SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

CR24

(Applicable from the academic year 2025-26 onwards)

Course Structure & Syllabus

ELECTRONICS & COMMUNICATION ENGINEERING

II B. TECH I SEMESTER

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

(CR24 COURSE STRUCTURE & SYLLABUS)

B.Tech. – II Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	BS	Probability theory and stochastic process	3	0	0	3
2	HSMC	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	Engineering Science	Signals and Systems	3	0	0	3
4	Professional Core	Electronic Devices and Circuits	3	0	0	3
5	Professional Core	Switching Theory and Logic Design	3	0	0	3
6	Professional Core	Electronic Devices and Circuits Lab	0	0	3	1.5
7	Professional Core	Switching Theory and Logic Design Lab	0	0	3	1.5
8	Skill Enhancement Course	Data Structures using Python	0	1	2	2
9	Audit Course	Environmental Science	2	0	0	-
Total			**16**	**2**	**08**	**20**

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

PROBABILITY THEORY AND STOCHASTIC PROCESS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	BS	3	0	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is :	
1	To give students an introduction to elementary probability theory, in preparation to learn the concepts of statistical analysis, random variables and stochastic processes.
2	To mathematically model the random phenomenon with the help of probability theory Concepts.
3	To introduce the important concepts of random variables and stochastic processes
4	To analyze the LTI systems with stationary random process as input.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** the concepts of Probability and Random variables	K2
CO2	**Analyze** the operations of single and multiple random variables	K4
CO3	**Characterize** the random processes in time and frequency domain	K3
CO4	**Analyze** LTI systems driven by a stationary random process using correlation and spectral density functions.	K4

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

UNIT-I Probability & Random Variable:

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

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

Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable. Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density–Point Conditioning, Conditional Distribution and Density– Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables :Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables

UNIT-III Random Processes–Temporal Characteristics:

The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT-IV Random Processes–Spectral Characteristics:

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation

Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT-V Linear Systems with Random inputs and Noise Sources:

Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties.

TEXT BOOKS:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles, 4th Ed, TMH, 2001.
2. Taub and Schilling - Principles of Communication systems, TMH, 2008

REFERENCE BOOKS:

1. Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002.
3. B. P. Lathi - Signals, Systems & Communications, B. S. Publications, 2003.
4. S.P Eugene Xavier-Statistical Theory of Communication, New Age Publications, 2003.

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	HSMC	2	1	0	3	30M	70 M	3 Hrs.

Course Objectives:

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

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity& Identify one's self, and one's surroundings (family, society nature)	**K1,K2**
CO2	Apply what they have learnt to their own self in different day-to-day settings in real life &Relate human values with human relationship and human society.	**K3,K4**
CO3	Justify the need for universal human values and harmonious existence	**K5**
CO4	Develop associally and ecologically responsible engineers	**K3,K6**

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	2	3					
CO2						3	3	1	1					
CO3						3	3	2	1					
CO4						2	2	3	2					

Course Topics:

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity–the Basic Human aspirations
Tutorial2: Practice Session PS2 Exploring Human Consciousness
Lecture5: Happiness and Prosperity–Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture12: Program me to ensure self-regulation and Health
Tutorial6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III Harmony in the Family and Society(6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV Harmony in the Nature /Existence (4 lectures and 2 tutorials for practice session)

Lecture19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture22: The Holistic Perception of Harmony in Existence
Tutorial11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V Implications of the Holistic Understanding –a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I –Introduction to Value Education

PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II –Harmony in the Human Being
PS4 Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III –Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfill Human Goal

Practice Sessions for UNIT IV –Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

RR Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

RR Gaur, R Asthana, G P Bagaria, *Teachers' Manua for A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN978-93-87034-53-2

Reference Books

1. *JeevanVidya: Ek Parichaya*, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. *HumanValues*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth*- by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E.F Schumacher.
6. *Slow is Beautiful*- Cecile Andrews
7. *Economy of Permanence* –J C Kumarappa
8. *Bharat Mein Angreji Raj*–Pandit Sunderlal
9. *Red is covering India*- by Dharampal
10. *Hind Swaraj or Indian Home Rule*- by Mohandas K.Gandhi
11. *India Wins Freedom* –Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared

and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development to commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

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

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

SIGNALS AND SYSTEMS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Engineering Science	2	1	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is :	
1	To study about signals and systems.
2	To analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
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:

Upon successful completion of the course, the student will be able to:		
CO1	Examine the various classifications of signals and systems	K3
CO2	Analyze the frequency domain representation of signals using Fourier concepts	K4
CO3	Classify the systems based on their properties and determine the response of LTI systems.	K4
CO4	Demonstrate the sampling process and various sampling techniques in signal processing	K3
CO5	Apply Laplace and z-transforms to analyze signals and Systems	K3

CO-PO MAPPING:

	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
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	3		-	-	-	-	-	-	-	-	-	-	2	-

UNIT- I: INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function.

