COURSE HANDOUT

PART-A:

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section – A
Academic Year : 2025-26
Course Name & Code : Probability Theory and Stochastic Processes – 23FE12
L-T-P-Cr Structure : 3-0-0-3
Course Instructor : Dr. K. Ravi Kumar, Assoc. Professor of ECE

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 - 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	2	30-06-25 01-07-25			
2.	Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces	1	04-07-25			
3.	Discrete and Continuous Sample Spaces	1	05-07-25			
4.	Events, Probability Definitions and Axioms	1	07-07-25			
5.	Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events	2	08-07-25 11-07-25			
6.	Concept of Random Variable, Conditions for a function to be a Random Variable	1	12-07-25			
7.	Classification of Random Variable , Cumulative Distribution Function (CDF) and Properties	1	14-07-25			
8.	Probability Density Function (PDF) and Properties	2	15-07-25 18-07-25			
9.	Pre-Defined Distributions	1	19-07-25			
10.	Pre-Defined Distributions	1	21-07-25			
11.	Tutorial-I	1	22-07-25			
No. of classes required to complete UNIT-I:14			**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	2	25-07-25			
13.	Central Moments, Variance and Skew	1	28-07-25			
14.	Chebychev's Inequality, Characteristic Function	1	29-07-25			
15.	Moment Generating Function, Vector random variables	1	01-08-25			
16.	Joint Distribution Function and Properties, Marginal Distribution Function	1	02-08-25			
17.	Joint Density Function and Properties, Marginal Density Function	2	04-08-25 05-08-25			
18.	Statistical Independence, Sum of Two Random Variables, Distribution and Density of Sum of Random Variables	1	08-08-25			
19.	Central Limit Theorem ,Unequal Distribution, Equal Distributions	1	09-08-25			
20.	Expected Value of Function of Random Variables, Joint Moment about the Origin	1	11-08-25			
21.	Joint Central Moments	1	12-08-25			

22.	Joint Characteristic Functions	1	18-08-25			
23.	Tutorial-II	1	19-08-25			
No. of classes required to complete UNIT-II :14			**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	22-08-25			
25.	Distribution and Density Functions, concept of Stationarity and Statistical Independence	1	23-08-25			
26.	First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity	1	01-09-25			
27.	Time Averages and Ergodicity	1	02-09-25			
28.	Mean-Ergodic Processes, Correlation-Ergodic Processes	1	05-09-25			
29.	Problem Solving session	1	06-09-25			
30.	Autocorrelation Function and Its Properties	1	08-09-25			
31.	Cross-Correlation Function and Its Properties	1	09-09-25			
32.	Covariance Functions	1	12-09-25			
33.	Convolution, Mean and Mean-squared Value of System Response	1	13-09-25			
34.	Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output	1	15-09-25			
35.	Tutorial-III	1	16-09-25			
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	19-09-25			
37.	Relationship between Power Spectrum and Autocorrelation Function	1	20-09-25			
38.	The Cross-Power Density Spectrum, Properties	1	22-09-25			
39.	Relationship between Cross-Power Spectrum and Cross-Correlation Function	1	23-09-25			
40.	Spectral Characteristics of System Response: Power Density Spectrum of Response	2	26-09-25 27-09-25			
41.	Cross-Power Density Spectrums of Input and Output	1	06-10-25			

42.	Problem Solving Session	1	07-10-25			
43.	Tutorial-IV	1	10-10-25			
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	11-10-25			
45.	Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures	1	13-10-25			
46.	Average Noise Figure of cascaded networks, Narrow Band noise	1	14-10-25			
47.	Quadrature representation of narrow band noise & its properties	1	17-10-25			
48.	Entropy, Information rate	1	18-10-25			
49.	Source coding: Huffman coding, Shannon Fano coding	1	20-10-25			
50.	Mutual information	1	24-10-25			
51.	Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR	1	25-10-25			
52.	Tutorial-V	1	27-10-25			
53.	Problem Solving Session	1	28-10-25			
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**	31-10-25			
55.	Applications of SSP	**1**	01-11-25			

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	Dr. K. Ravi Kumar	Dr. G L N Murthy	Dr. G L N Murthy	Dr.G.Srinivasulu
30.06.2025	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HOD**

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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 : 2025-26
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) 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 to course	1	30-06-2025			
2.	Introduction to Unit-I	1	01-07-2025			
3.	Definition and Classification of signals	1	01-07-2025			
4.	Definition and Classification of systems	1	05-07-2025			
5.	Singularity and Related signals	1	07-07-2025			
6.	Complex exponential and sinusoidal signals	1	08-07-2025			
7.	Operations on signals	1	08-07-2025			
8.	Properties of signals	1	12-07-2025			
9.	Problem Solving Session	1	14-07-2025			
10.	Problem Solving Session	1	15-07-2025			
11.	Analogy between vectors and signals	1	15-07-2025			
12.	Approximation of a signal by another signal	1	19-07-2025			
13.	Orthogonal signal space, Approximation of a signal by a set of mutually another signals	1	21-07-2025			
14.	Orthogonality in complex signals	1	22-07-2025			
15.	Problem Solving Session	1	22-07-2025			
16.	Problem Solving Session	1	28-07-2025			
No. of classes required to complete UNIT-I : 16			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, Dirichlet's conditions	1	29-07-2025			
2.	Trigonometric and Exponential Fourier series	1	29-07-2025			
3.	Problem Solving Session	1	02-08-2025			
4.	Relation between Trigonometric and Exponential Fourier series	1	04-08-2025			
5.	Properties of Fourier series	1	05-08-2025			
6.	Complex Fourier spectrum, Deriving Fourier transform from Fourier series	1	05-08-2025			
7.	Fourier transform of arbitrary signals	1	09-08-2025			
8.	Fourier transform of standard signals	1	11-08-2025			
9.	Problem Solving Session	1	12-08-2025			
10.	Fourier transform of periodic signals, Introduction to Hilbert Transform	1	12-08-2025			
11.	Properties of Fourier transforms	1	18-08-2025			
12.	Properties of Fourier transforms	1	19-08-2025			
13.	Problem Solving Session	1	19-08-2025			
14.	Problem Solving Session	1	23-08-2025			
15.	Problem Solving Session	1	25-08-2025			
16.	Problem Solving Session	1	21-08-2025			
No. of classes required to complete UNIT-II : 16			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.	Introduction, Linear and Non-linear systems	1	26-08-2025			
2.	Time invariant and Variant systems	1	26-08-2025			
3.	Concept of convolution in time and frequency domain. Graphical representation of convolution	1	30-08-2025			
4.	Problem Solving Session	1	01-09-2025			
5.	Response of a LTI system	1	02-09-2025			
6.	System bandwidth, Signal bandwidth and Rise time, Distortion less transmission through a system	1	02-09-2025			
7.	Filter characteristics of linear systems, Ideal and practical characteristics of LPF, HPF, BPF, BSF	1	06-09-2025			
8.	Causality and Poly-Wiener criterion for physical realization	1	08-09-2025			
9.	Problem Solving Session	1	09-09-2025			
No. of classes required to complete UNIT-III : 9			**No. of classes taken :**			

UNIT-IV : Correlation and Sampling Theorem

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	09-09-2025			
2.	Energy spectral density, Power spectral density, Parseval's theorem	1	13-09-2025			
3.	Cross-correlation function and properties	1	15-09-2025			
4.	Relation between Convolution and correlation	1	16-09-2025			
5.	Detection of periodic signals in the presence of noise by correlation	1	16-09-2025			
6.	Extraction of signal from noise by filtering	1	20-09-2025			
7.	Problem Solving Session	1	22-09-2025			
8.	Sampling Theorem, Graphical analysis of Sampling Theorem- Impulse sampling, Analytical analysis of Sampling Theorem	1	23-09-2025			
9.	Sampling Theorem for band limited signal- Band Pass sampling	1	23-09-2025			
10.	Reconstruction of signal from its samples, Statement of Sampling theorem,	1	27-09-2025			
11.	Effect of under sampling-Aliasing effect, Natural and Flat top Sampling	1	04-10-2025			
12.	Problem Solving Session	1	06-10-2025			
No. of classes required to complete UNIT-IV : 12			**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, Concept of Laplace transform	1	07-10-2025			
2.	Relation between Laplace and Fourier transform, Existence of Laplace transform	1	07-10-2025			
3.	Laplace transform of various classes of signals	1	11-10-2025			
4.	Region of convergence in s- Transform and Properties	1	13-10-2025			
5.	Properties of Laplace transform	1	14-10-2025			
6.	Inverse Laplace transform	1	14-10-2025			
7.	Introduction to Z-Transform, Z-transform of various classes of signals	1	18-10-2025			
8.	Region of convergence in z- Transform and Properties	1	20-10-2025			
9.	Properties of Z-transforms	1	25-10-2025			
10.	Inverse Z- transform	1	27-10-2025			
11.	Problem Solving Session	1	28-10-2025			
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	28-10-2025			

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) $=_{80\% \text{ of Max}((M1+Q1+A1),(M2+Q2+A2)) +20\% \text{ of Min}((M1+Q1+A1),(M2+Q2+A2))}$	**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.
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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	Course Coordinator	Module Coordinator	HOD
Dr. B. Rambabu	M. Shiva Shankara Rao	Dr. G.L.N Murthy	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

Date: 02-07-2025

Name of Course Instructor : Dr BVNR Siva Kumar, Dr B S H Prasad, Mr MSS Rao, Mr PV Rao
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/ A **A.Y.** : 2025-26

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**	**PSO 3**
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):

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	04-07-2025		TLM4	
2.	Design of Clipper circuit using diode / Determination of h-parameter of a BJT in CE configuration	3 + 3	11-07-2025 18-07-2025		TLM4	
3.	Design of Clamping circuit using diode / Estimation of Stability factor for a transistor self-biasing circuit	3 + 3	25-07-2025 01-08-2025		TLM4	
4.	Estimation of ripple factor and regulation without and with LC filter. Half-wave & Full-wave Rectifier / Determination of Break over voltage of SCR using V-I Characteristics	3 + 3	08-08-2025 22-08-2025			
5.	Frequency response of BJT-CE Amplifier / FET Characteristics – Drain & Transfer	3 + 3	12-09-2025 19-09-2025		TLM4	
6.	Design of FET-CS Amplifier / UJT Characteristics	3 + 3	26-09-2025 09-10-2025		TLM4	
7.	Demonstration	3	17-10-2025		TLM4	
8.	Revision	3	24-10-2025		TLM4	
9.	Lab Internal Examination	3	31-10-2025		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**

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

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	Course Coordinator	Module Coordinator	HOD
Dr. B.V.N.R. Siva kumar	**Mr. M. Siva Sankara Rao**	**Dr. B.V.N.R. Siva kumar**	**Dr. G. Srinivasulu**

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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART: A

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section – A
Academic Year : 2025-26
Course Name & Code : Switching Theory and Logic Design – 23EC04
L-T-P-Cr Structure : 3-0-0-3
Course Instructor : Mr. Ch Siva Rama Krishna

Course Objectives:

1	To solve a typical number base conversion and analyze new error coding techniques.
2	Theorems and functions of Boolean algebra and behavior of logic gates
3	To optimize logic gates for digital circuits using various techniques
4	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 &companylimited,2010

R3 : Switching Theory and Logic Design by A. Anand Kumar, PHI Learningpvtltd,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	01-07-25		TLM1	
2.	conversation from one radix to another radix	1	02-07-25		TLM1	
3.	r- 1's compliments and r's compliments of signed numbers	1	03-07-25		TLM1	
4.	2421 & 84-2-1 code	1	05-07-25		TLM2	
5.	Error detection codes: parity checking, even parity, odd parity	1	08-07-25		TLM1	
6.	Error correction codes: Hamming code.	1	09-07-25		TLM1	
7.	Boolean theorems	1	10-07-25		TLM1	
8.	Principle of complementation & duality, De-Morgan theorems.	1	15-07-25		TLM1	
9.	Logic operations; Universal Logic operations, EX-OR, EX- NOR operations.	1	16-07-25		TLM1	
10.	Standard SOP and POS Forms	1	17-07-25		TLM1	
11.	NAND-NAND and NOR-NOR realizations	1	19-07-25		TLM1	
12.	**Activity** Reinforce Boolean algebra laws through a fun competitive activity.	1	22-07-25		TLM6	
13.	Realization of three level logic circuits.	1	23-07-25		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 and realization of switching functions using Boolean theorems	1	25-07-25		TLM1	
2.	Minimization and realization of switching functions using Boolean theorems	1	29-07-25		TLM1	
3.	K-Map(2,3 variables)	1	30-07-25		TLM1	
4.	K-Map(4,5 variables)	1	31-07-25		TLM1	
5.	**Activity:** Karnaugh Map Puzzle	1	02-08-25		TLM6	

