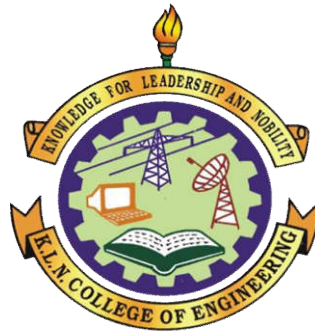


K.L.N. COLLEGE OF ENGINEERING

Pottapalayam - 630612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)



Estd: 1994

THIRD SEMESTER CURRICULUM AND SYLLABUS REGULATION 2024

For Under Graduate Program

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2024-2025 onwards)



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)



VISION OF THE INSTITUTION

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society

MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

To promote as a center of excellence in educational and research activities related to electronics and communication engineering and its allied areas.

MISSION OF THE DEPARTMENT

To create educational and research environment to meet ever changing and ever demanding needs of electronics and communication industry along with IT and other interdisciplinary fields.

To mould the students to become ethically upright and recognized as responsible engineers



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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To prepare graduates with a strong foundation in Engineering science and Technology with more emphasis in Electronics and Communication Engineering and its allied areas.

PEO 2: To prepare the students to pursue successful career in industry and to motivate them for higher education.

PEO 3: To prepare the graduates to sustain as good professional, researcher and to practice them in emerging technologies through lifelong learning.

PEO 4: To impart students with ethical standards, professional excellence through effective communication skills, team work, multi disciplinary projects and social responsibility.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Design and analyse the basic analog and digital electronic circuits.

PSO 2: Design and analyse the spectral components of communication signals and systems.

PSO 3: Develop the modules in VLSI and embedded systems.



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KNOWLEDGE AND ATTITUDE PROFILE

- WK1** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
- WK2** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- WK3** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- WK4** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- WK5** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- WK6** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- WK7** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
- WK8** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- WK9** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.



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PROGRAM OUTCOMES (POs)

PO 1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, and engineering fundamentals, and an engineering specialization as specified in WK1 to WK4, respectively, to develop solutions to complex engineering problems.

PO 2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences with holistic considerations for sustainable development* (WK1 to WK4).

PO3: Design/development of solutions: Design creative solutions for Complex engineering problems and design systems, components, or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon, as well as resource, cultural, societal, and environmental considerations as required (WK5).

PO 4: Investigation: Conduct investigations of complex engineering problems using research methods, including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (WK8).

PO 5: Tool Usage: Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (WK2 and WK6).

PO 6: The Engineer and the World: When solving complex engineering problems, analyze and evaluate sustainable development impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment (WK1, WK5, and WK7).

PO 7: Ethics: Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK9).

PO 8: Individual and Collaborative Team work: Function effectively as an individual and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote, and distributed settings (WK9).

PO 9: Communication: Communicate effectively and inclusively 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, taking into account cultural, language, and learning differences.

PO 10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO 11: Lifelong learning: Recognize the need for and have the preparation and ability for (i) independent and life-long learning (ii) adaptability to new and emerging technologies and (iii) critical thinking in the broadest context of technological change (WK8).



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REGULATIONS 2024
For Under Graduate Program
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

- i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.
- ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.
- iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering physics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme of study.
- vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.
- vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.
- viii. **Mandatory (MC) Courses** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc



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B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS 2024
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABUS

SEMESTER III

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	24BS302	Linear Algebra and Partial Differential Equations	BS	4	3	1	0	4
2.	24EC301	Analog Circuits	PC	3	3	0	0	3
3.	24EC302	Signals and Systems	PC	4	3	1	0	4
4.	24EC303	Digital Electronics	PC	3	3	0	0	3
5.	24HS301	Human Values and Ethics (Common to all B.E./B.Tech. programmes)	HS	2	1	1	0	2
THEORY CUM PRACTICAL								
6.	24CS306	Data Structures Using C	PC	5	3	0	2	4
PRACTICAL								
7.	24EC3L1	Analog Circuits Laboratory	PC	3	0	0	3	1.5
8.	24EC3L2	Digital Electronics and Simulation Laboratory	PC	3	0	0	3	1.5
9.	24HS3L1	Aptitude and Soft Skills – II (Common to all B.E./B.Tech. programmes)	EEC	2	0	0	2	1*
TOTAL				29	16	3	10	23

* The grades earned by the students will be recorded in the mark sheet, however the same shall not be considered for the computation of CGPA

24BS302	LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To introduce the basic concepts of Vector space, linear transformations and diagonalization.
- To apply the concept of inner product spaces in orthogonalization.
- To understand the procedure to solve partial differential equations and to learn application of partial differential equation.

UNIT - I VECTOR SPACES**9+3**

Vector spaces – Subspaces – Linear combinations and linear system of equations – Linear independence and linear dependence – Bases and dimensions.

UNIT - II LINEAR TRANSFORMATION AND DIAGONALIZATION**9+3**

Linear transformation - Null spaces and ranges - Dimension theorem (Without Proof) - Matrix representation of a linear transformations – Eigen values and Eigenvectors - Diagonalizability.

UNIT - III INNER PRODUCT SPACES**9+3**

Inner product, norms - Gram Schmidt orthogonalization process (Without Proof) - Adjoint of linear operations – Least square approximation.

UNIT - IV PARTIAL DIFFERENTIAL EQUATIONS**9+3**

Formation – Solutions of first order equations – Standard types and equations reducible to standard types – Singular solutions – Lagrange's linear equation – Classification of partial differential equations - Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differential equations.

UNIT - V FOURIER SERIES SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS**9+3**

Dirichlet's conditions – General Fourier series – Half range sine and cosine series - Method of separation of variables – Solutions of one-dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

TOTAL: 45+15 PERIODS**TEXT BOOKS:**

1. A.H.Friedberg, A.J.Insel and L.Spence, "Linear Algebra", Prentice Hall of India, New Delhi, 2017.
2. T.Veerarajan, "Linear Algebra and Partial Differential Equations", Tata McGraw Hill, New Delhi, 2018.

REFERENCES:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 4th Edition, 2017.
2. G.James, "Advanced Modern Engineering Mathematics", Pearson Education, 4th Edition, 2016.
3. D.C.Lay, "Linear Algebra and its Applications", Pearson Education, 5th Edition, 2018.
4. S.Kumaresan, "Linear Algebra – A Geometric Approach", Prentice Hall of India, New Delhi, Reprint 2018.
5. M.Chandrasekar, "Linear Algebra and Partial Differential Equations", Vishnu prints media, 2nd Edition, 2019.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

CO	Course Outcomes	Unit	K- CO
C201.1	Apply the concepts of Vector space to determine bases and dimensions.	I	K3
C201.2	Determine Eigen values and Eigen vectors using Linear transformations.	II	K3
C201.3	Construct the least square fit and orthonormal basis for an inner product space by using Gram-Schmidt process.	III	K3
C201.4	Solve the given first order and higher order partial differential equations with constant coefficients.	IV	K3
C201.5	Derive the Fourier series solutions of the given function and Partial differential equations of wave and heat equations problems.	V	K3



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24EC301

ANALOG CIRCUITS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the methods of Transistor biasing.
- To learn the mid band analysis of BJT amplifier circuits using small signal equivalent model.
- To learn the analysis of MOSFET amplifier circuits using small signal equivalent model.
- To realize the concept of power amplifiers and Tuned amplifiers.
- To understand the concept of feedback amplifier and differential amplifier.

UNIT - I TRANSISTOR BIASING AND STABILITY

9

BJT biasing – DC, AC Load line and quiescent point – Factors affecting quiescent point – Stability factor – Different types of biasing circuits and its comparison – Bias compensation – Diode and Thermistor compensations – Biasing the MOSFET.

UNIT - II LOW FREQUENCY AND HIGH FREQUENCY ANALYSIS OF BJT

9

CE amplifiers with and without bypass capacitor, CB and CC amplifiers – Hybrid – π equivalent circuit of BJTs – Method of drawing small signal equivalent circuit – Mid band analysis of various types of single stage amplifiers – High frequency analysis of CE amplifier - Darlington amplifiers - Cascode amplifiers.

UNIT - III LOW FREQUENCY AND HIGH FREQUENCY ANALYSIS OF MOSFET

9

CS amplifiers with and without bypass capacitor, CD and CG amplifiers – Hybrid – π equivalent circuit of FET – Method of drawing small signal equivalent circuit – small signal analysis of MOSFET amplifiers - High frequency analysis of CS amplifier.

UNIT - IV POWER AMPLIFIERS AND TUNED AMPLIFIERS

9

Classification of power amplifiers – Class A large signal amplifiers – transformer coupled class A audio power amplifier – efficiency of Class A amplifiers – Class B amplifier – push pull amplifier – complementary symmetry push pull amplifier. Tuned amplifiers – Analysis of capacitor coupled Single tuned amplifier – Stagger tuned amplifiers – Class C Tuned Amplifier.

UNIT - V FEEDBACK AMPLIFIERS AND DIFFERENTIAL AMPLIFIERS

9

Classification of amplifiers – The Feedback concept – Transfer gain with feedback – General characteristics of Negative feedback amplifiers – Input resistance – Output Resistance – Method of Analysis of a Feedback amplifier – Feedback Examples-Emitter Follower-CE amplifier with un bypassed RE. Current mirror - Differential amplifiers - CMRR.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.Millman and Christos C. Halkias, "Integrated Electronics", 2nd Edition, McGraw Hill Education, 2017.
2. Donald. A. Neamen, "Electronic Circuits Analysis and Design", McGraw Hill Education (India) Pvt. Ltd., 3rd Edition, 2010

REFERENCES:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Standard Edition, Shree Hari Publications, 2021.
2. David A. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2008.
3. Thomas L. Floyd, "Electronic Devices: Conventional Current Version", 10^h Edition, Pearson Education, 2017.
4. I.J. Nagrath, "Electronic Devices and Circuits", John Wiley & Sons, 2020.
5. B.P.Singh and Rekha Singh, "Electronic Devices and Integrated Circuits", Pearson Education, 2006.
6. Muhammad Rashid, "Microelectric Circuit Analysis and Design", CI-Engineering, 2010
7. S.Salivahanan and N.Suresh Kumar, "Electronic Devices and Circuits", 4th Edition, McGraw Hill Education, 2017.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

CO	Course Outcomes	Unit	K- CO
C202.1	Apply various biasing techniques for BJTs and MOSFETs to achieve bias point stability using appropriate compensation methods.	I	K3
C202.2	Analyze CE, CB, and CC amplifiers with and without bypass capacitors, and use small-signal models to determine voltage gain, current gain, input and output impedance	II	K4
C202.3	Analyze small-signal model to determine the voltage gain, current gain, input impedance, and output impedance of CS, CD, and CG amplifiers.	III	K4
C202.4	Apply the principles of power amplifier and tuned amplifier circuits to determine the efficiency and frequency response respectively.	IV	K3
C202.5	Identify the type of feedback employed in amplifier circuits and derive CMMR in differential amplifiers.	V	K3



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24EC302

SIGNALS AND SYSTEMS

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the Mathematical Representation of Signals and Systems.
- To explain the concept of Linear Time Invariant Systems and the Convolution property.
- To represent a given Continuous Time signal in frequency domain using Fourier series, Fourier Transform and Laplace Transform.
- To represent a given Discrete Time signal in frequency domain using discrete time Fourier Transform and Z-Transform.
- To understand Spectrum Analysis of Continuous Time signals and sampled version of the CT signal

UNIT - I CLASSIFICATION OF SIGNALS AND SYSTEMS**9 + 3**

Standard signals - Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids - Classification of signals - Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems - CT systems and DT systems - Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable, Generation of elementary signals using MATLAB.

UNIT - II ANALYSIS OF CONTINUOUS TIME SIGNALS**9 + 3**

Fourier Transform and its Inverse - properties - Laplace Transforms and its Inverse - properties - Region of Convergence

UNIT - III LINEAR TIME INVARIANT - CONTINUOUS TIME SYSTEMS**9 + 3**

Impulse response - convolution integrals - Differential Equation - Fourier and Laplace Transforms in Analysis of CT systems - Systems connected in series / parallel.

UNIT - IV ANALYSIS OF DISCRETE TIME SIGNALS**9 + 3**

Baseband signal Sampling - Fourier Transform of discrete time signals (DTFT) and its Inverse Properties - Z Transform and its Inverse - Properties - Region of Convergence.

UNIT - V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS**9 + 3**

Impulse response - Difference equations - Convolution sum - Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems - DT systems connected in series and parallel.

TOTAL: 45+15 PERIODS**TEXT BOOKS:**

1. Allan V. Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2015.
2. B.P.Lathi and R.A.Green, "Principles of Linear Systems and Signals", Oxford University Press, 3rd Edition, 2018.

REFERENCES:

1. Hwei P. Hsu, "Schaum Outlines - Signals and Systems Matlab Examples", McGraw Hill, 4th Edition 2019.
2. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
3. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.
4. S.Nagoorkani, "Signals and Systems - Simplified", McGraw Hill, 1st Edition, 2018.
5. Simon Haykin and Barry Van Veen, "Signals and Systems", Wiley, 2nd Edition, 2007

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

CO	Course Outcomes	Unit	K- CO
C203.1	Classify and simulate the given Continuous time and Discrete time signals and systems.	I	K3
C203.2	Analyze the spectral components of the given continuous time signals using Fourier transforms and Laplace transforms.	II	K4
C203.3	Solve continuous-time LTI systems represented by a differential equation using Fourier and Laplace transforms.	III	K3
C203.4	Analyze the spectral components of the given discrete time signals using discrete time Fourier transforms and z-transforms.	IV	K4
C203.5	Solve discrete-time LTI systems using difference equations represented by a discrete time Fourier transforms and z-transforms.	V	K3



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24EC303	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To design digital circuits using simplified Boolean functions
- To analyze and design combinational circuits
- To analyze and design synchronous and asynchronous sequential circuits
- To understand Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

UNIT - I INTRODUCTION TO DIGITAL SYSTEM 9

Digital Systems and Binary Numbers - Octal and Hexadecimal Numbers - Boolean Algebra and Logic Gates – Gate Level Minimization- Introduction - The Map Method – Four and Five Variable K-Map - Don't Care Conditions - Tabulation Method.

UNIT - II COMBINATIONAL LOGIC 9

Introduction - of Combinational Circuits - Analysis Procedure-Deriving truth table and logic diagram for few examples - Design Procedure - Binary Adder/Subtractor – Half adders, Full adders, Parallel Adder, Carry Look ahead Adder, Binary subtractor-Code converters- Magnitude Comparators – Encoder - Priority encoder – Decoder - Decimal Adder – Binary Multiplier – Multiplexers - Demultiplexers

UNIT - III SYNCHRONOUS SEQUENTIAL LOGIC 9

Storage Elements: Latches – Flip Flops -Analysis of Clocked Sequential Circuits – Analysis Examples with D, T and JK flip-flops, Moore and Mealy Finite State Machines - Synthesizable HDL Models of Sequential Circuits –State Reduction and Assignment-Design Procedure - Shift Registers – SISO, SIPO, PIPO, PISO, Universal shift register – Counters - Ripple and Synchronous Counters, Ring counter, Johnson counter.

UNIT - IV MEMORY AND PROGRAMMABLE LOGIC 9

Introduction – Random Access Memory – Read/Write operation - Memory description in HDL - Memory Decoding – Address Multiplexing – Read Only Memory - Programmable Logic Array - Programmable Array Logic – Design of various combinational logic circuits using Programmable Logic Devices.

UNIT - V SYSTEM DESIGN USING VERILOG 9

Introduction to Hardware Description Language - module description, gate delays, Boolean expressions, User Defined Primitives - HDL Models of Combinational Circuits - Gate level modeling, Data flow modeling, Behavioral modeling, Writing test bench for simple logics HDL model for Flip-Flops, Latches, HDL Model of ZERO detector (Moore/Mealy model) - HDL for Registers and Counters.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. M.Morris R. Mano and Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL", 5th Edition, Pearson Education, 2012.
2. D.P.Leach and A.P.Malvino, "Digital Principles and Applications", Tata Mc Graw Hill, 2011.

REFERENCES:

1. M. Morris R. Mano, "Digital Design", 3rd Edition, Pearson Education, 2002.
2. G.K.Kharate, "Digital Electronics", Oxford University Press, 2010.
3. John F. Wakerly, "Digital Design Principles and Practices", 5th Edition, Pearson Education, 2017.
4. Charles H. Roth Jr. and Larry L. Kinney, "Fundamentals of Logic Design", 6th Edition, cengage Learning, 2013.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

CO	Course Outcomes	Unit	K- CO
C204.1	Apply Boolean algebra, number systems, and gate-level minimization techniques such as K-maps and tabulation methods to simplify digital circuits.	I	K3
C204.2	Design and analyze combinational circuits including adders, subtractors, code converters, multiplexers, and demultiplexers.	II	K4
C204.3	Analyze synchronous sequential circuits, including flip-flops, shift registers, and counters, using Moore and Mealy state machines and HDL models.	III	K4
C204.4	Design memory systems and combinational logic circuits using RAM, ROM, memory decoding techniques, and various programmable logic components	IV	K4
C204.5	Develop Verilog-based models for combinational and sequential circuits using gate-level, data flow, and behavioral modeling, and write test benches for verification.	V	K4



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24HS301	HUMAN VALUES AND ETHICS	L	T	P	C
		1	1	0	2

OBJECTIVES:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT - I INTRODUCTION TO VALUE EDUCATION 3+3

Value Education – Definition - Concept and Need for Value Education - Natural acceptance, Self exploration - Fundamentals of value education - Happiness and Prosperity as parts of Value Education - fulfilling human aspirations.

Practice Session: Sharing about Oneself, Exploring Human Consciousness – self exploration, Exploring Natural Acceptance.

UNIT - II HARMONY IN THE HUMAN BEING 3+3

Understanding Myself as Co-existence of the Self and the Body – I' and Body synchronization - Realization of Self, Body needs - Self-regulation and Health.

Practice Session: Exploring the difference of Needs of Self and Body, Exploring Sources of Imagination in the Self, Harmony of Self with the Body - program for ensuring health vs dealing with disease.

UNIT - III HARMONY IN THE FAMILY, SOCIETY AND NATURE 3+3

Family as a basic unit of Human Interaction - Values in Relationships - The Basics for Trust and Respect in today's Crisis: Affection, e-Guidance, Reverence, Glory, Gratitude and Love – Harmony in society: Resolution, Prosperity, Fearlessness and Co-existence as Comprehensive Human Goal- Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

Practice Session: Exploring the Feelings of Trust, Respect and Gratitude, Exploring Systems to fulfil Human Goals considering society and nature - Co-existence in Existence.

UNIT - IV SOCIAL ETHICS 3+3

The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.

Practice Session: Exploring Ethical Human Conduct, Humanistic Models in Education, Exploring Steps of Transition towards Universal Human Order.

UNIT - V PROFESSIONAL ETHICS 3+3

Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies.

Practice Session: Holistic Technologies - Production Systems and Management Models, Holistic vision of life - Socially responsible behavior and environmentally responsible work.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. R.R.Gaur, R.Asthana and G.P.Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd revised edition, Excel Books, New Delhi, Reprint 2019.
2. A.N.Tripathy, "Human Values", New Age International Publishers, New Delhi, 2003.


REFERENCES:

1. E.G.Seebauer and Robert L. Berry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2000.
2. M.Govindrajran, S.Natrajan and V.S.Senthil Kumar, "Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd., Reprint 2011.
3. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 4th Edition, Reprint 2017.
4. Charles E. Harries, Michael S. Protchard and Michael J. Rabins, "Engineering Ethics- concepts and Cases", Thomson Learning, 2000.
5. S.K. Chakraborty and Dabangshu Chakraborty, "Human Values and Ethics: Achieving Holistic Excellence", ICFAI University Press, 2006.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

CO	Course Outcomes	Unit	K- CO
C205.1	Explain the significance of value inputs and start applying them in their life and profession to ensure happiness and prosperity.	I	AD
C205.2	Differentiate between Thyself and the Body to ensure competency of an individual.	II	AD
C205.3	Explain the role of a human being in ensuring harmony in family, society, and nature.	III	AD
C205.4	Develop an awareness of human values to appreciate the rights of others and to enable social balance	IV	AD
C205.5	Differentiate between ethical and unethical professional practices and apply suitable strategies to actualize a harmonious working environment.	V	AD


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24CS306	DATA STRUCTURES USING C	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To understand the concepts of ADTs.
- To learn the concepts of linear data structures.
- To learn the concepts of non-linear data structures and hashing.
- To explore the applications of linear and non-linear data structures
- To get familiarized to sorting and searching algorithms.

UNIT - I ARRAYS AND LISTS 9

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list – Doubly- Linked Lists – Circularly Linked List – Polynomial Manipulation using Linked List.

LAB COMPONENT

1. Implementation of Singly Linked List 6
2. Implementation of Polynomial Manipulation using Linked List

UNIT - II STACKS AND QUEUES 9

Stack ADT- Implementation of Stack - Applications: Evaluating Postfix Expressions, Infix to Postfix conversion -Queue ADT -Queue Implementation - Applications.

LAB COMPONENT

3. Linked list implementation of Stack ADT 6
4. Linked list implementation of Queue ADT

UNIT - III TREES 9

Trees - Binary Trees -Tree Traversals - Expression Trees - Binary Search Tree - AVL Trees, B-Tree, B+ Tree- Heap representation

LAB COMPONENT

5. Implementation of Binary Tree and Tree Traversals 6
6. Implementation of Binary Search Tree

UNIT - IV GRAPHS 9

Graph Definition - Representation of Graphs - Types of Graph - Breadth-first traversal Depth-first traversal - Applications of Graphs - Dijkstra's Algorithm - Prim's algorithm - Kruskal's Algorithm.

LAB COMPONENT

7. Implementation of Dijkstra's Algorithm 6
8. Implementation of Prim's Algorithm

UNIT - V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Linear Search - Binary Search - Insertion sort - Selection sort - Merge Sort -Quick sort, Bubble sort, Radix sort- Hashing -Hash Functions - Separate Chaining - Open Addressing - Double Hashing – Rehashing-b Extendable hashing.

LAB COMPONENT

9. Implementation of Linear Search and Binary Search 6
10. Implementation of Insertion Sort and Merge Sort

TOTAL:45+30 PERIODS

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997.
2. Kamthane, "Introduction to Data Structures in C", 1st Edition, Pearson Education, 2007.

REFERENCES:

1. E.Balagurusamy, "Data Structures using C", 1st Edition, Mc-Graw Hill, 2013.
2. Langsam, Augenstein and Tanenbaum, "Data Structures using C and C++", 2nd Edition, Pearson Education, 2015.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 2nd Edition, Mc-Graw Hill, 2002.
4. Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft, "Data Structures and Algorithms", 1st Edition, Pearson, 2002.
5. Kruse, "Data Structures and Program Design in C", 2nd Edition, Pearson Education, 2006.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

CO	Course Outcomes	Unit	K- CO
C206.1	Apply abstract data types and implement various algorithmic problems using arrays and linked list.	I	K3
C206.2	Apply the different linear data structures like stack and queue to solve various computing problems.	II	K3
C206.3	Build different types of trees and apply various operations for tree manipulation.	III	K3
C206.4	Solve graph based problem using traversal techniques and path finding.	IV	K3
C206.5	Apply different sorting, searching and hashing techniques for data manipulation and storing.	V	K3



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24EC3L1

ANALOG CIRCUITS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To study the stability of different biasing techniques.
- To study the frequency response of CE and CS amplifier.
- To design Amplifier circuits using different biasing techniques and to measure gain, Input and output resistances.
- To simulate various circuits using SPICE.

LIST OF EXPERIMENTS:

1. Design and demonstrate the bias network for Common emitter amplifiers.
2. Design and demonstrate the bias network for Common Source amplifiers.
3. Design and demonstrate the bias network for Cascode amplifiers.
4. Design and demonstrate the Class A Power Amplifier.
5. Design and demonstrate the Class B Power Amplifier.
6. Design and analyze the frequency response of Class C Tuned amplifier.
7. Design and analyze the frequency response series feedback amplifiers.
8. Design and analyze the frequency response Shunt Feedback Amplifier.
9. Design and demonstrate Differential amplifiers.

SIMULATION USING SPICE (USING TRANSISTOR):

10. Design and simulate CG & CD configuration of FET amplifiers with various active load configuration.
11. Design and simulate Common Collector Amplifier using various Bias techniques.

TOTAL: 45 PERIODS**LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:**

1. CRO/DSO – 15 Nos.
2. Signal Generator / Function Generators – 15 Nos.
3. Dual Regulated Power Supplies – 15 Nos.
4. Desktop PCs with SPICE software – 15 Nos.
5. Transistor/FET (BJT – NPN – PNP, NMOS/PMOS) – 30 Nos.
6. PN Junction Diodes – 30 Nos.
7. Digital Multimeter – 15 Nos.
8. Decade Resistance Box – 10 Nos.
9. Decade Inductance Box – 10 Nos.
10. Decade Capacitance Box – 10 Nos.

OUTCOMES:**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

CO	Course Outcomes	Expt	K- CO
C207.1	Design and demonstrate biasing networks for BJT and MOSFET amplifiers including Common Emitter, Common Source, and Cascode configurations.	1,2,3	K4
C207.2	Design and implement Class A and Class B power amplifiers and evaluate their performance characteristics.	4,5	K4
C207.3	Design and analyze frequency response characteristics of Class C tuned amplifiers and feedback amplifier configurations (series and shunt).	6,7,8	K4
C207.4	Design and demonstrate the working of differential amplifiers and analyze their significance in analog circuit design	9	K4
C207.5	Design and simulate FET and BJT amplifier configurations, including Common Gate, Common Drain, and Common Collector amplifiers, using various biasing techniques.	10,11	K4



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24EC3L2

**DIGITAL ELECTRONICS AND SIMULATION
LABORATORY**

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- Be familiar with various combinational circuits.
- Understand the various components used in the design of digital computers.
- Be exposed to sequential circuits
- Learn to use HDL and FPGA.

LIST OF EXPERIMENTS:

- I. Design and implementation of the following combinational circuits:
 1. Verification of Boolean Laws using basic gates
 2. Half Adder and Full Adder using basic gates.
 3. Code Converters using basic gates.
 4. 4 –bit binary adder / subtractor using MSI.
 5. Magnitude Comparator using basic gates and MSI.
 6. Multiplexer and Demultiplexer using basic gates
 7. Multiplexer and Demultiplexer using MSI
- II. Design and implementation of sequential circuits:
 8. Shift registers.
 9. Synchronous counters.
 10. Asynchronous counters.
- III. Coding combinational using HDL and Verify with FPGA:
 11. Half Adder
 12. Full Adder

TOTAL: 45 PERIODS**LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:****HARDWARE:**

1. Digital trainer kits 20 Nos.
2. Digital ICs required for the experiments in sufficient numbers.
3. FPGA kit.

SOFTWARE:

HDL simulator.

OUTCOMES:**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

CO	Course Outcomes	Expt	K- CO
C208.1	Design combinational circuits like adders, code-converters and magnitude comparators by using logic gates / MSI with respect to the design specifications.	1,2,3,4,5	K3
C208.2	Analyze the application of multiplexers by implementing various combinational logic / Boolean expressions with the help of multiplexers.	6,7	K4
C208.3	Develop and verify the function table of 4-bit SISO, SIPO, PIPO, PISO shift registers using D Flip-Flops.	8	K4
C208.4	Design synchronous and asynchronous counters by using Flip-Flops as per the design specifications.	9,10	K4
C208.5	Design and implement half adder and full adder using Verilog HDL and Synthesize the same using FPGA .	11,12	K4



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24HS3L1	APTITUDE AND SOFT SKILLS – II	L	T	P	C
		0	0	2	1

Module I Aptitude Skills II 15

Pipes and cisterns, boats and streams, Problems on trains, Alpha Numeric Puzzles, Simple Interest, Compound Interest, Mixtures and Allegations, calendar, clock, permutation and combination, probability, height and distance.

Module II Soft Skills II 15

Introduction to Soft skills – Non-Verbal Communication - Role play - Learning styles – Writing Bio-data and Process description - Peak Life Moment / Challenging moment - People management – team work, leadership, Decision making – problem identification - Email and Essay writing - Just a minute (JAM).

TOTAL: 30 PERIODS

REFERENCES:

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010



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