UNIT–II: FOURIER SERIES AND FOURIER TRANSFORM:

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function

UNIT-III: ANALYSIS OF LINEAR SYSTEMS:

Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant(LTV)system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal band width, system band width, Ideal LPF, HPF and BPF characteristics.

UNIT–IV:

CORRELATION: Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum

SAMPLINGTHEOREM: Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to B and Pass sampling, Related problems.

UNIT–V:

LAPLACE TRANSFORMS: Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's,
Inverse Laplace transform, Relation between L.T's, and F.T. of a signal.

Z–TRANSFORMS: Concept of Z-Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications-B. P. Lathi, B S Publications, 2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI, 2nd Edn, 1997
3. Signals & Systems-Simon Haykin and VanVeen, Wiley, 2nd Edition, 2007

REFERENCE BOOKS:

1. Principles of Linear Systems and Signals–BP Lathi, Oxford University Press, 2015
2. Signals and Systems–TK Rawat, Oxford University press, 2011

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

ELECTRONIC DEVICES AND CIRCUITS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Professional Core	3	0	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is :	
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:

Upon successful completion of the course, the student will be able to:		
CO1	Apply and acquire knowledge on basic concepts of semiconductor physics.	K2
CO2	Apply the formation of PN junction Diode and how it can be used in different electronic circuit applications.	K2
CO3	Analyze the different types of rectifiers with and without filters with relevant expressions and necessary comparisons & Transistor biasing.	K3
CO4	Design the amplification factors & h-parameters transistors (BJT and FET) in different configurations.	K3
CO5	Conduct the experiments of BJT and FET amplifiers with modern tools.	K4

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO2	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

UNIT–I

Review of Semiconductor Physics: Mobility and Conductivity, Intrinsic and extrinsic semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors. (Text book: 1)

Junction Diode Characteristics : energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance. (Text book: 1)

UNIT–II

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor Diode, LED, Photodiode, Tunnel Diode, UJT, PNPN Diode, SCR, Construction, operation and V-I characteristics. (Text book: 1) **Diode Circuits:** The Diode as a circuit element, The Load-Line concept, The Piecewise Linear Diode model, Clipping (limiting) circuits, Clipping at Two Independent Levels, Peak Detector, Clamping circuits, Comparators, Sampling Gate, **Basic Rectifier setup**, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters, Inductor filter, Capacitor filter, π-section Filter, comparison of various filter circuits in terms of ripple factors. (Text book: 1, 2)

UNIT–III

Transistor Characteristics: Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values. (Text book: 1)

Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and β, Stability factors, (S,S' ,S''), Bias compensation, Thermal runaway, Thermal stability. (Text book: 1)

UNIT–IV

Small Signal Low Frequency Transistor Amplifier Models BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. (Text book: 1, 2)

UNIT–V

FET: FET types, JFET operation, characteristics, small signal model of JFET. (Text book: 1)
MOSFET: MOSFET Structure, Operation of MOSFET: operation in triode region, operation in saturation region, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Channel length modulation, MOS transconductance, MOS device models: MOS small signal model, PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices. (Text book: 3) **CMOS amplifiers:** General Considerations, Common Source Stage, Common Gate Stage, Source Follower, comparison of FET amplifiers. (Text book: 3)

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits- J. Millman, C. C. Halkias and SatyabrataJit, Mc-Graw Hill Education, 4th edition, 2015.
2. Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.
3. Fundamentals of Microelectronics-BehzadRazavi, Wiley, 3rd edition, 2021.

REFERENCES:

1. Basic Electronics-Priciples and Applications, ChinmoySaha, ArindamHalder, Debarati Ganguly, Cambridge University Press.
2. Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson, 11th edition, 2015.
3. Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.
4. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022.

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

SWITCHING THEORY AND LOGIC DESIGN

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Professional Core	3	0	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is :	
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-Mc Cluskey methods
5	To understand concepts of combinational circuits.
6	To develop advanced sequential circuits.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** different number systems and apply to generate various codes.	K2
CO2	**Apply** the concept of Boolean algebra in minimization of switching functions	K3
CO3	**Design** different types of combinational logic circuits.	K3
CO4	**Apply** knowledge of flip-flops in designing of Registers and counters	K3
CO5	**Analyze** the operation and design methodology for synchronous sequential circuits and algorithmic state machines.	K4

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO2	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO3	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO4	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**
CO5	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

UNIT–I

REVIEW OF NUMBER SYSTEMS & CODES:

Representation of numbers of different radix, conversation from one radix to another radix, r- 1's compliments and r's compliments of signed members. Gray code ,4 bit codes; BCD,Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

BOOLEAN THEOREMS AND LOGIC OPERATIONS:

Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations; Basic logic operations-NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits.

UNIT–II

MINIMIZATION TECHNIQUES:

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables) and tabular method (Quine-mccluskey method) with only four variables and single function.

COMBINATIONAL LOGIC CIRCUITS DESIGN:

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4- bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a- head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

UNIT–III

COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI & LSI:

Design of encoder, decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits . Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bitdigital comparator and seven segment decoder.

INTRODUCTIONOFPLD's:

PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.

UNIT–IV

SEQUENTIAL CIRCUITSI:

Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip- flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of 5ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift, register

Study the following relevant ICs and their relevant functions 7474,7475,7476,7490,7493,74121.

UNIT–V

SEQUENTIALCIRCUITSII:

Finite state machine; state diagrams, state tables, reduction of state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa. Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence (with overlapping or without overlapping)

TEXT BOOKS:

1. Switching and finite automata theory Zvi.KOHAVI, Niraj.K.Jha 3rd Edition,Cambridge University Press, 2009
2. Digital Design by M.MorrisMano, MichaelDCiletti, 4th edition PHI publication, 2008
3. Switching theory and logic design by Hilland Peterson**,** Mc-GrawHill TM Hedition, 2012.

REFERENCES:

1. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 2006
2. Digital electronics by RS Sedha. S.Chand & company limited, 2010
3. Switching Theory and Logic Design by A.Anand Kumar, PHIL earning pvtltd, 2016.
4. Digital logic applications and design by John MY arbough, Cengage learning,2006.
5. TTL74-Series data book.

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

ELECTRONIC DEVICES AND CIRCUITS - LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Professional Core	0	0	3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To understand the characteristics of semiconductor devices such as diodes, BJTs, and FETs.
2	To analyze the performance of rectifiers, voltage regulators, and amplifiers.
3	To study and implement biasing techniques for transistors and FETs.
4	To evaluate the frequency response of amplifiers and understand their band width limitations.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Identify various electronic components and devices with their specifications.	K2
CO2	Analyze the characteristics of various junction diodes, transistors and calculate their parameters. (BJT & FET)	K3
CO3	Verify the parameters of rectifier circuits with and without filter and voltage regulator.	K4
CO4	Design various amplifiers and observe its frequency response. (BJT & FET)	K3

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Clipper circuit using diode
2. Clamping circuit using diode
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B:Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

Equipment required:

1. Regulated Power supplies
2. Analog/ Digital Storage Oscilloscopes
3. Analog/ Digital Function Generators
4. Digital Multi-meters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active& Passive Electronic Components.

Week-1:

CRO OPERATION AND ITS MEASUREMENTS (Measure amplitudes, time & freq.)

Week-2:

CLIPPER CIRCUIT (Using Diodes) (Measure clipping voltage wrt to reference)

Week-3:

CLAMPER CIRCUIT (Using Diodes)) (Measure clamping voltage wrt to reference)

Week-4:

RECTIFIERS (Without and With Capacitor Filter)

Part-A: Half-Wave Rectifier (Find Ripple factor, Regulation)

Part-B: Full-Wave Rectifier (Centre tapped)(Find Ripple factor, Regulation)

Week-5:

BJT CHARACTERISTICS (CE Configuration)

Part-A: Input Characteristics (Find hie, hre-parameters)

Part-B: Output Characteristics (Find hfe, hoe-parameters)

Week-6:

FET CHARACTERISTICS (CS Configuration)

Part-A: Drain Characteristics (Find rd-parameters)

Part-B: Transfer Characteristics (Find gm, μ-parameters)

Week-7:

TRANSISTOR BIASING - Design Self Bias Circuit (Find R1, R2, Re, Rb)

Week-8:

BJT CE AMPLIFIER (Find Ri, Ro, Av, f1, f2 & BW)

Week-9:

EMITTER FOLLOWER (CC – AMPLIFIER) (Find Ri, Ro, Av)

Week-10:

FET-CS AMPLIFIER (Find Av, f1, f2 & BW)

Additional Experiments:

1. CHARACTERISTICS OF UJT (Find intrinsic standoff ratio)
2. TRANSISTOR AS A SWITCH (Observe action of a Transistor as an electronic switch)

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

SWITCHING THEORY AND LOGIC DESIGN LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Professional Core	0	0	3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To outline the basics of digital electronics, Boolean algebra and basic logic gates
2	To design the simple logic circuits and verify the functionality
3	Design combinational and sequential logic circuits using digital ICs.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Able to test the operation of different logic gates using relevant IC's	K2
CO2	Able to apply the concept of Boolean algebra or k-maps to reduce and Construct logic circuit for given function.	K3
CO3	Able to analyses the operation of different combinational logic circuits.	K4
CO4	Able to design synchronous and asynchronous counters using flip flops	K3

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

Week-1:

1. Verification of truth tables of the following Logic gates
Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR

Week-2:

2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.

Week-3:

3. Verification of functional table of 3 to 8 line Decoder

Week-4:

4. 4-variable logic function verification using 8 to 1 multiplexer.

Week-5:

5. Design full adder circuit and verify its functional table.

Week-6:

6. Construct 7-Segment Display Circuit Using Decoder and 7-Segment LED and test it.

Week-7:

7. Draw the circuit diagram of a single bit comparator and test the output

Week-8:

8. Verification of functional tables of (i) JK Edge triggered Flip–Flop (ii) JK Master Slave Flip–Flop (iii) D Flip-Flop

Week-9:

9. Design a four-bit ring counter using D-Flip–Flops/JK Flip Flop and verify output.

Week-10:

10. Design a four-bit Johnson's counter using D-Flip-Flops/JK Flip Flops and verify output

Week-11:

11. Design MOD–8 synchronous counter using T-Flip-Flop and verify the result and sketch the output waveforms.

Week-12:

12. Draw the circuit diagram of 4- bit ripple counter and construct a circuit using T- Flip- Flops and Test It with a low frequency clock and sketch the output waveforms.

Week-13:

13. Verify the operation of 4-bit Universal Shift Register for different Modes of operation

Additional Experiments:

1. Design BCD Adder Circuit and Test the Same using Relevant IC
2. Design an Experimental model to demonstrate the operation of 74154 De- Multiplexer using LEDs for outputs.

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

DATA STRUCTURES USING PYTHON LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Skill Enhancement Course	**0**	**1**	**2**	**2**	**30M**	**70 M**	**3 Hrs.**

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Learn the fundamentals of writing Python scripts.
2	Implement Object Oriented Programming concepts in Python.
3	Understand Lists, Dictionaries and Regular expressions in Python.
4	Understand about the linear and non-linear data structures.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand**: Interpret the basics of Python, control flow statements and functions.	K2
CO2	**Apply**: Develop the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism ..	K3
CO3	**Apply:** Develop the Python programs by utilizing the linear data structures	K3
CO4	**Apply:** Develop the Python programs by utilizing the non-linear data structures	K3

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1 (k3)	PO2 (k4)	PO3 (k5)	PO4 (k5)	PO5 (k3)	PO6 (k3)	PO7 (k3)	PO8 (k3)	PO9 (k6)	PO10 (k2)	PO11 (k6)	PO12 (k1)	PSO1 (k3)	PSO2 (k3)
CO1(k2)		1			1				1	1	1	1	2	2
CO2(k3)			2	1	2				2	1	1	1	2	2
CO3(k3)			2	1	2				2	1	1	1	2	2
CO3(k3)			2	1	2				2	1	1	1	2	2

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

Week-1:

1. To study and experiment with Python basics, start with fundamental concepts like variables, data types, operators, control flow, and functions.

Week-2:

2. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.

Week-3:

3. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area () and perimeter ( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area ( ) and perimeter ( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter.

Week-4:

4. Write a python program to implement Method Overloading and Method Overriding.

Week-5:

5. Write a Python program to illustrate the following comprehensions:
   a) List Comprehensions b) Dictionary Comprehensions
   c) Set Comprehensions d) Generator Comprehensions

Week-6:

6. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5] .... [7, 8] [7, 9] [8, 9].

Week-7:

7. Write a program for Linear Search and Binary search.

Week-8:

8. Write a program to implement Bubble Sort and Selection Sort.

Week-9:

9. Write a program to implement Merge sort and Quick sort.

Week-10:

10. Write a program to implement Stacks and Queues.

Week-11:

11. Write a program to implement Singly Linked List.

Week-12:

12. Write a program to implement Doubly Linked list.

Week-13:

13. Write a program to implement Binary Search Tree.

Text Books:

1. Automate the Boring Stuff with Python by Al Sweigart
2. Problem Solving with Algorithms and Data Structures using Python" by Brad Miller and David Ranum
3. Python for everybody by Dr. Charles R. Severance
4. Python Data Science Handbook: Essential tools for working with data by Jake VanderPlas, Oreilly books
5. Learning Python by Mark Lutz, Oreilly books

Reference Books:

1. "Learning Python" by Mark Lutz and David Ascher 2nd Edition.
2. "Think Python: How to Think Like a Computer Scientist", by Allen B. Downey 2nd Edition.
3. "Data Structures and Algorithms in Python" by Michael T. Goodrich, Roberto Tamassia, And Michael H. Goldwasse

E-Resourses:

1. https://www.coursera.org/learn/python
2. Joy of computing using Python : https://nptel.ac.in/courses/106/106/106106182/
3. Python for data science: https://nptel.ac.in/courses/106/106/106106212/

Note: Experiment 1 is additionally included in the syllabus

Justification: The inclusion of python basics like variables, data types, control flow, and functions in the Data Structures using Python Lab is essential because they are the building blocks for working with data structures. Variables and data types allow students to store and manage data in structures like lists, sets, and dictionaries. Control flow helps iterate and manipulate the data within these structures, while functions make it easier to organize and reuse code for common operations. Together, these concepts are crucial for understanding how to implement and work with data structures effectively in Python.

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

[AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to NTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF ELECTRONICS & COMMNICATION ENGINEERING

ENVIRONMENTAL SCIENCE

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	Audit Course	3	1	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To make the students to get awareness on environment
2	To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
3	To save earth from the inventions by the engineers
4	To create awareness among the people about the social issues, environmental protection acts
5	To understand the impact of developmental activities on environment

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** the importance of environment & availability of resources	K2
CO2	**Understand** different environmental challenges induced due to anthropogenic activities as well as nature.	K2
CO3	**Analyze** the solutions to the environmental problems for the sake of healthy life by protecting our natural resources.	K4
CO4	**Create** awareness on the social issues, environmental protection acts	K5
CO5	**Understand** the environmental impact of developmental activities.	K2

CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

UNIT–I Multidisciplinary Nature Of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness. Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems– Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies– Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.–Energy resources

UNIT–II Ecosystems: Concept of an ecosystem.–Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem. b. Grass land ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Biodiversity And Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use ., social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India –Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT–III Environmental Pollution: Definition, Cause, effects and control measures of: a. Air Pollution. b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides

UNIT–IV Social Issues and the Environment: From Unsustainable to Sustainable development– Urban problems related to energy – Water conservation, rain water harvesting, and watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions–Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wastrel and reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act–Wild life Protection Act–Forest Conservation Act–Issues involved in enforcement of environment AL legislation–Public awareness.

UNIT–V Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmers. – Environment and human health – Human Rights – Value Education–HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies. Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc..

Text books: 1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press. 2. Palani swami, "Environmental Studies", Pearson

education 3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing)
K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt.Ltd.

Reference Books:

1. Deeksha Dave and E. Sai Baba Reddy, "Text book of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology",B S Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J.Glynn Henry and Gary W.Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M.Masters and WendellP.Ela, "Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited