Curriculum for UG Degree Course in B. Tech. Electronics and Telecommunication Engineering

(Academic Year: 2024-25 Onwards)

Second Year | Semester-III

Course Code	Course Title	Teaching Scheme Hours / Week			Cr	Examination Scheme			Total Marks
		L	T	P		ISE	ESE	Pr/Or	
23PCEC301	Electronic Circuits and Applications	3	0	0	**3**	50	50	0	**100**
23PCEC302	Signals and Systems	2	1	0	**3**	50	50	0	**100**
23PCEC303	Digital Electronics	3	0	0	**3**	50	50	0	**100**
23PCEC304	Data Structures and Algorithms	3	0	0	**3**	50	50	0	**100**
23OE301	Open Elective-I	3	0	0	**3**	50	50	0	**100**
23VEC301	Universal Human Values-II	2	1	0	**3**	50	50	0	**100**
23AEC301	Design Thinking	1	1	0	**2**	50	0	0	**50**
23PCEC301L	Electronic Circuits and Applications Lab.	0	0	2	**1**	0	0	25	**25**
23PCEC303L	Digital Electronics Lab.	0	0	2	**1**	25	0	25	**50**
23PCEC304L	Data Structures and Algorithms Lab.	0	0	2	**1**	0	0	25	**25**
	Total =	**17**	**03**	**06**	**23**	**375**	**300**	**75**	**750**

L=Lecture, T=Tutorial, P= Practical, Cr= Credits, ISE =In Semester Evaluation, ESE =End Semester Examination, Pr/Or = Practical/Oral

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23PCEC301 ELECTRONIC CIRCUITS AND APPLICATIONS

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Prerequisite: Basic Electronics, BJT

Course Objectives:

1. To understand semiconductor devices such as JFET and MOSFET, Its characteristics, Parameters and its applications
2. To understand Operational amplifier, Concept, Parameters and applications
3. To understand Linear and non-linear applications of Op-Amp

Course Outcomes:

After completion of the course, students will be able to

CO1 Interpret the characteristics of JFET and MOSFET
CO2 Analyze parameters of JFET and MOSFET towards its application as an Amplifier
CO3 Illustrate the significance of internal stages of Op-Amp, Interpret and calculate performance parameters of Op Amp
CO4 Design and Analyze the performance of Op Amp applications

Unit I: JFET

Introduction, Types, Construction of JFET, Characteristics (Transfer and Drain), and working of JFET, Schockley's equation, JFET biasing and DC analysis, JFET as amplifier, CS amplifier analysis.

Unit II: MOSFET

Two terminal MOS structure, EMOSFET-construction, symbols, Ideal EMOSFET V-I characteristics, Additional MOSFET structures (DMOSFET and CMOS), Non-ideal V-I characteristics of EMOSFET (finite output resistance, body effect, Break down effect, Temperature effect, Short channel effects), MOSFET biasing and DC circuit analysis, MOSFET small signal amplifier (CS configuration).

Unit III: OP-AMP Basics

Block diagram of OP-Amp, Differential Amplifier configurations, Symbol and ideal equivalent circuit of Op-Amp, Differential amplifier analysis for dual-input balanced-output configuration, DC and AC characteristics of Op-Amp.

Unit IV: Linear Applications of OP-AMP

Inverting and non-inverting amplifier, Voltage follower, Summing amplifier, Difference Amplifier, Instrumentation Amplifier, Ideal integrator, errors in ideal integrator, Practical integrator, Ideal differentiator, errors in ideal differentiator, Practical differentiator.

Unit V: Non-linear Applications of OP-AMP

Comparator, Characteristics of comparator, Applications of Comparator, Schmitt trigger, Square wave generator, Need of precision rectifier, Half wave and Full wave precision rectifiers.

Text Books:

1. R.L.Boylestad, L.Nashlesky, **"Electronic Devices and Circuits Theory"**, *Prentice Hall of India*, (11th Edition), (2013).
2. Donald Neaman, **"Electronic Circuit Analysis and Design"**, *Tata McGraw Hill*, (3rd Edition), (2007).
3. Ramakant A. Gaikwad, **"Op Amps and Linear Integrated Circuits"**, *Prentice Hall*, (4th Edition), (2000).

Reference Books:

1. Sergio Franco, **"Design with Operational Amplifiers and Analog Integrated Circuits"**, McGraw Hill Education, (3rd Edition), (2002).
2. David A. Bell, **"Electronic Devices and Circuits"**, Oxford, (5th Edition) (2008).
3. Millman Halkias, **"Integrated Electronics- Analog and Digital Circuits and Systems"**, *Tata McGraw Hill*, (2nd Edition) (2010).

Online Resources:

1. NPTEL Course **"Analog Electronic Circuits"**
   https://nptel.ac.in/courses/108/105/108105158/

2. NPTEL Course on **"Analog Circuits"**
   https://nptel.ac.in/courses/108/101/108101094/

23PCEC302 SIGNALS AND SYSTEMS

Teaching Scheme
Lectures: 2 Hours / Week
Tutorials: 1 Hour / week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Prerequisite: Linear Algebra and Univariate Calculus, Multivariate Calculus

Course Objectives:

1. To represent continuous and discrete-time signals and systems mathematically
2. To classify signals and systems into different categories
3. To apply signal operations on Continuous Time and Discrete Time signals
4. To analyse Linear Time-Invariant (LTI) systems in time and transform domains

Course Outcomes:

After completion of the course, students will be able to

CO1 Classify basic Signals and Systems based on characteristics
CO2 Apply operations on signals in Continuous Time and Discrete Time Domain
CO3 Apply Mathematical Transforms on signals
CO4 Analyse signals and systems in the Time and Frequency Domain

Unit I: Introduction To Signals

Definition of Signals and Systems, Conversion of analog signal to digital signal, Classification of signals: Continuous Time (CT) and Discrete Time (DT), Even, Odd, Periodic and aperiodic, Deterministic and random, Energy and power, Operations on signals: Amplitude scaling, Time scaling, Time shifting and Folding, Precedence rule, Addition, Multiplication, Differentiation, Integration, Elementary signals: Impulse and its properties, Step, Ramp, Exponential, Sine, Rectangular, Triangular, Signum and Sinc

Unit II: System Classification

System: Definition, Classification: linear and nonlinear, Time variant and invariant, Causal and non-causal, Static and dynamic, Stable and unstable, Invertible and non-invertible, System modelling: Input-output relation, Impulse response, Definition of impulse response, Convolution integral, Convolution sum, Properties of convolution, System interconnection, System properties in terms of impulse response, Step response in terms of impulse response

Unit III: Fourier Series and Fourier Transform

Introduction to Fourier Analysis, Fourier Series for Periodic Signals, Properties of Fourier Series, Fourier transform: Properties of CTFT, FT of standard signals. Inverse Fourier Transform and Application of Fourier Transforms

Unit IV: Discrete-Time Fourier Transform

Introduction to DTFT, Properties of DTFT, Frequency Response of DT systems, Inverse Discrete Fourier transform, Applications of DTFT.

Unit V: Z Transform

Need of Transform, Definition of unilateral and bilateral Z transform, Properties of Z transform, Inverse Z transform, Analysis of LTI DT System, Stability and Causality considerations of LTI system.

Text Books:

1. P. Rameshbabu, R. Anandanatarajan, **"Signals and Systems"**, *Scitech Publication, Fourth Edition, (2011).*
2. Simon Haykins and Barry Van Veen, **"Signals and Systems"**, *Wiley India, (2nd Edition), (2004)*
3. Lathi B. P, **"Signals, Systems and Communication"**, *BS Publication, (1stEdition), (2009).*
4. Simon Haykins, **"An Introduction to Analog and Digital Communications",** *Wiley India, (2nd Edition), (2008).*

Reference Books:

1. Alan V Oppenheim, S. Will sky, S. Hamid, **"Signals and Systems"**, *Pearson Education, (2nd Edition), (2015).*
2. Charles Phillips, "Signals, Systems and Transforms", Pearson Education, (4thEdition), (2004).
3. Mrinal Mandal and Amir Asif, "Continuous and Discrete Time Signals and Systems", Cambridge University Press, (1stEdition), (2007).

Online Resources:

1. NPTEL Course **"Principles of Signals and Systems"**
   https://onlinecourses.nptel.ac.in/noc24_ee36/
2. NPTEL Course **"Signals and Systems"**
   https://onlinecourses.nptel.ac.in/noc24_ee28/

23PCEC303 DIGITAL ELECTRONICS

Teaching Scheme:
Lectures: 3 Hours / Week

Examination Scheme:
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Prerequisite:
0ES01: Basic Electrical and Electronics Engineering Course

Course Objectives:
1. To design Combinational & Sequential Logic Circuits
2. To design Combinational & Sequential Logic Circuits using HDL
3. To study various types of Programmable Logic Devices (PLDs)
4. To study fundamentals of Logic Families

Course Outcomes:
After completion of the course, students will be able to
CO1 Design and analyse combinational logic circuits using basic logic gates and with MSI devices
CO2 Design and analyse synchronous sequential logic circuits with Flip-Flops and with MSI devices
CO3 Build combinational logic circuits using Programmable Logic Devices
CO4 Understand the operating characteristics of digital IC Logic Families

Unit I: Fundamentals of Digital Logic
Boolean Algebra, Standard representation of logic functions, Realization of SOP and POS forms, Canonical form, Min and Max terms, Minimization of logic functions using K-map up to 4 variables.

Unit II: Combinational Logic Design
Design of Adders, Subtractors, Code converters, Digital Comparators, Multiplexers, De-multiplexers, Decoders, Parity generator, Arithmetic Logic Unit.
Introduction to HDL, Modelling Styles, Modelling Combinational Logic using HDL

Unit III: Sequential Logic Design
Flip Flops, Clocked SR, JK, T, D and MS-JK flip-flop, Excitation table for flip-flops, Conversion of flip-flops, Applications of flip-flops: Counters: Synchronous and Asynchronous counters, shift registers, sequence generators, Modelling Sequential Logic using HDL

Unit IV: State Machines
Mealy and Moore machines representation, State diagram, State table, Design of State Machines using State assignment and State reduction, Design of sequence detector using Finite State Machine (FSM), Applications of FSM.

Unit V: Digital Logic Families and Programmable Logic Devices

Classification of logic families, Characteristics of digital logic families: Speed of operation, Power Dissipation, Figure of merit, Fan in, Fan out, Current and Voltage parameters, Noise immunity, Operating temperatures and Power supply requirements.

Introduction to PLDs and their types: PAL, CPLD and FPGA, Comparison between CPLD and FPGA.

Text Books:

1. R .P Jain, "Modern digital electronics", TMH Publication, (3rd Edition), (2007).
2. Anand Kumar, "Fundamentals of digital circuits", PHI Publication, (1st Edition), (2001).
3. Stephen D. Brown and Zvonko G Vranesic, "Fundamentals of Digital Logic with Verilog Design", Pearson Education, (2 nd Edition),(2008).
4. S. Palnitkar, "Verilog HDL – A Guide to Digital Design and Synthesis", Pearson Publication, (3 rd Edition), (2010).

Reference Books:

1. Wakerly, "Digital Design Principles and Practices", Pearson Education, (3rd Edition), (2004).
2. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, (3rd Edition), (2004).

Online Resources:

1. NPTEL Course "Digital Circuits and Systems" https://nptel.ac.in/courses /117/106 /117106086/
2. NPTEL Course "Hardware modeling using Verilog" https://nptel.ac.in/courses/106/105/106105165/

23PCEC304 DATA STRUCTURES AND ALGORITHMS

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Prerequisite: VSEC-101 Programming Skills in C language.

Course Objectives:

1. To recall the primitive data types, concepts of logic building and problem solving
2. To understand data representation, implementation and applications of linear and nonlinear data structures
3. To learn and apply different algorithms on different types of data structures
4. To learn the concept and understand the importance of time and space complexity

Course Outcomes:

After completion of the course, students will be able to

CO1 Demonstrate proficiency in simple numerical algorithms
CO2 Implement different sorting and searching algorithms and compare their complexities
CO3 Infer to the modelled data structures from the premise of the baseline models
CO4 Select and implement appropriate algorithms and data structures

Unit I: Introduction to Data and Data Structures

Concepts and definition of Data, Data type, Data object, Data structures, Searching Methods: Algorithms for Sequential Search, Indexed Sequential Search and Binary Search, Sorting Methods: Algorithms for Sorting. Introduction to Time complexity and Space complexity, Brief overview of the Big Oh and other notations as performance metrics for the algorithms.

Unit II: Pointers, Structures and Functions in C

Pointers: Basic concepts, Pointer declaration and initialization, Scale factor, Pointer to a pointer, Pointers and arrays, Structures in C: Concept, Comparison with arrays as a data structure, Array of Structures, Pointers and Structures, Concept of ordered list and polynomial representation using array of structures. Functions: Parameter passing by value, Parameter passing by reference, Recursive functions

Unit III: Linked lists

Concept of Lists, Single linked list: algorithms for Creation, Insertion, Deletion and traversals of above data structure, Concept of Doubly Linked List and Circular Linked List, Applications of Linked lists, Abstract Data Type (ADT),Generalized Linked List (GLL): Concept, Parenthesized enumeration, Representation of multivariable polynomials using GLL

Unit IV: Modeled Data Structures – Linear

Stacks: Definition and example, Representation using arrays and linked list, Applications of Stacks: Concept of infix, Postfix and Prefix expressions, Algorithm to convert infix expression to a postfix expression, Algorithm to evaluate a postfix expression, Queues: Definition and example, Representation of queue using array and linked list, Concept of Circular queue, Concept of priority queue, Applications of Queue

Unit V: Modeled Data Structures – Non Linear (Trees)

Difference between Linear and Non-linear data structures, Binary Trees (BT): Basic terminology, Types of Binary Trees, Binary Search Tree (BST): Difference between BST and BT. Representation of BST (Static and Dynamic), Algorithms for BST traversals: Pre-order, In-order and Post-order (recursive), Primitive operations on BST: Create, Insert, Delete.

Unit VI: Modeled Data Structures – Non Linear (Graphs)

Graphs: Concepts and terminology, Types of graphs: Directed graph, Undirected graph, Planar graph, Representation of graph using adjacency matrix, Adjacency list, Traversals: Depth First Search (DFS) and Breadth First Search (BFS). Minimal Spanning Tree (MST): Kruskal's algorithm, Algorithm to find the shortest path: Dijkstra's algorithm

Text Books:

1. Seymour Lipschutz, "Data Structures with C", Schaum"s Outlines, McGrawHill Education (India) Pvt. Ltd, (1st Edition), (2017).
2. E Balgurusamy, "Programming in ANSI C", McGraw-Hill, (8th Edition), (2019).

Reference Books:

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data structures using C and C++", PHI Publications, (2nd Edition), (2004)
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures in C", Universities Press, (2nd Edition), (2008)

Online Resources:

1. NPTEL Course "Programming, Data Structures and Algorithms using C" https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-cs25/

23VEC301 UNIVERSAL HUMAN VALUES II

Teaching Scheme
Lectures: 2 Hours / Week
Tutorial: 1 Hour / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Prerequisite:

Course Objectives:

1. To help the students appreciate the essential complementarily 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
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature

Course Outcomes:

After completion of the course, students will be able to

CO1 Understand the significance of value inputs in formal education and start applying them in their life and profession
CO2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO3 Analyze the value of harmonious relationship based on trust and respect in their life and profession
CO4 Examine the role of a human being in ensuring harmony in society and nature.
CO5 Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.

Unit I: Introduction to Value Education

Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity which is the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Current Scenario for Happiness and Prosperity, Method to Fulfill the Basic Human Aspirations.

Unit II: Harmony in the Human Being

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Program to ensure self-regulation and Health.

Unit III: Harmony in the Family and Society

Harmony in the Family, Family being the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, Trust which is the Foundational Value in Relationship, Respect as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order.

Unit IV: Harmony in the Nature or Existence

Digital Multiplexing: Multiplexers and hierarchies, Data formats and their spectra, Synchronization: Bit Synchronization, Scramblers, Frame Synchronization, Inter-symbol Interference, Equalization, Eye diagram.

Unit V: Implications of the Holistic Understanding, a Look at Professional Ethics

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models, Typical Case Studies with Strategies for Transition towards Value-based Life and Profession.

Text Books:

1. R. R. Gaur, R. Asthana, G. P. Bagaria, **"The Textbook A Foundation Course in Human Values and Professional Ethics"**, Excel Books, New Delhi, (2nd Revised Edition), (2019).
2. R. R. Gaur, R. Asthana, G. P. Bagaria, **"Teachers' Manual for A Foundation Course in Human Values and Professional Ethics",** Excel Books, New Delhi, (2nd Revised Edition), (2019).

Reference Books:

1. A. Nagaraj, **"Jeevan Vidya: Ek Parichaya"**, Jeevan Vidya Prakashan, Amarkantak, (1999).
2. A.N. Tripathi, **"Human Values"**, New Age Intl. Publishers, New Delhi, (2004).
3. Mohandas Karamchand Gandhi, **"The Story of My Experiments with Truth",** Prakash books Publishers, Daryaganj, New Delhi, (1983).
4. E. F. Schumacher, **"Small is Beautiful"**, Harper Collins Publishers, Noida, Uttar Pradesh, (2010).
5. Cecile Andrews, **"Slow is Beautiful"**, New Society Publishers, Canada, (2006).
6. J. C. Kumarappa, **"Economy of Permanence",** Sarva Seva Sangh Prakashan, Wardha, Sevagram, (2017).
7. Pandit Sunderlal ,**"Bharat Mein Angreji Raj",** Prabhat Prakashan, New Delhi (2018).
8. Dharampal, **"Rediscovering India",** Society for Integrated Development of Himalayas, (2003).
9. Mohandas Karamchand Gandhi, **"Hind Swaraj or Indian Home Rule",** Navajivan Publication House, Ahemadabad (2003).
10. Maulana Abdul Kalam Azad**, "India Wins Freedom",** Orient Black Swan, (1989).
11. Romain Rolland**, "Swami Vivekananda",** Advaita Ashram Publication Ramkrishna Math, (2nd Edition), (2010).
12. Romain Rolland, "**Gandhi",** Srishti Publishers & Distributor, (2002).
13. Annie Leonard, "**The story of stuff**", Little, Brown Book Group, (2005).

Online Resources:

- **NPTEL course on Humanities and social sciences**
  https://nptel.ac.in/courses/109/104/109104068/

23AEC301 DESIGN THINKING

Teaching Scheme:
Lectures: 1 hour/week
Tutorial: 1 hour/week

Examination Scheme:
In-Semester: 50 marks
Credits: 2

Prerequisites: -

Course Objectives:

Familiarize students with

1. Design Thinking process
2. User centric approach for designing a solution.
3. Problem analysis with various methods
4. Applications of Design Thinking

Course Outcomes:

Students should be able to

1. Apply the design process for real world problems.
2. Apply types of thinking ideas into visuals or prototypes.
3. Analyze problems with various methods and approaches for innovative user centric solutions.
4. Recommend a solution based on stages of Design Thinking.

Unit I: Introduction to Design thinking

Human Centred Design approach, Concept of Design Thinking. Features of Design Thinking, Process of thinking, Creative thinking, Lateral thinking, User centric approach and personas, Thinking hats.

Unit II: Stages of Design Thinking

Empathy: Difference Between Empathy and Sympathy, Empathy Techniques, Empathy Maps, define: Identification of Problem, Defining and Refining of Problem Statement, Ideate: Process of Ideation, Prototyping, Testing.

Unit III: Design thinking approaches

Visualization, Journey Mapping, Value Chain Analysis, Mind Mapping, Development, Assumption Testing, Prototype, Co-Creation, Learning Launches, Story Telling.

Unit IV: Design Thinking for Strategic Innovations and its applications

Strategic Management, Innovation Management, Frameworks for Innovation, Types of Innovations: Disruptive vs. Sustaining innovation, Radical vs. incremental innovation, Architectural vs. Modular Innovation, The Innovation Matrix, Business Model Innovation Applications: Product Development, Process Development, Service Management.

Textbooks:

1. Bryan Lawson, "How designers think: The design process demystified", 4th Edition, Butterworth Architecture
2. Nigel Cross, "Design Thinking", Berg Publishers – 2011

Reference Books:

1. Makarand Ramesh Velankar, Leena Manojkumar Panchal, "Design Thinking Primar", Techknowledge Publications- September 2023, ISBN: 978-93-5563-711-6
2. Ben Crothers, "Design Thinking Fundamentals", O'Reily
3. Tim Brown, "Change by Design: How Design Thinking Transforms Organizations", HarperCollins – 2009
4. Susan Weins Chenk, "Hundred things every designer needs to know about people", New Riders Publication
5. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", Wiley Publication
6. Roger L. Martin, "Design of Business: Why Design Thinking is the Next Competitive Advantage" Harvard Business Press
7. Karl Ulrich, "Design: Creation of Artifacts in Society" - 2011
8. Bala Ramadurai, "Karmic Design Thinking"
9. T. Amabile, "How to kill creativity", SAGE Publication - 2006
10. William Lidwell, Kritina Holden, Jill Butler, "Universal principles of Design ", Rockport Publishers
11. Bella Martin, Bruce Hanignton, Bruce M Hanington "Universal methods of design", Rockport Publishers - 2012
12. Roman Kizanie, "Empathy: Why it matters, how to get it", Tarcher Perigee Publishers
13. Karla McLaren, "The Art of Empathy: A complete Guide to life's most essential skill", Sounds True Publishers

23PCEC301L ELECTRONIC CIRCUITS AND APPLICATIONS LAB

Teaching Scheme
Practical: 2 Hours / Week

Examination Scheme
Practical Exam: 25 Marks
Credit: 1

Course Objectives:

1. To identify and characterize the device such as JFET and MOSFET.
2. To measure Op-Amp performance parameters and understand the difference between ideal and practical values for different ICs.
3. To design and implement linear and non-linear applications of Op-Amp and verify the functionality

Course Outcomes:

After completion of the course, students will be able to

CO1 Interpret characteristics of JFET and MOSFET
CO2 Design biasing circuits for JFET amplifier and analyse performance of JFET amplifier
CO3 Build Op-Amp based circuits and analyse their performance

List of Experiments:

1. Plot V-I characteristics of JFET.
2. Implement biasing circuits for JFET and verify DC operating point.
3. Implement JFET CS amplifier and calculate AV, Ri and Ro.
4. Measure Op-Amp parameters and compare with the ideal specifications.
5. Design, Build and Test Integrator for given frequency fa.
6. Design, Build and Test Schmitt trigger and plot transfer characteristics.
7. Design, Build and Test Square wave form generator.
8. Build and Test half and full wave precision rectifier.

23PCEC303L DIGITAL ELECTRONIC LAB

Teaching Scheme
Practical: 2 Hours / Week

Examination Scheme
In-Sem Exam: 25 Marks
Practical Exam: 25 Marks
Credit: 1

Course Objectives:

1. To acquire the basic knowledge of basic building blocks of digital circuits
2. To apply the acquired knowledge to perform analysis and to design various Combinational and Sequential Logic Circuits
3. To understand Hardware Description Language design flow to model & simulate digital circuits

Course Outcomes:

After completion of the course, students will be able to

CO1 Design Combinational Logic Circuits
CO2 Design Sequential Logic Circuits
CO3 Design Finite State Machines
CO4 Use Hardware Description Language to model digital circuits and verify the model through simulation

List of Experiments:

1. Design and implement 1- digit BCD adder using IC 7483.
2. Design of Combinational Logic Circuits using Multiplexer IC 74153/74151.
3. Design of Combinational Logic Circuits using Decoder IC 74138.
4. Design & Implement Asynchronous counter using flip-flops.
5. Design & Implement Synchronous counter using flip-flops.
6. Implement & Verify operation of Shift Registers using flip-flops.
7. Design & Implement Finite State Machine/ Sequence Detector using flip-flops.
8. Simulate HDL Code for a combinational logic circuit ex. Multiplexers/ decoders.
9. Simulate HDL Code for a sequential logic circuit ex. Counter.

23PCEC304L DATA STRUCTURES AND ALGORHTIMS LAB

Teaching Scheme
Practical: 2 Hours / Week

Examination Scheme
Practical: 25 Marks
Credits: 1

Course Objectives:

1. To recall the concepts of procedural programming language paradigm
2. To understand the significance of data structures and its use.
3. To understand and implement data searching and sorting methods
4. To understand and implement algorithms for solving given problems.

Course Outcomes:

After completion of the course, students will be able to

CO1 Utilize the principal algorithms of sorting and searching on the given data.
CO2 Implement the linear data structures like arrays, records and linked lists.
CO3 Implement stacks & queues on the premise of the baseline models.
CO4 Build, represent and traverse non-linear data structures.

List of Experiments:

1. Program to re-order the data using sorting techniques like – bubble, selection, insertion sort.

2. Program to locate data using sequential and binary search techniques.

3. Create a database of students using array of structures with attributes; roll no, name, program, course, marks obtained for different subjects with their total and average. Implement the following operations on the database:
   a) Display the database in a tabular form.
   b) Modify (should be able to modify each field of the database)
   c) Append (add a new record to the existing database)
   d) Search for a particular record from the database.
   e) Sort the records in the database.

4. Program to add two polynomials using array of structures. The display should include the polynomials that are added and the resultant polynomial in descending order of the exponents.

5. Program to create a singly linked list using dynamic memory allocation functions. Implement the following operations on the linked list:
   a) Display
   b) Insert a node in the linked list (at front, at end, in the middle)
   c) Delete a node from the linked list (at front, at end, in the middle),
   d) Display the linked list in reverse.
   e) Revert the linked list.

6. Program to model an array as a stack (Static implementation of Stack) and perform the following operations on it:
   a) Push

b) Pop
c) Display

7. Program to model a singly linked list as a stack (Dynamic implementation of Stack) and perform the following operations on it:
   a) Push
   b) Pop
   c) Display.

8. Program to model an array as a queue (Static implementation of Queue) and perform the following operations on it:
   a) Add
   b) Delete
   c) Display

9. Program to model a linked list as a queue (Dynamic implementation of Queue) and perform the following operations on it:
   a) Add
   b) Delete
   c) Display

10 Create a Binary Search Tree and perform the following operations on it:
   a) Recursive traversals on the tree (display elements of the tree)
   b) Search a node in the tree

11 Create a graph and represent it using adjacency matrix.
   Implement BFS and DFS traversals.