6.	Tabular method (Quine-McCluskey method)	2	05-08-25		TLM1	
7.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	06-08-25 07-08-25		TLM1	
8.	Design of Full Adder, half subtractor	1	12-08-25		TLM1	
9.	full subtractor, applications of full adders	1	13-08-25		TLM1	
10.	4- bit adder-sub tractor circuit	1	14-08-25		TLM1	
11.	BCD adder circuit, Excess 3 adder circuit	1	19-08-25		TLM1	
12.	carry look-a- head adder circuit	1	20-08-25			
13.	Design code converts using Karnaugh method and draw the complete circuit diagrams	1	21-08-25		TLM2	
14.	**Activity:** Logic Circuit Design Challenge	1	23-08-25		TLM6	
No. of classes required to complete UNIT-II : 14			**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	02-09-25		TLM1	
2.	multiplexer and de-multiplexers	1	03-09-25		TLM1	
3.	Implementation of higher order circuits using lower order circuits	1	04-09-25		TLM1	
4.	Realization of Boolean functions using decoders	1	06-09-25		TLM1	
5.	Realization of Boolean functions using multiplexers	1	09-09-25		TLM1	
6.	Design of Priority encoder, 4-bit digital comparator	1	10-09-25		TLM1	
7.	seven segment decoder	1	11-09-25		TLM1	
8.	PROM-Basics structures, realization of Boolean functions, Programming table.	1	16-09-25		TLM1	
9.	PAL -Basics structures, realization of Boolean functions, Programming table.	1	17-09-25		TLM2	
10.	PLA -Basics structures, realization of Boolean functions, Programming table.	1	18-09-25		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, operation of NAND & NOR Latches	1	20-09-25		TLM1	
2.	Flip-Flops: Truth tables and excitation tables of RS flip-flop, JK flip- flop, with reset and clear terminals	1	23-09-25		TLM1	
3.	Flip-Flops: Truth tables and excitation tables of T-flip-flop, D flip- flop, with reset and clear terminals	1	24-09-25		TLM1	
4.	Conversion from one flip-flop to another flip- flop.	1	25-09-25		TLM1	
5.	Conversion from one flip-flop to another flip- flop.	1	27-09-25		TLM1	
6.	Design of ripple counters, design of synchronous counters	1	01-10-25		TLM1	
7.	Johnson counter, ring counter.	1	04-10-25		TLM1	
8.	Design of registers - Buffer register, control buffer register, shift register.	1	07-10-25		TLM1	

9.	Bi- directional shift register, universal shift, register.	1	08-10-25		TLM2	
10.	Study the following relevant ICs and their relevant functions 7474, 7475, 7476	1	09-10-25		TLM1	
11.	**Activity:** Understand the operation and timing of flip-flops.	1	14-10-25		TLM6	
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	15-10-25		TLM1	
2.	Reduction of state tables	1	16-10-25		TLM1	
3.	Reduction of state tables	1	18-10-25		TLM1	
4.	Analysis of clocked sequential circuits Mealy to Moore conversion	1	22-10-25		TLM1	
5.	Analysis of clocked sequential circuits Moore to Mealy to conversion	1	23-10-25		TLM1	
6.	Realization of sequence generator	1	25-10-25		TLM1	
7.	Design of Clocked Sequential Circuit to detect the given sequence (with overlapping)	1	28-10-25		TLM5	
8.	Design of Clocked Sequential Circuit to detect the given sequence (without overlapping)	1	29-10-25		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	30-10-25		TLM2	
2.	Introduction to HDL,Verilog HDL	1	01-11-25		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: ROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

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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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.
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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	Course Coordinator	Module Coordinator	HOD
Mr.Ch.Sivaramakrishna	Mr.CH.Mallikharjuna Rao	Dr.P.Lachi Reddy	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	: 2025-26
Course Name & Code	: **UHV-2:** Understanding Harmony and Ethical Human Conduct (23HS01)
L-T-P-Cr	: 2-1-0-3
Course Instructure	: **Dr.E V Krishna Rao**

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		1			2	2	2	2			2			
CO2	1		1			2	2	2	2			2			
CO3	1		1			3	3	3	3			3			
CO4	1		1			3	3	3	3			3			
CO5	1		1			3	3	3	3			3			

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	30-06-2025		TLM2	
2.	Process for self exploration: Natural Acceptance	1	01-07-2025		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	1	03-07-2025		TLM2	
4.	Understanding Value Education	1	05-07-2025		TLM2	
5.	Tutorial PS1 Self-exploration as the Process for Value Education	1	07-07-2025		TLM3	
6.	Continuous Happiness and Prosperity- Basic Human Aspirations	1	08-07-2025		TLM2	
7.	Happiness and Prosperity-Current Scenario	1	10-07-2025		TLM2	
8.	Tutorial PS2 Exploring Human Consciousness	1	14-07-2025		TLM3	
9.	Method to Fulfill the Basic Human Aspirations	1	15-07-2025		TLM2	
10.	Method to Fulfill the Basic Human Aspirations	1	17-07-2025		TLM2	
11.	Tutorial – PS3 Exploring Natuaral Acceptance	1	19-07-2025		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	21-07-2025		TLM2	

13.	Distinguishing between the Needs of the self and the body	1	22-07-2025		TLM2	
14.	Tutorial PS4 Distinguishing between the Needs of the self and the body	1	24-07-2025		TLM3	
15.	The body as an Instrument of the self	1	28-07-2025		TLM2	
16.	Understanding Harmony in the self	1	29-07-2025		TLM2	
17.	Tutorial PS5 Sources of Imagination in the self	1	31-07-2025		TLM3	
18.	Harmony of the self with the body	1	02-08-2025		TLM2	
19.	Programme to ensure self-regulation and Health	1	04-08-2025		TLM2	
20.	Programme to ensure self-regulation and Health	1	05-08-2025		TLM2	
21.	Tutorial -PS6 Harmony of the self with the body	1	07-08-2025		TLM3	
No. of classes required to complete UNIT-II: 10				**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
22.	Harmony in the Family-Basic unit of Human Interaction	1	11-08-2025		TLM2	
23.	Harmony in the Family-Basic unit of Human Interaction	1	12-08-2025		TLM2	
24.	'Trust' – the Foundational Value in Relationship	1	14-08-2025		TLM2	
25.	'Trust' – the Foundational Value in Relationship	1	18-08-2025		TLM2	
26.	Tutorial PS7 Exploring the Feeling of Trust	1	19-08-2025		TLM3	
27.	'Respect' – as the Right Evaluation	1	21-08-2025		TLM1	
28.	'Respect' – as the Right Evaluation	1	23-08-2025		TLM1	
29.	Tutorial PS8 Exploring the Feeling of Respect	1	01-09-2025		TLM2	
30.	Other Feelings, Justice in Human-to-Human Relationship	1	02-09-2025		TLM2	
31.	Other Feelings, Justice in Human-to-Human Relationship	1	04-09-2025		TLM2	
32.	Understanding Harmony in the Society	1	06-09-2025		TLM2	
33.	Understanding Harmony in the Society	1	08-09-2025		TLM2	

34.	Vision for the Universal Human Order	1	09-09-2025		TLM2	
35.	Tutorial PS9 Exploring systems to fufil Human Goal	1	11-09-2025		TLM3	
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
36.	Understanding Harmony in the Nature	1	15-09-2025		TLM2	
37.	Understanding Harmony in the Nature	1	16-09-2025		TLM2	
38.	Interconnectedness, self-regulation	1	18-09-2025		TLM2	
39.	Mutual Fulfilment among the Four Orders of Nature	1	20-09-2025		TLM2	
40.	Tutorial PS10 Exploring Four Orders of Nature	1	22-09-2025		TLM3	
41.	Realizing Existence as Co-existence at All Levels	1	23-09-2025		TLM2	
42.	Realizing Existence as Co-existence at All Levels	1	25-09-2025		TLM2	
43.	The Holistic Perception of Harmony in Existence	1	27-09-2025		TLM2	
44.	The Holistic Perception of Harmony in Existence	1	06-10-2025		TLM2	
45.	Tutorial PS11 Exploring Co-existence in Existence	1	07-10-2025		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**
46.	Natural acceptance of human values	1	09-10-2025		TLM2	
47.	Definitiveness of ethical human conduct	1	13-10-2025		TLM2	
48.	Tutorial PS12 Exploring Ethical human conduct	1	14-10-2025		TLM3	
49.	Basis for humanistic education	1	16-10-2025		TLM2	
50.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human order	1	18-10-2025		TLM2	
51.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human order	1	20-10-2025		TLM2	
52.	Competence in professional ethics	1	23-10-2025		TLM2	

53.	Tutorial PS13 Exploring Humanistic models in education	1	25-10-2025		TLM3	
54.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	27-10-2025		TLM2	
55.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	28-10-2025		TLM2	
56.	Strategy for transition towards value based life and profession	1	30-10-2025		TLM3	
57.	Tutorial PS14 Steps of transition towards Universal Human Order	1	01-11-2025		TLM2	
No. of classes required to complete UNIT-V: 12				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	25-08-2025	30-08-2025	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	03-11-2025	08-11-2025	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	**2 W**

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., III-Sem., ECE-A
ACADEMIC YEAR : 2025-26
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 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	-	-	-

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.

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	30-06-2025		TLM2			
2.	Multidisciplinary Nature ofEnvironmental Studies	1	04-07-2025		TLM2			

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Natural Resources – Forest resources	1	07-07-2025		TLM1	CO1	T1,T2	
4.	Water resources	1	11-07-2025		TLM1	CO1	T1,T2	
5.	Mineral resources	1	14-07-2025		TLM1	CO1	T1,T2	
6.	Food resources	1	18-07-2025		TLM1	CO1	T1,T2	
7.	Energy resources		21-07-2025					
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystems and Biodiversity

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	25-07-2025		TLM1	CO2	T1,T2	
9.	Ecological succession &	1	28-07-2025		TLM1	CO2	T1,T2	
10.	Food chains, Food webs & Ecological Pyramids	1	01-08-2025		TLM1	CO2	T1,T2	
11.	Types of ecosystems	1	04-08-2025		TLM1	CO2	T1,T2	
12.	Biodiversity – introduction, levels, bio geographic classification	1	08-08-2025		TLM1	CO2	T1,T2	

13.	Values of Biodiversity, India as mega diversity nation	1	11-08-2025		TLM1	CO2	T1,T2	
14.	Threats to biodiversity and Conservation of biodiversity	1	18-08-2025		TLM1	CO2	T1,T2	
15.	Revision	1	22-08-2025		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		06			No. of classes taken:			

I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
16.	Environmental pollution -Air pollution	1	01-09-2025		TLM1	CO3	T1,T2	
17.	Water pollution, Marine pollution, Thermal pollution	1	05-09-2025		TLM1	CO3	T1,T2	
18.	Soil pollution	1	08-09-2025		TLM1	CO3	T1,T2	
19.	Noise pollution & Nuclear Hazards	1	12-09-2025		TLM1	CO3	T1,T2	
20.	Solid waste management	1	15-09-2025		TLM1	CO3	T1,T2	
21.	Disaster management	1	19-09-2025		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Social Issues and Environment

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
22.	From Unsustainable to Sustainable development	1	22-09-2025		TLM1	CO4	T1,T2	
23.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	26-09-2025		TLM1	CO4	T1,T2	
24.	Environmental ethics, Climate change	1	29-09-2025		TLM1	CO4	T1,T2	
25.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	03-10-2025		TLM1	CO4	T1,T2	
26.	Environmental Acts	1	06-10-2025		TLM1	CO4	T1,T2	
27.	Environmental Acts	1	10-10-2025		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		06			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
28.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	13-10-2025		TLM1	CO5	T1,T2	
29.	Environment and human health –Human Rights – Value Education	1	17-10-2025		TLM1	CO5	T1,T2	
30.	HIV/AIDS – Women and Child Welfare	1	20-10-2025		TLM1	CO5	T1,T2	
31.	Role of information Technology in Environment and human health	1	24-10-2025		TLM1	CO5	T1,T2	
32.	Revision	1	27-10-2025		TLM3	CO5	T1,T2	
33.	Revision	1	31-10-2025		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		06			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
34.	Case studies	2	18-08-2025 27-10-2025		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

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.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Dr. Shaheda Niloufer	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(Autonomous Status Since the Academic Year 2010-11 & Extended up to 2031-32)
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(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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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program : B.Tech. III-Sem., ECE., Section– A
Academic Year : 2025-26
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 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

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	30-06-2025			
2.	Review of Semiconductor Physics: Mobility and Conductivity	1	01-07-2025			
3.	Intrinsic and Extrinsic Semiconductors	1	03-07-2025			
4.	Continuity Equation, Law of Junction.	1	05-07-2025			
5.	Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction	1	07-07-2025			
6.	p-n junction diode, Current components in p-n junction Diode	1	08-07-2025			
7.	Diode equation, V-I Characteristics	1	10-07-2025			
8.	Temperature dependence on V-I characteristics	1	14-07-2025			
9.	Diode resistance, Diode capacitance.	1	15-07-2025			
10.	Special Semiconductor Devices: Zener Diode, Breakdown Mechanisms and Applications	1	17-07-2025			
11.	Varactor Diode, LED	1	19-07-2025			
12.	Photodiode, Tunnel Diode	1	21-07-2025			
13.	UJT Operation and V-I characteristics	1	22-07-2025			
14.	PNPN Diode	1	24-07-2025			
15.	SCR Operation and V-I characteristics (Flipped Cl)	1	26-07-2025			
16.	Revision	1	28-07-2025			
No. of classes required to complete UNIT-I : 15			**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	29-07-2025			
2.	Piecewise Linear Diode Model, Clipping Circuits.	1	31-07-2025			
3.	Clipping at Two Independent Levels.	1	04-08-2025			
4.	Peak Detector, Clamping circuits	1	05-08-2025			
5.	Basic Rectifier Setup, Half Wave Rectifier	1	07-08-2025			
6.	Full Wave Rectifier, Bridge Rectifier	1	11-08-2025			
7.	Derivations of Characteristics of Rectifiers	1	12-08-2025			
8.	Filters, Inductor Filter	1	14-08-2025			
9.	Capacitor Filter, π-Section Filter	1	18-08-2025			
10.	Comparison of various Filter Circuits in terms of Ripple Factors. (Quiz)	1	19-08-2025			
11.	Revision	1	21-08-2025			
No. of classes required to complete UNIT-II : 11			**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	01-09-2025			
2.	Transistor as an amplifier,	1	02-09-2025			
3.	characteristics of transistor in CB, CE,CC configurations	1	04-09-2025			
4.	Ebers-Moll model of a transistor,	1	06-09-2025			
5.	punch through/ reach through,	1	08-09-2025			
6.	Photo transistor, typical transistor junction voltage values.	1	09-09-2025			
7.	Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis,	1	11-09-2025			
8.	BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias.	1	13-09-2025			
9.	Stabilization against variations in VBE, Ic, and β, Stability factors, (S,S',S''),	1	15-09-2025			
10.	Bias compensation, Thermal runaway, Thermal stability.	1	16-09-2025			
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	18-09-2025			
2.	Determination of h-parameters for a BJT amplifier	1	20-09-2025			
3.	Conversion of h-parameters	1	22-09-2025			
4.	generalized analysis of transistor amplifier model using h-parameters	1	23-09-2025			
5.	Analysis of CB amplifiers using exact and approximate analysis.	1	25-09-2025			
6.	Analysis of CE amplifiers using exact and approximate analysis	1	27-09-2025			
7.	Analysis of CC amplifiers using exact and approximate analysis	1	29-09-2025			
8.	Comparison of transistor amplifiers	1	30-09-2025			
9.	generalized analysis of transistor amplifier model using h-parameters	1	04-10-2025			
10.	Problem Solving Session	1	06-10-2025			
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	07-10-2025			
2.	Characteristics, small signal model of JFET					
3.	MOSFET Structure, Operation of MOSFET in triode region	1	09-10-2025			
4.	Operation in saturation region, MOSFET as a variable resistor,	1	11-10-2025			
5.	Derivation of V-I characteristics of MOSFET	**1**	13-10-2025			
6.	Channel length modulation, MOS transconductance	1	14-10-2025			
7.	MOS device models: MOS small signal model, PMOS Transistor,	1	16-10-2025			
8.	CMOS Technology, Comparison of Bipolar and MOS devices.	1	18-10-2025			
9.	CMOS amplifiers: General Considerations	1	20-10-2025			
10.	Common Source Stage ,Common Gate Stage.	1	23-10-2025			
11.	Source Follower, comparison of FET amplifiers.	1	25-10-2025			
12.	Revision		27-10-2025			
	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	28-10-2025			
2.	TTL logic Family	1	30-10-2025			
3	ECL logic Family	1	01-11-2025			

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:	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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PO 11:	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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	Course Coordinator	Module Coordinator	HOD
Dr.B.V.N.R.Sivakumar	Mr K V Ashok	Dr. B.V.N.R. Sivakumar	Dr. G. Srinivasulu

Program Outcomes (POs):

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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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 : 2025-26
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. Ch.Mallikharjuna Rao, Mrs. B Rajeswari, Mr. K Sreedhar Reddy

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):

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, COs, Pos and PSOs.	3	02-07-25		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	09-07-25		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	16-07-25		TLM4	
4.	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	23-07-25		TLM4	
5.	4 variable logic function verification using 8 to1 multiplexer.	3	30-07-25		TLM4	
6.	Design full adder circuit and verify its functional table.	3	06-08-25		TLM4	
7.	Verification of functional tables of (i) JK Master Slave Flip–Flop (ii) D Flip-Flop	3	13-08-25		TLM4	
8.	Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output	3	20-08-25		TLM4	
9.	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	03-09-25		TLM4	
10.	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	10-09-25		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	17-09-25		TLM4	
12.	Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	24-09-25		TLM4	
13.	Draw the circuit diagram of a single bit comparator and test the output	3	01-10-25		TLM4	
14.	Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.	3	08-10-25		TLM4	
15.	Design of any combinational circuit,sequential circuit using Hardware Description Language (Additional Experiments)	3	15-10-25		TLM4	
16.	Makeup Lab	3	22-10-25		TLM4	
17.	Lab Internal Examination	3	29-10-25			
No. of classes required:45				**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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Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. Ch Siva Rama Krishna, Mr.Ch. Mallikharjuna Rao Mrs. B Rajeswari, Mr. K Sreedhar Reddy	Mr. Ch Siva Rama Krishna	Dr. P.Lachi Reddy	Dr. G. Srinivasulu

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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: **Mr. R. Ashok**
Course Name & Code **: DATA STRUCTURES LAB & 20CSS3**
L-T-P Structure **: 0-1-**3 **Credits:** 2
Program/Sem/Sec : B.Tech/III/ECE-A **A.Y.:** 2025-26

PREREQUISITE: C Programming Language

COURSE OBJECTIVE:
The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques **COURSE OUTCOMES (CO):**

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	PSO1	PSO2	PSO3
CO1	3	2											2		
CO2	3	2											2		
CO3	3	2											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	HOD Sign
1.	**UNIT1**: 1.Program to find min & max element in an array. 2.Program to implement matrix multiplication.	4	30-06-2025 03-07-2024		
2.	3.Find an element in given list of sorted elements in an array using Binary search.	4	07-07-2025 10-07-2025		
3.	4.Implement Selection and Quick sort techniques	4	14-07-2025 17-07-2025		
4.	**UNIT:2** Write a program to implement the following operations. a. Insert b. Deletion c. Traversal	4	21-07-2025 23-07-2025		
5.	Write a program to store name, roll no, and marks of students in a class using circular double linked list	4	28-07-2025 31-07-2025		
6.	Write a program to perform addition of given two polynomial expressions using linked list	4	04-08-2025 07-08-2025		
7.	**UNIT:3** Implement stack operations using a. Arrays b. Linked list	2	11-08-2025 14-08-2025		
8.	Convert given infix expression into post fix expression using stacks.	7	18-08-2025 21-08-2025 01-09-2025		

9.	Evaluate given post fix expression using stack.	5	04-09-2025 08-09-2025 11-09-2025		
10.	4.Write a program to reverse given linked list using stack	7	14-09-2025 17-09-2025 21-09-2025		
11.	UNIT 4: 1.ImplementQueue operations using a. Arrays b. Linked list.	4	24-09-2025 06-10-2025		
12.	2. Implement Circular Queue using a. Arrays b. Linked list. 3.Implement Dequeue using linked list.	7	09-10-2025 13-10-2025 16-10-2025		
13.	**UNIT5:** 1.Implement binary tree traversals using linked list. 2. Write program to create binary search tree for given list of integers. Perform in-order traversal of the tree. Implement insertion and deletion operations.	8	20-10-2025 23-10-2025 27-10-2025		
14.	Lab Internal Exam	3	03-11-2024		

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work& Record	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.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. R. Ashok**	**Mr. R. Ashok**	**Dr. Y. Vijaya Bhaskar Reddy**	**Dr.S. Nagarjuna Reddy**
Signature				

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE HANDOUT

Name of Course Instructor : Dr.B.Rambabu/Mr.P.Venkateswara Rao
Course Name : Association
Program/Sem/Sec : B.Tech. ECE.III-Sem, A Sec A.Y : 2025-26

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	Tentative Date of Completion	Actual Date of Completion	HOD Sign Weekly
1)	Discussion about Association Activities by teacher	02-07-2025		
2)	Two-minute talk on Aditya L1 Mission	09-07-2025		
3)	Group Discussion on National Education Policy	16-07-2025		
4)	Innovations in Technology with respect to ECE(PPT)	23-07-2025		
5)	Group Discussion on smart devices	30-07-2025		
6)	Innovations in Technology with respect to ECE(PPT)	06-08-2025		
7)	Debate on social networks	13-08-2025		
8)	Technical Quiz on competitive exam topics	20-08-2025		
9)	Current affairs on technological changes/Technical Talks (PPT/Video)	03-09-2025		
10)	Technical Quiz	10-09-2025		
11)	Debate-Role of AI on Man Kind	17-09-2025		
12)	Presentation on Role of Technology in economical growth of a country	24-09-2025		
13)	Group Discussion on Drone Technology for real time applications	08-10-2025		
14)	Presentation on 5G Technology	15-10-2025		
15)	Testing knowledge on verbal/quantitative/reasoning/problem solving/logical/etc skills	22-10-2025		
16)	Technical Quiz	29-10-2025		

Course Instructors
Dr.B. Rambabu
Mr.P. Venkateswara Rao

HOD
Dr.G.Srinivasulu

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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section – B
Academic Year : 2025-26
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, Professor of ECE

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 Course outcomes	2	30.06.2025 01.07.2025			
2.	Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces	1	02.07.2025			
3.	Discrete and Continuous Sample Spaces	1	05.07.2025			
4.	Events, Probability Definitions and Axioms	1	07.07.2025			
5.	Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events	2	08.07.2025 09.07.2025			
6.	Concept of Random Variable, Conditions for a function to be a Random Variable	1	11.07.2025			
7.	Classification of Random Variable , Cumulative Distribution Function (CDF) and Properties	1	14.07.2025			
8.	Probability Density Function (PDF) and Properties	2	15.07.2025 16.07.2025			
9.	Pre-Defined Distributions **Activity: Simulation through MATLAB**	1	18.07.2025			
10.	Pre-Defined Distributions- **Activity: Simulation through MATLAB**	1	19.07.2025			
11.	Tutorial-I	1	21.07.2025			
No. of classes required to complete UNIT-I:14			**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	22.07.2025			
13.	Central Moments, Variance and Skew	1	23.07.2025			
14.	Chebychev's Inequality, Characteristic Function	1	25.07.2025			
15.	Moment Generating Function, Vector random variables **Activity : Concept mapping**	1	28.07.2025			
16.	Joint Distribution Function and Properties, Marginal Distribution Function	2	29.07.2025 30.07.2025			
17.	Joint Density Function and Properties, Marginal Density Function	1	01.08.2025			
18.	Statistical Independence, Sum of Two Random Variables, Distribution and Density of Sum of Random Variables	1	04.08.2025			

19.	Central Limit Theorem, Unequal Distribution, Equal Distributions	1	05.08.2025			
20.	Expected Value of Function of Random Variables, Joint Moment about the Origin **Activity: Live Polling (Quiz)**	1	06.08.2025			
21.	Joint Central Moments	1	08.08.2025			
22.	Joint Characteristic Functions	1	11.08.2025			
23.	Tutorial-II	1	12.08.2025			
No. of classes required to complete UNIT-II :13			**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	13.08.2025			
25.	Distribution and Density Functions, concept of Stationarity and Statistical Independence	1	18.08.2025			
26.	First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity	1	19.08.2025			
27.	Time Averages and Ergodicity	1	20.08.2025			
28.	Mean-Ergodic Processes, Correlation-Ergodic Processes **Activity: Concept mapping**	1	22.08.2025			
29.	Problem Solving session	1	01.09.2025			
30.	Autocorrelation Function and Its Properties	1	02.09.2025			
31.	Cross-Correlation Function and Its Properties	1	03.09.2025			
32.	Covariance Functions	1	08.09.2025			
33.	Convolution, Mean and Mean-squared Value of System Response	1	09.09.2025			
34.	Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output **Activity: Simulation using MATLAB**	1	10.09.2025			
35.	Tutorial-III	1	12.09.2025			
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	15.09.2025			
37.	Relationship between Power Spectrum and Autocorrelation Function	1	16.09.2025			

38.	The Cross-Power Density Spectrum, Properties	1	17.09.2025			
39.	Relationship between Cross-Power Spectrum and Cross-Correlation Function	1	19.09.2025 22.09.2025			
40.	Spectral Characteristics of System Response: Power Density Spectrum of Response **Activity: Quiz on multiple types signals**	2	23.09.2025			
41.	Cross-Power Density Spectrums of Input and Output	1	24.09.2025			
42.	Problem Solving Session	1	26.09.2025			
43.	Tutorial-IV	1	06.10.2025			
No. of classes required to complete UNIT-IV:9			**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	07.10.2025			
45.	Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures	1	08.10.2025			
46.	Average Noise Figure of cascaded networks, Narrow Band noise	2	10.10.2025 13.10.2025			
47.	Quadrature representation of narrow band noise & its properties	2	14.10.2025 15.10.2025			
48.	Entropy, Information rate	1	17.10.2025			
49.	Source coding: Huffman coding, Shannon Fano coding	1	21.10.2025			.
50.	Mutual information	1	22.10.2025			
51.	Channel capacity of discrete channel, **Activity: Concept mapping of channels** Shannon-Hartley law; Trade -off between bandwidth and SNR	1	24.10.2025			
52.	Tutorial-V	1	27.10.2025			
53.	Problem Solving Session	1	28.10.2025			
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
54.	Stochastic Signal Processing (SSP)	**1**	29.10.2025			
55.	Applications of SSP	**1**	31.10.2025			

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	Dr. G L N Murthy	Dr. G L N Murthy	Dr. G L N Murthy	Dr.G.Srinivasulu
30.06.2025	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HOD**

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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–B
Academic Year	: 2025-26
Course Name & Code	: **UHV-2:** Understanding Harmony and Ethical Human Conduct (23HS01)
L-T-P-Cr	: 2-1-0-3
Course Instructure	: **Dr.E V Krishna Rao**

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		1			2	2	2	2			2			
CO2	1		1			2	2	2	2			2			
CO3	1		1			3	3	3	3			3			
CO4	1		1			3	3	3	3			3			
CO5	1		1			3	3	3	3			3			

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	01-07-2025		TLM2	
2.	Process for self exploration: Natural Acceptance	1	02-07-2025		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	1	04-07-2025		TLM2	
4.	Understanding Value Education	1	05-07-2025		TLM2	
5.	Tutorial PS1 Self-exploration as the Process for Value Education	1	08-07-2025		TLM3	
6.	Continuous Happiness and Prosperity- Basic Human Aspirations	1	09-07-2025		TLM2	
7.	Happiness and Prosperity-Current Scenario	1	11-07-2025		TLM2	
8.	Tutorial PS2 Exploring Human Consciousness	1	15-07-2025		TLM3	
9.	Method to Fulfill the Basic Human Aspirations	1	16-07-2025		TLM2	
10.	Method to Fulfill the Basic Human Aspirations	1	18-07-2025		TLM2	
11.	Tutorial – PS3 Exploring Natuaral Acceptance	1	19-07-2025		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	22-07-2025		TLM2	

13.	Distinguishing between the Needs of the self and the body	1	23-07-2025		TLM2	
14.	Tutorial PS4 Distinguishing between the Needs of the self and the body	1	25-07-2025		TLM3	
15.	The body as an Instrument of the self	1	29-07-2025		TLM2	
16.	Understanding Harmony in the self	1	30-07-2025		TLM2	
17.	Tutorial PS5 Sources of Imagination in the self	1	01-08-2025		TLM3	
18.	Harmony of the self with the body	1	02-08-2025		TLM2	
19.	Programme to ensure self-regulation and Health	1	05-08-2025		TLM2	
20.	Programme to ensure self-regulation and Health	1	06-08-2025		TLM2	
21.	Tutorial -PS6 Harmony of the self with the body	1	08-08-2025		TLM3	
No. of classes required to complete UNIT-II: 10				**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
22.	Harmony in the Family-Basic unit of Human Interaction	1	12-08-2025		TLM2	
23.	Harmony in the Family-Basic unit of Human Interaction	1	13-08-2025		TLM2	
24.	'Trust' – the Foundational Value in Relationship	1	19-08-2025		TLM2	
25.	'Trust' – the Foundational Value in Relationship	1	20-08-2025		TLM2	
26.	Tutorial PS7 Exploring the Feeling of Trust	1	22-08-2025		TLM3	
27.	'Respect' – as the Right Evaluation	1	23-08-2025		TLM1	
28.	'Respect' – as the Right Evaluation	1	02-09-2025		TLM1	
29.	Tutorial PS8 Exploring the Feeling of Respect	1	03-09-2025		TLM2	
30.	Other Feelings, Justice in Human-to-Human Relationship	1	05-09-2025		TLM2	
31.	Other Feelings, Justice in Human-to-Human Relationship	1	06-09-2025		TLM2	
32.	Understanding Harmony in the Society	1	09-09-2025		TLM2	
33.	Understanding Harmony in the Society	1	10-09-2025		TLM2	
34.	Vision for the Universal Human Order	1	12-09-2025		TLM2	

35.	Tutorial PS9 Exploring systems to fufil Human Goal	1	16-09-2025		TLM3	
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
36.	Understanding Harmony in the Nature	1	17-09-2025		TLM2	
37.	Understanding Harmony in the Nature	1	19-09-2025		TLM2	
38.	Interconnectedness, self-regulation	1	20-09-2025		TLM2	
39.	Mutual Fulfilment among the Four Orders of Nature	1	23-09-2025		TLM2	
40.	Tutorial PS10 Exploring Four Orders of Nature	1	24-09-2025		TLM3	
41.	Realizing Existence as Co-existence at All Levels	1	26-09-2025		TLM2	
42.	Realizing Existence as Co-existence at All Levels	1	27-09-2025		TLM2	
43.	The Holistic Perception of Harmony in Existence	1	07-10-2025		TLM2	
44.	The Holistic Perception of Harmony in Existence	1	08-10-2025		TLM2	
45.	Tutorial PS11 Exploring Co-existence in Existence	1	10-10-2025		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**
46.	Natural acceptance of human values	1	14-10-2025		TLM2	
47.	Definitiveness of ethical human conduct	1	15-10-2025		TLM2	
48.	Tutorial PS12 Exploring Ethical human conduct	1	17-10-2025		TLM3	
49.	Basis for humanistic education	1	18-10-2025		TLM2	
50.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human order	1	22-10-2025		TLM2	
51.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human order	1	24-10-2025		TLM2	
52.	Competence in professional ethics	1	25-10-2025		TLM2	
53.	Tutorial PS13 Exploring	1	28-10-2025		TLM3	

	Humanistic models in education					
54.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	29-10-2025		TLM2	
55.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	31-10-2025		TLM2	
56.	Strategy for transition towards value based life and profession	1	01-11-2025		TLM3	
57.	Tutorial PS14 Steps of transition towards Universal Human Order	1	01-11-2025		TLM2	
No. of classes required to complete UNIT-V: 11				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	**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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	25-08-2025	30-08-2025	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	03-11-2025	08-11-2025	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	**2 W**

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr.E V Krishna Rao**	**Dr.E V Krishna Rao**	**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 : 2025-26
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	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)

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 to course	1	30-06-2025			
2.	Introduction to Unit-I	1	01-07-2025			
3.	Definition and Classification of signals	1	02-07-2025			
4.	Definition and Classification of systems	1	03-07-2025			
5.	Singularity and Related signals	1	07-07-2025			
6.	Complex exponential and sinusoidal signals	1	08-07-2025			
7.	Operations on signals	1	09-07-2025			
8.	Properties of signals	1	10-07-2025			
9.	Problem Solving Session	1	14-07-2025			
10.	Problem Solving Session	1	15-07-2025			
11.	Analogy between vectors and signals	1	16-07-2025			
12.	Approximation of a signal by another signal	1	17-07-2025			
13.	Orthogonal signal space, Approximation of a signal by a set of mutually another signals	1	21-07-2025			
14.	Orthogonality in complex signals	1	22-07-2025			
15.	Problem Solving Session	1	23-07-2025			
16.	Problem Solving Session	1	24-07-2025			
No. of classes required to complete UNIT-I : 16			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, Dirichlet's conditions	1	28-07-2025			
2.	Trigonometric and Exponential Fourier series	1	29-07-2025			
3.	Problem Solving Session	1	30-07-2025			
4.	Relation between Trigonometric and Exponential Fourier series	1	31-07-2025			
5.	Properties of Fourier series	1	04-08-2025			
6.	Complex Fourier spectrum, Deriving Fourier transform from Fourier series	1	05-08-2025			
7.	Fourier transform of arbitrary signals	1	06-08-2025			
8.	Fourier transform of standard signals	1	07-08-2025			
9.	Problem Solving Session	1	11-08-2025			
10.	Fourier transform of periodic signals, Introduction to Hilbert Transform	1	12-08-2025			
11.	Properties of Fourier transforms	1	13-08-2025			
12.	Properties of Fourier transforms	1	14-08-2025			
13.	Problem Solving Session	1	18-08-2025			
14.	Problem Solving Session	1	19-08-2025			
15.	Problem Solving Session	1	20-08-2025			
16.	Problem Solving Session	1	21-08-2025			
No. of classes required to complete UNIT-II : 16			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.	Introduction, Linear and Non-linear systems	1	01-09-2025			
2.	Time invariant and Variant systems	1	02-09-2025			
3.	Concept of convolution in time and frequency domain. Graphical representation of convolution	1	03-09-2025			
4.	Problem Solving Session	1	04-09-2025			
5.	Response of a LTI system	1	08-09-2025			
6.	System bandwidth, Signal bandwidth and Rise time, Distortion less transmission through a system	1	09-09-2025			
7.	Filter characteristics of linear systems, Ideal and practical characteristics of LPF, HPF, BPF, BSF	1	10-09-2025			
8.	Causality and Poly-Wiener criterion for physical realization	1	11-09-2025			
9.	Problem Solving Session	1	15-09-2025			
No. of classes required to complete UNIT-III : 9			**No. of classes taken :**			

UNIT-IV : Correlation and Sampling Theorem

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	16-09-2025			
2.	Energy spectral density, Power spectral density, Parseval's theorem	1	17-09-2025			
3.	Cross-correlation function and properties	1	18-09-2025			
4.	Relation between Convolution and correlation	1	22-09-2025			
5.	Detection of periodic signals in the presence of noise by correlation	1	23-09-2025			
6.	Extraction of signal from noise by filtering	1	24-09-2025			
7.	Problem Solving Session	1	25-09-2025			
8.	Sampling Theorem, Graphical analysis of Sampling Theorem- Impulse sampling, Analytical analysis of Sampling Theorem	1	29-09-2025			
9.	Sampling Theorem for band limited signal- Band Pass sampling	1	01-10-2025			
10.	Reconstruction of signal from its samples, Statement of Sampling theorem,	1	06-10-2025			
11.	Effect of under sampling-Aliasing effect, Natural and Flat top Sampling	1	07-10-2025			
12.	Problem Solving Session	1	08-10-2025			
No. of classes required to complete UNIT-IV : 12			**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, Concept of Laplace transform	1	09-10-2025			
2.	Relation between Laplace and Fourier transform, Existence of Laplace transform	1	13-10-2025			
3.	Laplace transform of various classes of signals	1	14-10-2025			
4.	Region of convergence in s- Transform and Properties	1	15-10-2025			
5.	Properties of Laplace transform	1	16-10-2025			
6.	Inverse Laplace transform	1	20-10-2025			
7.	Introduction to Z-Transform, Z-transform of various classes of signals	1	22-10-2025			
8.	Region of convergence in z- Transform and Properties	1	23-10-2025			
9.	Properties of Z-transforms	1	27-10-2025			
10.	Inverse Z- transform	1	28-10-2025			
11.	Problem Solving Session	1	29-10-2025			
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	30-10-2025			

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

Program Specific Outcomes (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. B. Ramesh Reddy	Dr. B. Rambabu	Dr. G.L.N Murthy	Dr. G. Srinivasulu

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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:

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

Course Instructor : Mrs. K.Pavani, Sr. Asst. Professor ,ECE

Course Name & Code : **Electronic Devices and Circuits** – 23EC03

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

Academic Year **:** 2025-26

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	-

CorrelationLevels:**1**-Slight(Low),**2**-Moderate(Medium),**3**-Substantial(High)andNocorrelation:**'-'**

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 (LESSONPLAN)

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	30/06/2025			
2.	Review of Semiconductor Physics: Mobility and Conductivity	1	01/07/2025			
3.	Intrinsic and Extrinsic Semiconductors	1	02/07/2025			
4.	Continuity Equation, Law of Junction.	1	03/07/2025			
5.	Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction	1	7/7/2025			
6.	p-n junction diode, Current components in p-n junction Diode	1	8/7/2025			
7.	Diode equation, V-I Characteristics	1	9/7/2025			
8.	Temperature dependence on V-I characteristics	1	10/7/2025			
9.	Diode resistance, Diode capacitance.	1	14/7/2025			
10.	Special Semiconductor Devices: Zener Diode, Breakdown Mechanisms and Applications	1	15/7/2025			
11.	Varactor Diode, LED	1	16/7/2025			
12.	Photodiode, Tunnel Diode	1	17/7/2025			
13.	UJT, PNPN Diode	1	21/7/2025			
14	SCR, Construction, Operation and V-I characteristics	1	22/7/2025			
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	23/7/2025			
2.	The Piecewise Linear Diode Model, Clipping (limiting) Circuits.	1	24/7/2025			
3.	Clipping at Two Independent Levels.	1	28/7/2025			
4.	Peak Detector, Clamping circuits	1	29/7/2025			
5.	Basic Rectifier Setup, Half Wave Rectifier	1	30/7/2025			
6.	Full Wave Rectifier, Bridge Rectifier	1	31/7/2025			
7.	Derivations of Characteristics of Rectifiers	1	4/8/2025			
8.	Filters, Inductor Filter	1	5/8/2025			
9.	Capacitor Filter, π-Section Filter	1	6/8/2025			
10.	Comparison of various Filter Circuits in terms of Ripple Factors.	1	7/8/2025			
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	11/8/2025			
2.	Transistor as an amplifier,	1	12/8/2025			
3.	characteristics of transistor in CB, CE,CCconfigurations	1	13/8/2025			
4.	Ebers-Moll model of a transistor,	1	14/8/2025			
5.	punch through/ reach through,	1	18/8/2025			
6.	Photo transistor, typical transistor junction voltage values.	1	19/8/2025			
7.	Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis,	1	20/8/2025			
8.	BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias.	1	21/8/2025			
9.	Stabilization against variations in VBE, Ic, and β, Stability factors, (S,S',S''),	1	1/9/2025			
10.	Bias compensation, Thermal runaway, Thermal stability.	1	2/9/2025			
No.of classes required to complete : UNIT-II: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	3/9/2025			
2.	Determination of h-parameters for a BJT amplifier	1	4/9/2025			
3.	Conversion of h-parameters	1	8/9/2025			
4.	generalized analysis of transistor amplifier model using h-parameters	1	9/9/2025			
5.	Analysis of CB amplifiers using exact and approximate analysis.	1	10/9/2025			
6.	Analysis of CE amplifiers using exact and approximate analysis	1	11/9/2025			
7.	Analysis of CC amplifiers using exact and approximate analysis	1	15/9/2025			
8.	Comparison of transistor amplifiers	1	16/9/2025			
9.	generalized analysis of transistor amplifier model using h-parameters	1	17/9/2025			
10.	Problem Solving Session	1	18/9/2025			
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	22/9/2025			
2.	Characteristics, small signal model of JFET		23/9/2025			
3.	MOSFET Structure, Operation of MOSFETin triode region	1	6/10/2025			
4.	Operation in saturation region, MOSFET as a variable resistor,	1	7/10/2025			
5.	Derivation of V-I characteristics of MOSFET		8/10/2025			
6.	Channel length modulation, MOS transconductance	1	9/10/2025			
7.	MOS device models: MOS small signal model, PMOS Transistor,	1	13/10/2025			
8.	CMOS Technology, Comparison of Bipolar and MOS devices.	1	14/10/2025			
9.	CMOS amplifiers: General Considerations	1	15/10/2025			
10.	Common Source Stage ,Common Gate Stage.	1	16/10/2025			
	Source Follower, comparison of FET amplifiers.	1	20/10/2025			
No.of classes required to complete : UNIT-IV:11			**No.of classes taken :**			

ContentBeyondtheSyllabus

S.No.	Topicstobecovered	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	22/10/2025			
2.	TTL logic Family	1	23/10/2025			
3	ECL logic Family	1	27/10/2025			

TeachingLearningMethods

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.

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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.

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

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

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mrs. K. Pavani	Mr. K. V. Ashok	Dr. B. V. N. R. Siva Kumar	Dr.G.Srinivasulu

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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART: A

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section – B
Academic Year : 2025-26
Course Name & Code : Switching Theory and Logic Design – 23EC04
L-T-P-Cr Structure : 3-0-0-3
Course Instructor : CH.Mallikharjuna Rao

Course Objectives:

1	To solve a typical number base conversion and analyze new error coding techniques.
2	Theorems and functions of Boolean algebra and behavior of logic gates
3	To optimize logic gates for digital circuits using various techniques
4	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 &companylimited,2010

R3 : Switching Theory and Logic Design by A. Anand Kumar, PHI Learningpvtltd,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	30.6.2025		TLM1	
2.	conversation from one radix to another radix	1	3.7.2025		TLM1	
3.	r- 1's compliments and r's compliments of signed numbers	1	4.7.2025		TLM1	
4.	2421 & 84-2-1 code	1	5.7.2025		TLM1	
5.	Error detection codes: parity checking, even parity, odd parity	1	7.7.2025		TLM1	
6.	Error correction codes: Hamming code.	1	10.7.2025		TLM1	
7.	Boolean theorems	1	11.7.2025		TLM1	
8.	Principle of complementation & duality, De-Morgan theorems.	1	14.7.2025		TLM1	
9.	Logic operations; Universal Logic operations, EX-OR, EX- NOR operations.	1	17.7.2025		TLM1	
10.	Standard SOP and POS Forms	1	18.7.2025		TLM1	
11.	NAND-NAND and NOR-NOR realizations	1	19.7.2025		TLM1	
12.	Realization of three level logic circuits.	1	21.7.2025		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	24.7.2025		TLM1	
2.	Minimization and realization of switching functions using Boolean theorems	1	25.7.2025		TLM1	
3.	K-Map(2,3 variables)	1	26.7.2025		TLM1	
4.	K-Map(4,5 variables)	1	28.7.2025		TLM1	
5.	K-Map(6 variables)	1	31.7.2025		TLM2	
6.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	1.8.2025		TLM1	

7.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	2.8.2025		TLM1	
8.	Design of Full Adder, half subtractor	1	4.8.2025		TLM1	
9.	full subtractor, applications of full adders	1	7.8.2025		TLM1	
10.	4- bit adder-sub tractor circuit	1	8.8.2025		TLM1	
11.	BCD adder circuit ,Excess 3 adder circuit	1	11.8.2025		TLM1	
12.	carry look-a- head adder circuit	1	14.8.2025		TLM2	
13.	Design code converts using Karnaugh method and draw the complete circuit diagrams	1	18.8.2025		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	21.8.2025		TLM1	
2.	multiplexer and de-multiplexers	1	22.8.2025		TLM1	
3.	Implementation of higher order circuits using lower order circuits	1	23.8.2025		TLM1	
4.	Realization of Boolean functions using decoders	1	1.9.2025		TLM1	
5.	Realization of Boolean functions using multiplexers	1	4.9.2025		TLM1	
6.	Design of Priority encoder, 4-bit digital comparator	1	5.9.2025		TLM1	
7.	seven segment decoder	1	6.9.2025		TLM1	
8.	PROM-Basics structures, realization of Boolean functions, Programming table.	1	8.9.2025		TLM1	
9.	PAL -Basics structures, realization of Boolean functions, Programming table.	1	11.9.2025		TLM2	
10	PAL -Basics structures, realization of Boolean functions, Programming table.	1	12.9.2025		TLM1	
11.	PLA -Basics structures, realization of Boolean functions, Programming table.	1	15.9.2025			
12.	PLA -Basics structures, realization of Boolean functions, Programming table.	1	18.9.2025			
No. of classes required to complete UNIT-III : 12			**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	19.9.2025		TLM1	
2.	Flip-Flops: Truth tables and excitation tables of RS flip-flop, JK flip- flop, with reset and clear terminals	1	20.9.2025		TLM1	
3.	Flip-Flops: Truth tables and excitation tables of T-flip-flop, D flip- flop, with reset and clear terminals	1	22.9.2025		TLM1	
4.	Conversion from one flip-flop to another flip- flop.	1	25.9.2025		TLM1	
5.	Conversion from one flip-flop to another flip- flop.	1	26.9.2025		TLM1	
6.	Design of ripple counters, design of synchronous counters	1	27.9.2025		TLM1	

7.	Johnson counter, ring counter.	1	29.9.2025		TLM1	
8.	Design of registers - Buffer register, control buffer register.	1	3.10.2025		TLM1	
9.	Shift register.	1	4.10.2025		TLM2	
10.	Bi- directional shift register, universal shift, register.	1	6.10.2025		TLM1	
11.	Study the following relevant ICs and their relevant functions 7474, 7475, 7476	1	9.10.2025		TLM1	
12.	Study the following relevant ICs and their relevant functions 7490, 7493, 74121.		10.10.2025			
No. of classes required to complete UNIT-III : 12			**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	13.10.2025		TLM1	
2.	Reduction of state tables	1	16.10.2025		TLM1	
3.	Reduction of state tables	1	17.10.2025		TLM1	
4.	Analysis of clocked sequential circuits Mealy to Moore conversion	1	18.10.2025		TLM1	
5.	Analysis of clocked sequential circuits Moore to Mealy to conversion	1	23.102025		TLM1	
6.	Realization of sequence generator	1	24.10.2025		TLM1	
7.	Tutorial	1	25.10.2025		TLM5	
8.	Design of Clocked Sequential Circuit to detect the given sequence (with overlapping)	1	27.10.2025		TLM1	
9.	Design of Clocked Sequential Circuit to detect the given sequence (without overlapping)	1	30.10.2025			
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	31.10.2025		TLM2	
2.	Introduction to HDL,Verilog HDL	1	01.11.2025		TLM2	

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

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: ROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

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:	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

Program Specific Outcomes (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr.CH.Mallikharjuna Rao	Mr.CH.Mallikharjuna Rao	Dr.P.Lachi Reddy	Dr. G. Srinivasulu

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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

PART-A:

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

Course Instructor : Mrs. K.Pavani/ Dr. B. V. N. R. Siva Kumar/ Mr. K. V. Ashok/ Mr.M.Siva Sankara Rao

Course Name & Code : Electronic Devices and Circuits Lab – 23EC52

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

Academic Year : 2025-26

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	3/7/2025		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	10/7/2025		TLM4	
3.	Design of Clipper circuit using diode/ Determination of h-parameter of a BJT in CE configuration	3	17/7/2025		TLM4	
4.	Design of Clipper circuit using diode/ Determination of h-parameter of a BJT in CE configuration	3	24/7/2025		TLM4	
5.	Design of Clamping circuit using diode/ Estimation of Stability factor for a transistor self-biasing circuit	3	31/7/2025		TLM4	
6.	Design of Clamping circuit using diode/ Estimation of Stability factor for a transistor self-biasing circuit	3	7/8/2025		TLM4	
7.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier/ Determination of Break over voltage of SCR using V-I Characteristics	3	14/8/2025		TLM4	
8.	Estimation of ripple factor and regulation of rectifiers without and with LC filter. Part A: Half-wave Rectifier Part B: Full-wave Rectifier/ Determination of Break over voltage of SCR using V-I Characteristics	3	21/8/2025		TLM4	
9.	Frequency response of BJT-CE Amplifier/ Design of FET-CS Amplifier	3	4/9/2025		TLM4	

10.	Frequency response of BJT-CE Amplifier/ Design of FET-CS Amplifier	3	11/9/2025		TLM4
11.	UJT Characteristics	3	18/9/2025		TLM4
12.	Revision	3	25/9/2025		TLM4
13.	Lab Internal examination	3	9/10/2025		
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 (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: **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

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

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

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

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

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

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

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Mrs. K. Pavani	Mr. M.Siva Sankara Rao	Dr. B. V. N. R. Siva Kumar	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–B
Academic Year : 2025-26
Course Name & Code : Switching Theory and Logic Design Lab – 23EC53
L-T-P-Cr : 0-0-3-1.5
Course Instructure : Mr.CH. MallikharjunaRao,Mr.CH.Sivaramakrishna,Mrs.B.Rajeswari, Mr. K.Sreedhar Reddy

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):

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	4.7.2025		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	11.7.2025		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	18.7.2025		TLM4	
4.	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	25.7.2025		TLM4	
5.	4 variable logic function verification using 8 to1 multiplexer.	3	1.8.2025		TLM4	
6.	Design full adder circuit and verify its functional table.	3	8.8.2025		TLM4	
7.	Verification of functional tables of (i) JK Master Slave Flip–Flop (ii) D Flip-Flop	3	22.8.2025		TLM4	
8.	Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output	3	5.9.2025		TLM4	
9.	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	12.9.2025		TLM4	
10.	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	19.9.2025		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	26.9.2025		TLM4	
12.	Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	3.10.2025		TLM4	
13.	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.	3	10.10.2025		TLM4	
14.	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	17.102025		TLM4	
15.	Makeup Lab	3	24.10.2025		TLM4	
16.	Lab Internal Examination	3	31.10.2025		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**

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

Program Specific Outcomes (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr.CH.Mallikharjuna Rao Mr.CH.Sivarama Krishna Mrs.B.Rajeswari Mr.K.Sreedhar Reddy	Mr.CH.Sivarama Krishna	Dr. P.Lachi Reddy	Dr. G. Srinivasulu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.O.Venkata Siva
Course Name & Code : DATA STRUCTURES LAB & 20CSS3
L-T-P Structure : 0-1-2 **Credits:** 2
Program/Sem/Sec : B.Tech/III/ECE-B **A.Y.:** 2025-26

PREREQUISITE: C Programming Language

COURSE OBJECTIVE:
The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques **COURSE OUTCOMES (CO):**

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	PSO1	PSO2	PSO3
CO1	3	2											2		
CO2	3	2											2		
CO3	3	2											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	HOD Sign
1.	**UNIT1**: 1.Program to find min & max element in an array. 2.Program to implement matrix multiplication.	4	01-07-2025 05-07-2025		
2.	3.Find an element in given list of sorted elements in an array using Binary search.	4	08-07-2025 12-07-2025		
3.	4.Implement Selection and Quick sort techniques	4	15-07-2025 19-07-2025		
4.	**UNIT:2** Write a program to implement the following operations. a. Insert b. Deletion c. Traversal	4	22-07-2025 26-07-2025		
5.	Write a program to store name, roll no, and marks of students in a class using circular double linked list	4	29-07-2025 02-08-2025		
6.	Write a program to perform addition of given two polynomial expressions using linked list	4	05-08-2025 09-08-2025		
7.	**UNIT:3** Implement stack operations using a. Arrays b. Linked list	2	12-08-2025 19-08-2025		
8.	Convert given infix expression into post fix expression using stacks.	7	23-08-2025 02-09-2025 06-09-2025		

9.	Evaluate given post fix expression using stack.	5	09-08-2025 13-08-2025 16-08-2025		
10.	4.Write a program to reverse given linked list using stack	7	20-08-2025 23-08-2025 27-08-2025		
11.	UNIT 4: 1.ImplementQueue operations using a. Arrays b. Linked list.	4	04-10-2025 07-10-2025		
12.	2. Implement Circular Queue using a. Arrays b. Linked list. 3.Implement Dequeue using linked list.	7	11-10-2025 14-10-2025 18-10-2025		
13.	**UNIT5:** 1.Implement binary tree traversals using linked list. 2. Write program to create binary search tree for given list of integers. Perform in-order traversal of the tree. Implement insertion and deletion operations.	8	21-10-2025 25-10-2025 28-10-2025		
14.	Lab Internal Exam	3	01-11-2025		

PART-C

EVALUATION PROCESS (R23 Regulation):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr.O.V.SIVA**	**Mr.R.Ashok**	**Dr. Y.Vijaya Bhaskar Reddy**	**Dr.S.Nagarjuna Reddy**
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-B
ACADEMIC YEAR : 2025-26
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 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	-	-	-

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.

