1	24-10-2024		TLM1	
4.	Analysis of clocked sequential circuits Mealy to Moore conversion	1	25-10-2024		TLM1	
5.	Analysis of clocked sequential circuits Moore to Mealy to conversion	1	28-10-2024		TLM1	
6.	Realization of sequence generator	1	30-10-2024		TLM1	
7.	Design of Clocked Sequential Circuit to detect the given sequence (with overlapping)	1	01-11-2024		TLM5	
8.	Design of Clocked Sequential Circuit to detect the given sequence (without overlapping)	1	04-11-2024		TLM1	
9.	Problems solving Session	1	06-11-2024		TLM1	
No. of classes required to complete UNIT-V : 09			No. of classes taken :			

Content beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Design of 32-bit Adder	1	07-11-2024		TLM2	
2.	Introduction to HDL, Verilog HDL	1	08-11-2024		TLM2	

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

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

II- Descriptive Examination (Unit-III,IV & V)	M2=15
II-Quiz Examination (Unit-III,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

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

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

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

Program Specific Outcomes (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

Dt:15.07.2024

Course Instructor
CH.Mallikharjuna Rao

Course Coordinator
Mr.Ch.Sivaramakrishna

Module Coordinator
Dr.P.Lachi Reddy

HOD
Dr. G. Srinivasulu



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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Date: 13-07-2024

Name of Course Instructor : Dr. T Satyanarayana, Dr. B.V.N.R. Siva Kumar, Mr. Ch. James Vijay
Course Name & Code : Electronic Devices and Circuits Lab -23EC52
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech., ECE. /III/C **A.Y.** : 2024-25

Course Objectives: This course introduces the characteristics and applications of semiconductor devices. Emphasis is placed on characteristics and testing practically to strengthen the knowledge.

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

CO1	Demonstrate the characteristics of BJT, FET, SCR, UJT and applications of diode. (Apply-L3)
CO2	Model the Rectifiers, filters and Amplifiers used in electronic circuits. (Apply-L3)
CO3	Analyze the device parameters of Diodes, Bipolar Junction Transistors, and Field Effect Transistors for its electrical parameters using VI characteristics. (Analyze - L4).
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	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	-	-	1	1	-	2	-
CO3	3	1	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): BATCH-I

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to EDC Lab experiments, COs, POs and PSOs.	3	24-07-2024		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	31-07-2024		TLM4	
3.	Design of Clipper circuit using diode.	3	07-08-2024		TLM4	
4.	Design of Clamping circuit using diode	3	14-08-2024		TLM4	
5.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier	3	21-08-2024		TLM4	
6.	Determination of h-parameter of a BJT in CE configuration	3	28-08-2024		TLM4	
7.	Determination of Break over voltage of SCR using V-I Characteristics	3	11-09-2024		TLM4	
8.	UJT Characteristics	3	18-09-2024		TLM4	
9.	Estimation of Stability factor for a transistor self-biasing circuit	3	25-09-2024		TLM4	
10.	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	3	09-10-2024		TLM4	
11.	Design of Emitter Follower-CC Amplifier, Design of FET-CS Amplifier	3	16-10-2024		TLM4	
12.	Revision	3	23-10-2024		TLM4	
13.	Lab Internal examination	3	06-11-2024			
No. of classes required: 39				No. of classes taken:		

COURSE DELIVERY PLAN (LESSON PLAN): BATCH-II

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to EDC Lab experiments, COs, POs and PSOs.	3	20-07-2024		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	27-07-2024		TLM4	
3.	Design of Clipper circuit using diode.	3	03-08-2024		TLM4	
4.	Design of Clamping circuit using diode	3	17-08-2024		TLM4	
5.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier	3	24-08-2024		TLM4	
6.	Determination of h-parameter of a BJT in CE configuration	3	31-08-2024		TLM4	
7.	Determination of Break over voltage of SCR using V-I Characteristics	3	21-09-2024		TLM4	
8.	UJT Characteristics, Estimation of Stability factor for a transistor self-biasing circuit	3	28-09-2024		TLM4	
9.	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	3	05-10-2024		TLM4	
10.	Design of Emitter Follower-CC Amplifier, Design of FET-CS Amplifier	3	19-10-2024		TLM4	
11.	Lab Internal examination	3	02-11-2024			
No. of classes required: 33				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10
Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE): (A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

PART-D

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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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.
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PO 10:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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PO 12:	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

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

Course Instructor
Dr. T. Satyanarayana

Course Coordinator
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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program	: B.Tech.,ECE.,III-Sem.,Section-C
Academic Year	: 2024-25
Course Name & Code	: Switching Theory and Logic Design Lab – 23EC53
L-T-P-Cr	: 0-0-3-1.5
Course Instructure	: CH. Mallikharjuna Rao, M.K.Linga Murthy, G.Asha

Course Objectives:

This course gives the ability to design and verify digital logic circuits like; logic gates, combinational and sequential logic circuits using discrete components and Integrated Circuits.

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

CO 1	Demonstrate the functionality of Logic gates, Flip-flops, Shift registers and Counters	L2
CO 2	Apply the Boolean minimization methods to implement Combinational and Sequential logic circuits using logic gates	L3
CO 3	Analyze the behavior of Combinational and Sequential logic circuits	L4
CO 4	Adapt effective Communication, presentation and report writing skills	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
CO 1	2	3	3	1	2	3	-	2	-	-	-	1	-	3	-
CO 2	2	1	1	1	1	3	-	2	-	-	-	1	-	3	-
CO 3	2	1	1	-	1	3	-	2	-	-	-	1	-	3	-
CO 4	-	-	-	-	-	-	-	-	-	3	-	3	-	3	-

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

PART-B: COURSE DELIVERY PLAN (LESSON PLAN):Batch-I

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Implementation of the following Logic gates using Universal Gates: Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR	3	24.7.2024		TLM4	
2.	Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.	3	31.7.2024		TLM4	
3.	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	7.8.2024		TLM4	
4.	4 variable logic function verification using 8 to 1 multiplexer.	3	14.8.2024		TLM4	
5.	Design full adder circuit and verify its functional table.	3	21.8.2024		TLM4	
6.	Verification of functional tables of (i) JK Master Slave Flip-Flop (ii) D Flip-Flop	3	28.8.2024		TLM4	
7.	Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output	3	11.9.2024		TLM4	
8.	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	18.9.2024		TLM4	
9.	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	25.9.2024		TLM4	
10.	Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms	3	9.10.2024		TLM4	
11.	Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	16.10.2024		TLM4	
12.	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.	3	23.10.2024		TLM4	
13.	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	30.10.2024		TLM4	
14.	Lab Internal Examination	3	6.11.2024		TLM4	
No. of classes required:39				No. of classes taken:		

PART-B: COURSE DELIVERY PLAN (LESSON PLAN):Batch-II

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Implementation of the following Logic gates using Universal Gates: Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR	3	20.7.2024		TLM4	
2	Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.	3	27.7.2024		TLM4	
3	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	3.8.2024		TLM4	
4	4 variable logic function verification using 8 to 1 multiplexer.	3	3.8.2024		TLM4	
5	Design full adder circuit and verify its functional table.	3	17.8.2024		TLM4	
6	Verification of functional tables of (i) JK Master Slave Flip-Flop (ii) D Flip-Flop	3	24.8.2024		TLM4	
7	Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output	3	31.8.2024		TLM4	
8	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	21.9.2024		TLM4	
9	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	28.9.2024		TLM4	
10	Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms	3	5.10.2024		TLM4	
11	Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	19.10.2024		TLM4	
12	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.	3	26.10.2024		TLM4	
13	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	2.11.2024		TLM4	
14	Lab Internal Examination	3	9.11.2024		TLM4	
No. of classes required:39				No. of classes taken:		

Teaching Learning Methods

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8...	A1 =10
Record and observation	1,2,3,4,5,6,7,8...	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8...	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8...	30
Semester End Examination (SEE)	1,2,3,4,5,6,7,8...	70
Total Marks=CIE+SEE		100

PART-D

Program Educational Objectives (PEOs):

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

Program Outcomes (POs):

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

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

Program Specific Outcomes (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

Dt: 15.07.2024

Course Instructor
CH.Mallikharjuna Rao
M.K.Linga Murthy
G.Asha

Course Coordinator
M.K.Linga Murthy

Module Coordinator
Dr. P.Lachi Reddy

HOD
Dr. G. Srinivasulu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. Y. Babu / Mrs.N.V.Padmavathi / Mrs.B.Nirosha
Course Name & Code : Data Structures using C & 23CS53
L-T-P Structure : 0-1-2 Credits: 2
Program/Sem/Sec : B.Tech/III/C-Sec. A.Y.: 2024-25

PREREQUISITE: Introduction to Programming

COURSE OBJECTIVES: The main objectives of the course are to

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

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

CO1: Implement Various Searching & Sorting Techniques. (Apply - L3)

CO2: Implement Linked List, Stack & Queue data structures. (Apply - L3)

CO3: Design and implement algorithms for operations on binary trees and binary search trees. (Apply - L3)

CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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													
CO2	3	2													
CO3	3	2													
CO4								2	2	2					

Note: 1- Slight (Low), 2 - Moderate (Medium), 3 - Substantial (High)

PART-B:**COURSE DELIVERY PLAN (LESSON PLAN):**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Method	HOD Sign
1.	Introduction to Arrays, Searching Techniques	4	18-07-2024 19-07-2024 25-07-2024		TLM3 TLM4 TLM3	
2.	Sorting Techniques	4	26-07-2024 01-08-2024 02-08-2024		TLM4 TLM3 TLM4	
3.	Linked List Programs	5	08-08-2024 09-08-2024 16-08-2024		TLM3 TLM4 TLM4	
4.	Circular Double Linked List Program	4	22-08-2024 23-08-2024 29-08-2024		TLM3 TLM4 TLM3	
5.	Stack using Arrays and Linked List	5	30-08-2024 12-09-2024 13-09-2024		TLM4 TLM3 TLM4	
6.	Infix to Postfix, Evaluation of Postfix Expression using Stack	4	19-09-2024 20-09-2024 26-09-2024		TLM3 TLM4 TLM3	
7.	Queue using Arrays and Linked List	4	27-09-2024 03-10-2024 04-10-2024		TLM4 TLM3 TLM4	
8.	Circular Queue using Arrays and Linked List Dequeue using Linked List	5	17-10-2024 18-10-2024 24-10-2024		TLM3 TLM4 TLM3	

9.	Binary Search Tree	3	25-10-2024		TLM4	
10.	Binary Tree Traversals	3	01-11-2024 07-11-2024		TLM4 TLM3	
11.	Lab Internal Exam	3	08-11-2024		TLM4	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and 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	The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.Y.Babu	Ms. P. Sarala	Dr. Y. V. Bhaskar Reddy	Dr. D. Veeraiah

Signature				
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Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM	: II B. Tech., III-Sem., ECE-C
ACADEMIC YEAR	: 2024-25
COURSE NAME & CODE	: Environmental Science
L-T-P STRUCTURE	: 2-0-0
COURSE CREDITS	: 0
COURSE INSTRUCTOR	: Dr. Shaheda Niloufer
COURSE COORDINATOR	: Dr. Shaheda Niloufer
PRE-REQUISITES	: biology, chemistry, geology, mathematics or physics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

COURSE OUTCOMES (COs)

In this course the student will learn about

CO1: The necessity of resources, their exploitation and sustainable management (**Understand – L2**)

CO2: The interactions of human and ecosystems and their role in the food web in the natural world and the global biodiversity, threats to biodiversity and its conservation. (**Understand – L2**)

CO3: Environmental problems like pollution, disasters and possible solutions. (**Remember – L1**)

CO4: The importance of environmental decision making in organizations through understanding the environmental law and environmental audits. (**Remember – L1**)

CO5: Environmental issues like over population, human health etc related to local, regional and global levels. (**Understand – L2**)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	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).

BOS APPROVED TEXT BOOKS:

T1. Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.

T2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.

T3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.

T4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

R1. KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.

R2. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.

R3. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.

R4. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.

R5. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.

R6. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.

R7. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- <https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2->

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	19-07-2024		TLM2			
2.	Multidisciplinary Nature of Environmental Studies	1	24-07-2024		TLM2			

UNIT-I: Differential Equations of first order and first degree

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Natural Resources – Forest resources	1	26-07-2024		TLM1	CO1	T1,T2	
4.	Water resources	1	31-07-2024		TLM1	CO1	T1,T2	
5.	Mineral resources	1	02-08-2024		TLM1	CO1	T1,T2	
6.	Food resources	1	07-08-2024		TLM1	CO1	T1,T2	
7.	Energy resources	1	09-08-2024		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-I		07			No. of classes taken:			

UNIT-II: Linear Differential equations of higher order (Constant Coefficients)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
8.	Ecosystems – Structure & Functions	1	14-08-2024		TLM1	CO1	T1,T2	
9.	Ecological succession & Food chains, Food webs & Ecological Pyramids	1	16-08-2024		TLM1	CO1	T1,T2	
10.	Types of ecosystems	1	21-08-2024		TLM1	CO1	T1,T2	
11.	Biodiversity – introduction, levels, biogeographic classification	1	23-08-2024		TLM1	CO1	T1,T2	
12.	Values of Biodiversity, India as mega diversity nation	1	28-08-2024		TLM1	CO1	T1,T2	
13.	Threats to biodiversity & Conservation of biodiversity	1	30-08-2024		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-II		06			No. of classes taken:			

I MID EXAMINATIONS (02-09-2024 TO 09-09-2024)

UNIT-III: Partial Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Environmental pollution -Air pollution	1	11-09-2024		TLM1	CO2	T1,T2	
15.	Water pollution, Marine pollution, Thermal pollution	1	13-09-2024		TLM1	CO2	T1,T2	
16.	Soil pollution	1	18-09-2024		TLM1	CO2	T1,T2	
17.	Noise pollution & Nuclear Hazards	1	20-09-2024		TLM1	CO2	T1,T2	
18.	Solid waste management	1	25-09-2024		TLM1	CO2	T1,T2	
19.	Disaster management	1	27-09-2024		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Vector Differentiation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
20.	From Unsustainable to Sustainable development	1	04-10-2024		TLM1	CO3	T1,T2	
21.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	09-10-2024		TLM1	CO3	T1,T2	

22.	Environmental ethics, Climate change	1	16-10-2024		TLM1	CO3	T1,T2	
23.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	18-10-2024		TLM1	CO3	T1,T2	
24.	Environmental Acts	1	23-10-2024		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-IV		05			No. of classes taken:			

UNIT-V: Vector Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	25-10-2024		TLM1	CO4	T1,T2	
26.	Environment and human health – Human Rights – Value Education	1	30-10-2024		TLM1	CO4	T1,T2	
27.	HIV/AIDS – Women and Child Welfare	1	01-11-2024		TLM1	CO4	T1,T2	
28.	Role of information Technology in Environment and human health	1	06-11-2024		TLM1	CO4	T1,T2	
29.	Case Studies	1	08-11-2024		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-V		04			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
30.	Case studies	2	13-09-2024 30-10-2024		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			

II MID EXAMINATIONS (11-11-2024 TO 16-11-2024)

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

PART-C EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
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Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE):	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.
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Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	Dr. A. RAMI REDDY
Course Instructor	Course Coordinator	Module Coordinator	HOD



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NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)

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L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A

Name of Course Instructor : CH.Mallikharjuna Rao / Dr. B.Rambabu

Course Name & Code : AECEL

Program/Sem/Sec : B.Tech., ECE., III-Sem, C Sec

A.Y : 2024-25

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	Roll. No. of Participants	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1.	Discussion about Association Activities by teacher & Schedule	***	16.07.2024		
2.	IEEE Spectrum Magazine-Any Topic from Latest Editions (Presentation/Group Discussion)	23761A04D3 TO 23761A04D7	23.07.2024		
3.	Smart India Hakathon /Ideation (Presentation/Group Discussion)	23761A04D8 TO 23761A04E2	30.07.2024		
4.	Current Affairs/Technical Talks	23761A04E3 TO 23761A04E7	06.08.2024		
5.	Technical Quiz	23761A04E8 TO 23761A04F2	13.08.2024		
6.	Debate on Latest Technologies	23761A04F3 TO 23761A04F7	20.08.2024		
7.	IEEE Spectrum Magazine-Any Topic from Latest Editions (Presentation/Group Discussion)	23761A04F8 TO 23761A04G2	27.08.2024		
8.	Smart India Hakathon /Ideation (Presentation/Group Discussion)	23761A04G3 TO 23761A04G7	10.09.2024		
9.	Current Affairs/Technical Talks	23761A04G8 TO 23761A04H2	17.09.2024		
10.	Technical Quiz	23761A04H3 TO 23761A04H7	24.09.2024		
11.	Debate on Latest Technologies	23761A04H8 TO 23761A04I2	01.10.2024		
12.	IEEE Spectrum Magazine-Any Topic from Latest Editions (Presentation/Group Discussion)	23761A04I3 TO 23761A04I7	08.10.2024		
13.	Smart India Hakathon /Ideation (Presentation/Group Discussion)	23761A04I8 TO 23761A04J2	15.10.2024		
14.	Conclusion / Closing Remarks by Association Coordinator	23761A04J3 TO 23761A04J7	22.10.2024		
15.	Discussion on Technical Magazines and Exploring the job opportunities in core companies	23761A04J7,LE students	29.10.2024		
16.	Seminar on Quantum Computing ,Cloud Computing & Edge	LE students	05.11.2024		

	Computing, Neuromorphic Computing			
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Course Instructor

- 1. Mr. CH.Mallikharjuna rao
- 2. Dr. B.Rambabu

HOD

Dr. G Srinivasulu



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)
NAAC Accredited with CGPA of 3.20 on 4-point scale at 'A' Grade NIRF-2022 (Positioned in the Band of 251-300 in the Engineering Category) NIRF-2023 (Positioned in the Band of 101-150 in the Innovation Category)
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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, N.T.R Dist., Andhra Pradesh, India.

Department of Electronics and Communication Engineering

COURSE HANDOUT

Faculty Name : T.Balakrishna
Dept & Section : ECE-C
Subject : Quantitative Aptitude

Date: 15-07-2024
Semester: III
A.Y.: 2024-2025

S.No.	No. of Lecture Hours	Date	Planned Topics	Actual Date	Remarks
1	1	18-07-24	Introduction to Number System		
2	1	25-07-24	Unit Places		
3	1	01-08-24	LCM & HCF		
4	1	08-08-24	Coding and Decoding		
5	1	22-08-24	Mixed Letter and Number Coding		
6	1	29-08-24	Matrix Coding		
7	1	12-09-24	Averages		
8	1	19-09-24	Problems on Ages		
9	1	26-09-24	Problems on Numbers		
10	1	03-10-24	Ratio & Proportions		
11	1	10-10-24	Partnership		
12	1	17-10-24	Permutation and Combination		
13	1	24-10-24	Rank-Repetition		
14	1	07-11-24	Clocks-Angle, reflex angle & Mirror image		

Signature of Faculty

Signature of HOD