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	01-07-2025		TLM2			
2.	Multidisciplinary Nature ofEnvironmental Studies	1	07-07-2025		TLM2			

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Natural Resources – Forest resources	1	08-07-2025		TLM1	CO1	T1,T2	
4.	Water resources	1	14-07-2025		TLM1	CO1	T1,T2	
5.	Mineral resources	1	15-07-2025		TLM1	CO1	T1,T2	
6.	Food resources	1	21-07-2025		TLM1	CO1	T1,T2	
7.	Energy resources		22-07-2025					
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystems and Biodiversity

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	28-07-2025		TLM1	CO2	T1,T2	
9.	Ecological succession &	1	29-07-2025		TLM1	CO2	T1,T2	
10.	Food chains, Food webs & Ecological Pyramids	1	04-08-2025		TLM1	CO2	T1,T2	
11.	Types of ecosystems	1	05-08-2025		TLM1	CO2	T1,T2	
12.	Biodiversity – introduction, levels, bio geographic classification	1	11-08-2025		TLM1	CO2	T1,T2	

13.	Values of Biodiversity, India as mega diversity nation	1	12-08-2025		TLM1	CO2	T1,T2	
14.	Threats to biodiversity and Conservation of biodiversity	1	18-08-2025		TLM1	CO2	T1,T2	
15.	Revision	1	19-08-2025		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		08			No. of classes taken:			

I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
16.	Environmental pollution -Air pollution	1	01-09-2025		TLM1	CO3	T1,T2	
17.	Water pollution, Marine pollution, Thermal pollution	1	02-09-2025		TLM1	CO3	T1,T2	
18.	Soil pollution	1	08-09-2025		TLM1	CO3	T1,T2	
19.	Noise pollution & Nuclear Hazards	1	09-09-2025		TLM1	CO3	T1,T2	
20.	Solid waste management	1	15-09-2025		TLM1	CO3	T1,T2	
21.	Disaster management	1	16-09-2025		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Social Issues and Environment

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
22.	From Unsustainable to Sustainable development	1	22-09-2025		TLM1	CO4	T1,T2	
23.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	23-09-2025		TLM1	CO4	T1,T2	
24.	Environmental ethics, Climate change	1	29-09-2025		TLM1	CO4	T1,T2	
25.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	30-09-2025		TLM1	CO4	T1,T2	
26.	Environmental Acts	1	06-10-2025		TLM1	CO4	T1,T2	
27.	Environmental Acts	1	07-10-2025		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		06			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
28.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	13-10-2025		TLM1	CO5	T1,T2	
29.	Environment and human health –Human Rights – Value Education	1	14-10-2025		TLM1	CO5	T1,T2	
30.	HIV/AIDS – Women and Child Welfare	1	20-10-2025		TLM1	CO5	T1,T2	
31.	Role of information Technology in Environment and human health	1	27-10-2025		TLM1	CO5	T1,T2	
32.	Revision	1	28-10-2025		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		05			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
33.	Case studies	2	19-08-2025 07-10-2025		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

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.
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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.

Dr. ShahedaNiloufer	**Dr. ShahedaNiloufer**	**Dr. ShahedaNiloufer**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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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 – C
Academic Year : 2025-26
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, Professor of ECE

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 - 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 Course outcomes	2	30.06.2025 02.07.2025			
2.	Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces	1	04.07.2025			
3.	Discrete and Continuous Sample Spaces	1	04.07.2025			
4.	Events, Probability Definitions and Axioms	1	07.07.2025			
5.	Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events	2	09.07.2025 11.07.2025			
6.	Concept of Random Variable, Conditions for a function to be a Random Variable	1	11.07.2025			
7.	Classification of Random Variable , Cumulative Distribution Function (CDF) and Properties	1	14.07.2025			
8.	Probability Density Function (PDF) and Properties	2	16.07.2025 18.07.2025			
9.	Pre-Defined Distributions **Activity: Simulation through MATLAB**	1	18.07.2025			
10.	Pre-Defined Distributions- **Activity: Simulation through MATLAB**	1	21.07.2025			
11.	Tutorial-I	1	23.07.2025			
No. of classes required to complete UNIT-I:14			**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	25.07.2025			
13.	Central Moments, Variance and Skew	1	25.07.2025			
14.	Chebychev's Inequality, Characteristic Function	1	28.07.2025			
15.	Moment Generating Function, Vector random variables **Activity: Concept mapping**	1	30.07.2025			
16.	Joint Distribution Function and Properties, Marginal Distribution Function	1	01.08.2025			
17.	Joint Density Function and Properties, Marginal Density Function	2	01.08.2025 04.08.2025			
18.	Statistical Independence, Sum of Two Random Variables, Distribution and	1	06.08.2025			

	Density of Sum of Random Variables					
19.	Central Limit Theorem, Unequal Distribution, Equal Distributions	1	08.08.2025			
20.	Expected Value of Function of Random Variables, Joint Moment about the Origin **Activity: Live Polling (Quiz)**	1	08.08.2025			
21.	Joint Central Moments	1	11.08.2025			
22.	Joint Characteristic Functions	1	13.08.2025			
23.	Tutorial-II	1	18.08.2025			
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	20.08.2025			
25.	Distribution and Density Functions, concept of Stationarity and Statistical Independence	1	22.08.2025			
26.	First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity	1	22.08.2025			
27.	Time Averages and Ergodicity	1	01.09.2025			
28.	Mean-Ergodic Processes, Correlation-Ergodic Processes **Activity: Concept mapping**	1	03.09.2025			
29.	Problem Solving session	1	08.08.2025			
30.	Autocorrelation Function and Its Properties	1	10.08.2025			
31.	Cross-Correlation Function and Its Properties	1	12.09.2025			
32.	Covariance Functions	1	12.09.2025			
33.	Convolution, Mean and Mean-squared Value of System Response	1	15.09.2025			
34.	Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output **Activity: Simulation using MATLAB**	1	16.09.2025			
35.	Tutorial-III	1	19.09.2025			
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	19.09.2025			
37.	Relationship between Power Spectrum and Autocorrelation Function	1	22.09.2025			

38.	The Cross-Power Density Spectrum, Properties	1	24.09.2025			
39.	Relationship between Cross-Power Spectrum and Cross-Correlation Function	1	26.09.2025			
40.	Spectral Characteristics of System Response: Power Density Spectrum of Response **Activity: Quiz on multiple types signals**	2	26.09.2025 29.09.2025			
41.	Cross-Power Density Spectrums of Input and Output	1	06.10.2025			
42.	Problem Solving Session	1	08.10.2025			
43.	Tutorial-IV	1	10.10.2025			
No. of classes required to complete UNIT-IV:9			**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	10.10.2025			
45.	Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures	1	13.10.2025			
46.	Average Noise Figure of cascaded networks, Narrow Band noise	2	15.10.2025 17.10.2025			
47.	Quadrature representation of narrow band noise & its properties	2	17.10.2025 22.10.2025			
48.	Entropy, Information rate	1	24.10.2025			
49.	Source coding: Huffman coding, Shannon Fano coding	1	24.10.2025			
50.	Mutual information	1	27.10.2025			
51.	Channel capacity of discrete channel, **Activity: Concept mapping of channels** Shannon-Hartley law; Trade -off between bandwidth and SNR	1	29.10.2025			
52.	Tutorial-V	1	31.10.2025			
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
53.	Stochastic Signal Processing (SSP)	**1**	31.10.2025			

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	Dr. G L N Murthy	Dr. G L N Murthy	Dr. G L N Murthy	Dr.G.Srinivasulu
30.06.2025	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HOD**

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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
Academic Year : 2025-26
Course Name & Code : **UHV-2:** Understanding Harmony and Ethical Human Conduct (23HS01)
L-T-P-Cr : 2-1-0-3
Course Instructure : **Mrs. B. Rajeswari**

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		1			2	2	2	2			2			
CO2	1		1			2	2	2	2			2			
CO3	1		1			3	3	3	3			3			
CO4	1		1			3	3	3	3			3			
CO5	1		1			3	3	3	3			3			

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	30-06-2025		TLM2	
2.	Process for self exploration: Natural Acceptance	1	01-07-2025		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	1	03-07-2025		TLM2	
4.	Understanding Value Education	1	05-07-2025		TLM2	
5.	Tutorial PS1 Self-exploration as the Process for Value Education	1	07-07-2025		TLM3	
6.	Continuous Happiness and Prosperity- Basic Human Aspirations	1	08-07-2025		TLM2	
7.	Happiness and Prosperity-Current Scenario	1	10-07-2025		TLM2	
8.	Tutorial PS2 Exploring Human Consciousness	1	14-07-2025		TLM3	
9.	Method to Fulfill the Basic Human Aspirations	1	15-07-2025		TLM2	
10.	Method to Fulfill the Basic Human Aspirations	1	17-07-2025		TLM2	
11.	Tutorial – PS3 Exploring Natuaral Acceptance	1	19-07-2025		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	21-07-2025		TLM2	
13.	Distinguishing between the Needs of the self and the body	1	22-07-2025		TLM2	
14.	Tutorial PS4 Distinguishing between the Needs of the self and the body	1	24-07-2025		TLM3	
15.	The body as an Instrument of the self	1	28-07-2025		TLM2	
16.	Understanding Harmony in the self	1	29-07-2025		TLM2	

17.	Tutorial PS5 Sources of Imagination in the self	1	31-07-2025		TLM3	
18.	Harmony of the self with the body	1	02-08-2025		TLM2	
19.	Programme to ensure self-regulation and Health	1	04-08-2025		TLM2	
20.	Programme to ensure self-regulation and Health	1	05-08-2025		TLM2	
21.	Tutorial -PS6 Harmony of the self with the body	1	07-08-2025		TLM3	
No. of classes required to complete UNIT-II: 10				**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
22.	Harmony in the Family-Basic unit of Human Interaction	1	11-08-2025		TLM2	
23.	'Trust' – the Foundational Value in Relationship	1	12-08-2025		TLM2	
24.	'Trust' – the Foundational Value in Relationship	1	14-08-2025		TLM2	
25.	Tutorial PS7 Exploring the Feeling of Trust	1	18-08-2025		TLM3	
26.	'Respect' – as the Right Evaluation	1	19-08-2025		TLM1	
27.	'Respect' – as the Right Evaluation	1	21-08-2025		TLM1	
28.	Tutorial PS8 Exploring the Feeling of Respect	1	23-08-2025		TLM2	
29.	Other Feelings, Justice in Human-to-Human Relationship	1	01-09-2025		TLM2	
30.	Other Feelings, Justice in Human-to-Human Relationship	1	02-09-2025		TLM2	
31.	Understanding Harmony in the Society	1	04-09-2025		TLM2	
32.	Vision for the Universal Human Order	1	06-09-2025		TLM2	
33.	Tutorial PS9 Exploring systems to fufil Human Goal	1	08-09-2025		TLM3	
No. of classes required to complete UNIT-III: 12				**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
34.	Understanding Harmony in the Nature	1	09-09-2025		TLM2	
35.	Understanding Harmony in the Nature	1	11-09-2025		TLM2	
36.	Interconnectedness, self-regulation	1	15-09-2025		TLM2	

37.	Mutual Fulfilment among the Four Orders of Nature	1	16-09-2025		TLM2	
38.	Mutual Fulfilment among the Four Orders of Nature	1	18-09-2025		TLM2	
39.	Tutorial PS10 Exploring Four Orders of Nature	1	20-09-2025		TLM3	
40.	Realizing Existence as Co-existence at All Levels	1	22-09-2025		TLM2	
41.	Realizing Existence as Co-existence at All Levels	1	23-09-2025		TLM2	
42.	The Holistic Perception of Harmony in Existence	1	25-09-2025		TLM2	
43.	The Holistic Perception of Harmony in Existence	1	27-09-2025		TLM2	
44.	Tutorial PS11 Exploring Co-existence in Existence	1	29-09-2025		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
45.	Natural acceptance of human values	1	04-10-2025		TLM2	
46.	Definitiveness of ethical human conduct	1	06-10-2025		TLM2	
47.	Tutorial PS12 Exploring Ethical human conduct	1	07-10-2025		TLM3	
48.	Basis for humanistic education	1	09-10-2025		TLM2	
49.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human order	1	13-10-2025		TLM2	
50.	Competence in professional ethics	1	14-10-2025		TLM2	
51.	Competence in professional ethics	1	16-10-2025		TLM2	
52.	Tutorial PS13 Exploring Humanistic models in education	1	18-10-2025		TLM3	
53.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	20-10-2025		TLM2	
54.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	23-10-2025		TLM2	
55.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	25-10-2025		TLM2	
56.	Strategy for transition towards value based life and	1	27-10-2025		TLM2	

	profession					
57.	Strategy for transition towards value based life and profession	1	28-10-2025		TLM2	
58.	Tutorial PS14 Steps of transition towards Universal Human Order	1	30-10-2025		TLM3	
59.	Conclusion on UHV-2	1	01-11-2025		TLM3	
No. of classes required to complete UNIT-V: 15				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	25-08-2025	30-08-2025	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	03-11-2025	08-11-2025	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	17-11-2025	29-11-2025	**2 W**

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mrs. B. Rajeswari**	**Dr. E V Krishna Rao**	**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–C
Academic Year : 2025-26
Course Name & Code : Signals and Systems – 23EC02
L-T-P-Cr : 3-0-0-3
Course Instructure : Mr. M.Sivasankara Rao

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)

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 to course	1	30-06-2025			
2.	Introduction to Unit-I	1	01-07-2025			
3.	Definition and Classification of signals	1	02-07-2025			
4.	Definition and Classification of systems	1	03-07-2025			
5.	Singularity and Related signals	1	07-07-2025			
6.	Complex exponential and sinusoidal signals	1	08-07-2025			
7.	Operations on signals	1	09-07-2025			
8.	Properties of signals	1	10-07-2025			
9.	Problem Solving Session	1	14-07-2025			
10.	Problem Solving Session	1	15-07-2025			
11.	Analogy between vectors and signals	1	16-07-2025			
12.	Approximation of a signal by another signal	1	17-07-2025			
13.	Orthogonal signal space, Approximation of a signal by a set of mutually another signals	1	21-07-2025			
14.	Orthogonality in complex signals	1	22-07-2025			
15.	Problem Solving Session	1	23-07-2025			
16.	Problem Solving Session	1	24-07-2025			
No. of classes required to complete UNIT-I : 16			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, Dirichlet's conditions	1	28-07-2025			
2.	Trigonometric and Exponential Fourier series	1	29-07-2025			
3.	Problem Solving Session	1	30-07-2025			
4.	Relation between Trigonometric and Exponential Fourier series	1	31-07-2025			
5.	Properties of Fourier series	1	04-08-2025			
6.	Complex Fourier spectrum, Deriving Fourier transform from Fourier series	1	05-08-2025			
7.	Fourier transform of arbitrary signals	1	06-08-2025			
8.	Fourier transform of standard signals	1	07-08-2025			
9.	Problem Solving Session	1	11-08-2025			
10.	Fourier transform of periodic signals, Introduction to Hilbert Transform	1	12-08-2025			
11.	Properties of Fourier transforms	1	13-08-2025			
12.	Properties of Fourier transforms	1	14-08-2025			
13.	Problem Solving Session	1	18-08-2025			
14.	Problem Solving Session	1	19-08-2025			
15.	Problem Solving Session	1	20-08-2025			
16.	Problem Solving Session	1	21-08-2025			
No. of classes required to complete UNIT-II : 16			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.	Introduction, Linear and Non-linear systems	1	01-09-2025			
2.	Time invariant and Variant systems	1	02-09-2025			
3.	Concept of convolution in time and frequency domain. Graphical representation of convolution	1	03-09-2025			
4.	Problem Solving Session	1	04-09-2025			
5.	Response of a LTI system	1	08-09-2025			
6.	System bandwidth, Signal bandwidth and Rise time, Distortion less transmission through a system	1	09-09-2025			
7.	Filter characteristics of linear systems, Ideal and practical characteristics of LPF, HPF, BPF, BSF	1	10-09-2025			
8.	Causality and Poly-Wiener criterion for physical realization	1	11-09-2025			
9.	Problem Solving Session	1	15-09-2025			
No. of classes required to complete UNIT-III : 9			**No. of classes taken :**			

UNIT-IV : Correlation and Sampling Theorem

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	16-09-2025			
2.	Energy spectral density, Power spectral density, Parseval's theorem	1	17-09-2025			
3.	Cross-correlation function and properties	1	18-09-2025			
4.	Relation between Convolution and correlation	1	22-09-2025			
5.	Detection of periodic signals in the presence of noise by correlation	1	23-09-2025			
6.	Extraction of signal from noise by filtering	1	24-09-2025			
7.	Problem Solving Session	1	25-09-2025			
8.	Sampling Theorem, Graphical analysis of Sampling Theorem- Impulse sampling, Analytical analysis of Sampling Theorem	1	29-09-2025			
9.	Sampling Theorem for band limited signal- Band Pass sampling	1	01-10-2025			
10.	Reconstruction of signal from its samples, Statement of Sampling theorem,	1	06-10-2025			
11.	Effect of under sampling-Aliasing effect, Natural and Flat top Sampling	1	07-10-2025			
12.	Problem Solving Session	1	08-10-2025			
No. of classes required to complete UNIT-IV : 12			**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, Concept of Laplace transform	1	09-10-2025			
2.	Relation between Laplace and Fourier transform, Existence of Laplace transform	1	13-10-2025			
3.	Laplace transform of various classes of signals	1	14-10-2025			
4.	Region of convergence in s- Transform and Properties	1	15-10-2025			
5.	Properties of Laplace transform	1	16-10-2025			
6.	Inverse Laplace transform	1	20-10-2025			
7.	Introduction to Z-Transform, Z-transform of various classes of signals	1	22-10-2025			
8.	Region of convergence in z- Transform and Properties	1	23-10-2025			
9.	Properties of Z-transforms	1	27-10-2025			
10.	Inverse Z- transform	1	28-10-2025			
11.	Problem Solving Session	1	29-10-2025			
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	30-10-2025			

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

Program Specific Outcomes (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. M.Sivasankara Rao	Mr. M.Sivasankara Rao	Dr. G.L.N Murthy	Dr. G. Srinivasulu

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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program : B.Tech. III-Sem., ECE., Section– C
Academic Year : 2025-26
Course Name & Code : **Electronic Devices and Circuits** – 23EC03
L-T-P-Cr : 3-0-0-3
Course Instructure : Mr. K.V. Ashok

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 (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	30-06-2025			
2.	Review of Semiconductor Physics: Mobility and Conductivity	1	01-07-2025			
3.	Intrinsic and Extrinsic Semiconductors	1	02-07-2025			
4.	Continuity Equation, Law of Junction.	1	04-07-2025			
5.	Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction	1	07-07-2025			
6.	p-n junction diode, Current components in p-n junction Diode	1	08-07-2025			
7.	Diode equation, V-I Characteristics	1	09-07-2025			
8.	Temperature dependence on V-I characteristics	1	11-07-2025			
9.	Diode resistance, Diode capacitance.	1	14-07-2025			
10.	Special Semiconductor Devices: Zener Diode, Breakdown Mechanisms and Applications	1	15-07-2025			
11.	Varactor Diode, LED	1	16-07-2025			
12.	Photodiode, Tunnel Diode	1	18-07-2025			
13.	UJT, PNPN Diode	1	21-07-2025			
14	SCR, Construction, Operation and V-I characteristics	1	22-07-2025			
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	23-07-2025			
2.	The Piecewise Linear Diode Model, Clipping (limiting) Circuits.	1	25-07-2025			
3.	Clipping at Two Independent Levels.	1	28-07-2025			
4.	Peak Detector, Clamping circuits	1	29-07-2025			
5.	Basic Rectifier Setup, Half Wave Rectifier	1	30-07-2025			
6.	Full Wave Rectifier, Bridge Rectifier	1	01-08-2025			
7.	Derivations of Characteristics of Rectifiers	1	04-08-2025			
8.	Filters, Inductor Filter	1	05-08-2025			
9.	Capacitor Filter, π-Section Filter	1	06-08-2025			
10.	Comparison of various Filter Circuits in terms of Ripple Factors.	1	08-08-2025			
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	11-08-2025			
2.	Transistor as an amplifier,	1	12-08-2025			
3.	characteristics of transistor in CB, CE,CC configurations	1	13-08-2025			
4.	Ebers-Moll model of a transistor,	1	18-08-2025			
5.	punch through/ reach through,	2	20-08-2025			
6.	Photo transistor, typical transistor junction voltage values.	1	22-08-2025			
7.	Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis,	1	01-09-2025			
8.	BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias.	1	02-09-2025			
9.	Stabilization against variations in VBE, Ic, and β, Stability factors, (S,S',S''),	1	03-09-2025			
10.	Bias compensation, Thermal runaway, Thermal stability.	1	05-09-2025			
No. of classes required to complete UNIT-III : 11			**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	08-09-2025			
2.	Determination of h-parameters for a BJT amplifier	1	09-09-2025			
3.	Conversion of h-parameters	1	10-09-2025			
4.	generalized analysis of transistor amplifier model using h-parameters	1	12-09-2025			
5.	Analysis of CB amplifiers using exact and approximate analysis.	1	15-09-2025			
6.	Analysis of CE amplifiers using exact and approximate analysis	1	16-09-2025			
7.	Analysis of CC amplifiers using exact and approximate analysis	1	17-09-2025			
8.	Comparison of transistor amplifiers	1	19-09-2025			
9.	generalized analysis of transistor amplifier model using h-parameters	1	22-09-2025			
10.	Problem Solving Session	1	23-09-2025			
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	24-09-2025			
2.	Characteristics, small signal model of JFET		26-09-2025			
3.	MOSFET Structure, Operation of MOSFET in triode region	1	29-09-2025			
4.	Operation in saturation region, MOSFET as a variable resistor,	1	06-10-2025			
5.	Derivation of V-I characteristics of MOSFET		07-10-2025			
6.	Channel length modulation, MOS transconductance	1	08-10-2025			
7.	MOS device models: MOS small signal model, PMOS Transistor,	1	10-10-2025			
8.	CMOS Technology, Comparison of Bipolar and MOS devices.	1	13-10-2025			
9.	CMOS amplifiers: General Considerations	2	15-10-2025			
10.	Common Source Stage ,Common Gate Stage.	1	17-10-2025			
11.	Source Follower, comparison of FET amplifiers.	1	20-10-2025			
	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.	Realization of Universal gates with CMOS transistor	2	24-10-2025			
2.	TTL logic Family	2	28-10-2025			
3	ECL logic Family	2	31-10-2025			

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	Course Coordinator	Module Coordinator	HOD
Mr.K.V. Ashok	Mr.K.V.Ashok	Dr. B.V.N.R. Siva Kumar	Dr. G. Srinivasulu

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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

PART: A

Program/Sem/Sec : B.Tech., ECE., III-Sem., Section – C
Academic Year : 2025-26
Course Name & Code : Switching Theory and Logic Design – 23EC04
L-T-P-Cr Structure : 3-0-0-3
Course Instructor : CH.Mallikharjuna Rao

Course Objectives:

1	To solve a typical number base conversion and analyze new error coding techniques.
2	Theorems and functions of Boolean algebra and behavior of logic gates
3	To optimize logic gates for digital circuits using various techniques
4	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 &companylimited,2010

R3 : Switching Theory and Logic Design by A. Anand Kumar, PHI Learningpvtltd,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	30.6.2025		TLM1	
2.	conversation from one radix to another radix	1	1.7.2025		TLM1	
3.	r- 1's compliments and r's compliments of signed numbers	1	3.7.2025		TLM1	
4.	2421 & 84-2-1 code	1	5.7.2025		TLM1	
5.	Error detection codes: parity checking, even parity, odd parity	1	7.7.2025		TLM1	
6.	Error correction codes: Hamming code.	1	8.7.2025		TLM1	
7.	Boolean theorems	1	10.7.2025		TLM1	
8.	Principle of complementation & duality, De-Morgan theorems.	1	14.7.2025		TLM1	
9.	Logic operations; Universal Logic operations, EX-OR, EX- NOR operations.	1	15.7.2025		TLM1	
10.	Standard SOP and POS Forms	1	17.7.2025		TLM1	
11.	NAND-NAND and NOR-NOR realizations	1	19.7.2025		TLM1	
12.	Realization of three level logic circuits.	1	21.7.2025		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	22.7.2025		TLM1	
2.	Minimization and realization of switching functions using Boolean theorems	1	24.7.2025		TLM1	
3.	K-Map(2,3 variables)	1	26.7.2025		TLM1	
4.	K-Map(4,5 variables)	1	28.7.2025		TLM1	
5.	K-Map(6 variables)	1	29.7.2025		TLM2	
6.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	31.7.2025		TLM1	

7.	Tabular method (Quine-McCluskey method) with only four variables and single function.	1	2.8.2025		TLM1	
8.	Design of Full Adder, half subtractor	1	4.8.2025		TLM1	
9.	full subtractor, applications of full adders	1	5.8.2025		TLM1	
10.	4- bit adder-sub tractor circuit	1	7.8.2025		TLM1	
11.	BCD adder circuit ,Excess 3 adder circuit	1	11.8.2025		TLM1	
12.	carry look-a- head adder circuit	1	12.8.2025		TLM2	
13.	Design code converts using Karnaugh method and draw the complete circuit diagrams	1	14.8.2025		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	18.8.2025		TLM1	
2.	multiplexer and de-multiplexers	1	19.8.2025		TLM1	
3.	Implementation of higher order circuits using lower order circuits	1	21.8.2025		TLM1	
4.	Realization of Boolean functions using decoders	1	23.8.2025		TLM1	
5.	Realization of Boolean functions using multiplexers	1	1.9.2025		TLM1	
6.	Design of Priority encoder, 4-bit digital comparator	1	2.9.2025		TLM1	
7.	seven segment decoder	1	4.9.2025		TLM1	
8.	PROM-Basics structures, realization of Boolean functions, Programming table.	1	6.9.2025		TLM1	
9.	PAL -Basics structures, realization of Boolean functions, Programming table.	1	8.9.2025		TLM2	
10	PAL -Basics structures, realization of Boolean functions, Programming table.	1	9.9.2025		TLM1	
11.	PLA -Basics structures, realization of Boolean functions, Programming table.	1	11.9.2025			
12.	PLA -Basics structures, realization of Boolean functions, Programming table.	1	15.9.2025			
No. of classes required to complete UNIT-III : 12			**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	16.9.2025		TLM1	
2.	Flip-Flops: Truth tables and excitation tables of RS flip-flop, JK flip- flop, with reset and clear terminals	1	18.9.2025		TLM1	
3.	Flip-Flops: Truth tables and excitation tables of T-flip-flop, D flip- flop, with reset and clear terminals	1	20.9.2025		TLM1	
4.	Conversion from one flip-flop to another flip- flop.	1	22.9.2025		TLM1	
5.	Conversion from one flip-flop to another flip- flop.	1	23.9.2025		TLM1	
6.	Design of ripple counters, design of synchronous counters	1	25.9.2025		TLM1	

7.	Johnson counter, ring counter.	1	27.9.2025		TLM1	
8.	Design of registers - Buffer register, control buffer register.	1	29.9.2025		TLM1	
9.	Shift register.	1	4.10.2025		TLM2	
10.	Bi- directional shift register, universal shift, register.	1	6.10.2025		TLM1	
11.	Study the following relevant ICs and their relevant functions 7474, 7475, 7476	1	7.10.2025		TLM1	
12.	Study the following relevant ICs and their relevant functions 7490, 7493, 74121.	1	9.10.2025			
No. of classes required to complete UNIT-III : 12			**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	13.10.2025		TLM1	
2.	Reduction of state tables	1	14.10.2025		TLM1	
3.	Reduction of state tables	1	16.10.2025		TLM1	
4.	Analysis of clocked sequential circuits Mealy to Moore conversion	1	18.10.2025		TLM1	
5.	Analysis of clocked sequential circuits Moore to Mealy to conversion	1	21.102025		TLM1	
6.	Realization of sequence generator	1	23.10.2025		TLM1	
7.	Tutorial	1	25.10.2025		TLM5	
8.	Design of Clocked Sequential Circuit to detect the given sequence (with overlapping)	1	27.10.2025		TLM1	
9.	Design of Clocked Sequential Circuit to detect the given sequence (without overlapping)	1	28.10.2025			
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	30.10.2025		TLM2	
2.	Introduction to HDL,Verilog HDL	1	01.11.2025		TLM2	

Teaching Learning Methods

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

PART-C: EVALUATION PROCESS:

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: ROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs):

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:	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

Program Specific Outcomes (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr.CH.Mallikharjuna Rao	Mr.CH.Mallikharjuna Rao	Dr.P.Lachi Reddy	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

Name of Course Instructors : Mr. K.V. Ashok/Dr. B.V.N.R. Siva Kumar/Mr. M. Sivasankara Rao/Mr. P. Venkateswara Rao
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.** : 2025-26

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):

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	04-07-2025		TLM4	
2.	Measurement of Voltage, Current and Frequency of a circuit using CRO.	3	11-07-2025		TLM4	
3.	Design of Clipper circuit using diode.	3	18-07-2025		TLM4	
4.	Design of Clamping circuit using diode	3	25-07-2025		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	01-08-2025		TLM4	
6.	Determination of h-parameter of a BJT in CE configuration	3	08-08-2025		TLM4	
7.	Determination of Break over voltage of SCR using V-I Characteristics	3	22-08-2025		TLM4	
8.	UJT Characteristics	3	05-09-2025		TLM4	
9.	Estimation of Stability factor for a transistor self-biasing circuit	6	19-09-2025		TLM4	
10.	FET Characteristics Part A: Drain Characteristics Part B: Transfer Characteristics	6	19-09-2025		TLM4	
11.	Design of Emitter Follower-CC Amplifier, Design of FET-CS Amplifier	6	03-10-2025		TLM4	
12.	Revision	6	17-10-2025		TLM4	
13.	Lab Internal examination	3	24-10-2025			
No. of classes required: 51				**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:	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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	**Course Coordinator**	**Module Coordinator**	**HOD**
Mr. K. V. Ashok	Mr. M. Sivasankara Rao	Dr. B.V.N.R. Siva Kumar	Dr. G. Srinivasulu

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Department of Electronics and Communication Engineering

COURSE HANDOUT

PART-A:

Program : B.Tech. III-Sem., ECE., Section–C
Academic Year : 2025-26
Course Name & Code : Switching Theory and Logic Design Lab – 23EC53
L-T-P-Cr : 0-0-3-1.5
Course Instructure : Mr.CH. MallikharjunaRao,Mr.CH.Sivaramakrishna,Mrs.B.Rajeswari, Mr. K.Sreedhar Reddy

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 to1 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 and7 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	3.7.2025		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	10.7.2025		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	17.7.2025		TLM4	
4	Verification of functional table of 3 to 8-line Decoder /De-multiplexer	3	24.7.2025		TLM4	
5	4 variable logic function verification using 8 to1 multiplexer.	3	31.7.2025		TLM4	
6	Design full adder circuit and verify its functional table.	3	7.8.2025		TLM4	
7	Verification of functional tables of (i) JK Master Slave Flip–Flop (ii) D Flip-Flop	3	14.8.2025		TLM4	
8	Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output	3	21.8.2025		TLM4	
9	Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output	3	4.9.2025		TLM4	
10	Verify the operation of 4-bit Universal Shift Register for different Modes of operation	3	11.9.2025		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	18.9.2025		TLM4	
12	Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.	3	25.9.2025		TLM4	
13	(a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.	3	9.10.2025		TLM4	
14	Design of any combinational circuit, sequential circuit using Hardware Description Language (Additional Experiments)	3	16.10.2025		TLM4	
15.	Makeup Lab	3	23.10.2025			
16.	Lab Internal Examination	3	30.10.2025		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**

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.

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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
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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	Course Coordinator	Module Coordinator	HOD
Mr.CH.Mallikharjuna Rao Mr.CH.Sivarama Krishna Mrs.B.Rajeswari Mr.K.Sreedhar Reddy	Mr.CH.Sivarama Krishna	Dr. P.Lachi Reddy	Dr. G. Srinivasulu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Accredited by NAAC with 'A' Grade & NBA (Under Tier - I),
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: **Mr. P. Narasimha Rao**
Course Name & Code **: DATA STRUCTURES LAB & 23CSS3**
L-T-P Structure **: 0-1-**2 **Credits:** 2
Program/Sem/Sec : B.Tech/III/ECE-C **A.Y.:** 2025-26

PREREQUISITE: C Programming Language

COURSE OBJECTIVE:
The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques **COURSE OUTCOMES (CO):**

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	PSO1	PSO2	PSO3
CO1	3	2											2		
CO2	3	2											2		
CO3	3	2											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	HOD Sign
1.	**UNIT1**: 1.Program to find min & max element in an array. 2.Program to implement matrix multiplication.	4	01-07-2025 05-07-2024		
2.	3.Find an element in given list of sorted elements in an array using Binary search.	4	08-07-2025 12-07-2025		
3.	4.Implement Selection and Quick sort techniques	4	15-07-2025 19-07-2025		
4.	**UNIT:2** Write a program to implement the following operations. a. Insert b. Deletion c. Traversal	4	22-07-2025 26-07-2025		
5.	Write a program to store name, roll no, and marks of students in a class using circular double linked list	4	29-07-2025 02-08-2025		
6.	Write a program to perform addition of given two polynomial expressions using linked list	4	05-08-2025 09-08-2025		
7.	**UNIT:3** Implement stack operations using a. Arrays b. Linked list	2	12-08-2025 19-08-2025		
8.	Convert given infix expression into post fix expression using stacks.	7	23-08-2025 02-09-2025 06-09-2025		

9.	Evaluate given post fix expression using stack.	5	09-09-2025 13-09-2025 16-09-2025		
10.	4.Write a program to reverse given linked list using stack	7	20-09-2025 23-09-2025 27-09-2025		
11.	UNIT 4: 1.ImplementQueue operations using a. Arrays b. Linked list.	4	04-10-2025 07-10-2025		
12.	2. Implement Circular Queue using a. Arrays b. Linked list. 3.Implement Dequeue using linked list.	7	11-10-2025 14-10-2025 18-10-2025		
13.	**UNIT5:** 1.Implement binary tree traversals using linked list. 2. Write program to create binary search tree for given list of integers. Perform in-order traversal of the tree. Implement insertion and deletion operations.	8	21-10-2025 25-10-2025 28-10-2025		
14.	Lab Internal Exam	3	01-11-2024		

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. P. Narasimha Rao**	**Mr.R.Ashok**	**Dr. Y.Vijaya Bhaskar Reddy**	**Dr.S.Nagarjuna Reddy**
Signature				

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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., III-Sem., ECE-C
ACADEMIC YEAR : 2025-26
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 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	-	-	-

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.

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	02-07-2025		TLM2			

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
2.	Natural Resources – Forest resources	1	05-07-2025		TLM1	CO1	T1,T2	
3.	Water resources	1	09-07-2025		TLM1	CO1	T1,T2	
4.	Mineral resources	1	16-07-2025		TLM1	CO1	T1,T2	
5.	Food resources	1	19-07-2025		TLM1	CO1	T1,T2	
6.	Energy resources	1	23-07-2025		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystems and Biodiversity

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
7.	Ecosystems – Structure & Functions	1	30-07-2025		TLM1	CO2	T1,T2	
8.	Ecological succession &	1	02-08-2025		TLM1	CO2	T1,T2	
9.	Food chains, Food webs & Ecological Pyramids	1	06-08-2025		TLM1	CO2	T1,T2	
10.	Biodiversity – introduction, levels, bio geographic classification	1	13-08-2025		TLM1	CO2	T1,T2	
11.	Values of Biodiversity, India as mega diversity nation	1	20-08-2025		TLM1	CO2	T1,T2	
12.	Threats to biodiversity and Conservation of biodiversity	1	20-08-2025		TLM1	CO2	T1,T2	

13.	Biodiversity – introduction, levels, bio geographic classification	1	23-08-2025		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-II		07			No. of classes taken:			

I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Environmental pollution -Air pollution	1	03-09-2025		TLM1	CO3	T1,T2	
15.	Water pollution, Marine pollution, Thermal pollution	1	06-09-2025		TLM1	CO3	T1,T2	
16.	Soil pollution	1	10-09-2025		TLM1	CO3	T1,T2	
17.	Noise pollution & Nuclear Hazards	1	17-09-2025		TLM1	CO3	T1,T2	
18.	Solid waste management	1	20-09-2025		TLM1	CO3	T1,T2	
19.	Disaster management	1	24-09-2025		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Social Issues and Environment

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	27-09-2025		TLM1	CO4	T1,T2	
21.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	01-10-2025		TLM1	CO4	T1,T2	
22.	Environmental ethics, Climate change	1	04-10-2025		TLM1	CO4	T1,T2	
23.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	08-10-2025		TLM1	CO4	T1,T2	
24.	Environmental Acts	1	15-10-2025		TLM1	CO4	T1,T2	
25.	Environmental Acts	1	18-10-2025		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		06			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly

26.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	22-10-2025		TLM1	CO5	T1,T2	
27.	Environment and human health –Human Rights – Value Education	1	25-10-2025		TLM1	CO5	T1,T2	
28.	HIV/AIDS – Women and Child Welfare	1	29-10-2025		TLM1	CO5	T1,T2	
29.	Role of information Technology in Environment and human health	1	01-11-2025		TLM1	CO5	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	18-08-2025 27-10-2025		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

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.
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Dr. Shaheda Niloufer	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD