

LOYOLA ACADEMY

DEGREE & PG COLLEGE

OLD ALWAL, SECUNDERABAD - 500 010, TELANGANA, INDIA

An Autonomous College affiliated to Osmania University

Re-accredited with 'A' Grade (III Cycle) by NAAC

A "College with Potential for Excellence" by UGC

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SCHOOL OF INFORMATICS

Department of B.Sc. Computer Science & INTERNET OF THINGS

Year of Inception: 2022



**Minutes of 4th meeting of the BOS held on Friday,
17th January, 2025 at 10.00 a.m.**

Academic Year: 2025-26 for the batch of 2025-28



Loyola Academy, Alwal, Secunderabad 500 010

ANNEXURE - I

**LOYOLA ACADEMY DEGREE & PG COLLEGE
B.S.C. COMPUTER SCIENCE AND INTERNET OF THINGS AY (2025-28)
CONSOLIDATED SCHEME**

Year	Sem	Course-I	Course-II	Course-III	Course-IV	Course-V	Course-VI	Hours	Credits	
I		General English-I (3) (AECC-1)	Value Education and Personality Development (2) (AECC-2)	Fundamentals of IOT and Robotics (4+1) (DSC-1)	Matrices and Vector Calculus (4) (DSC-2)	Problem Solving and Programming in 'C' (4+1) (DSC-3)	Basic Electronics & Circuits (4+1) (DSC-4)	30	24	AECC=2 DSC=4
		General English-II (3) (AECC-3)	Indian Heritage and Culture (2) (AECC-4)	Data Structures with C (4+1) (DSC-5)	Discrete Mathematics (4) (DSC-6)	Digital Logic Design (4+1) (DSC-7)	Computer Organization (4) (DSC-8)			
II		Environmental Studies and Gender Sensitization (3) (AECC-5)	Introduction to IOT Raspberry Pi Pico W (2+1) GE-1	Computer Networks (2) (SEC-1)	Probability and Statistics (4) (DSC-9)	Sensors and Actuators (4+1) (DSC-10)	Python Programming (4+1) (DSC-11)	30	24	AECC=1 GE=1 SEC=1 DSC=3
		Java Programming (4+1) (DSC-12)	Distributed Computing (2) (SEC-3)	Data Analytics for IOT (4) (DSC - 13)	Mobile Application Development for IOT (4+1) (DSC-14)	Artificial Intelligence (4) (DSC-15)	Microprocessor and Microcontroller (4+1) (DSC-16)			
III		Machine Learning (4+1) (DSC - 17)	Embedded System Design (4) (DSC - 18)	IOT Cloud Security (4) (DSC-19)	Deep Learning/ Big Data (4) (DSE-1)	IOT Architecture and Its Protocol/Adhoc Wireless Sensor Networks (4) (DSE-2)	Data Base Management System (4+1) (DSC-20)	30	26	DSE=2 DSC=4
		Natural Language Processing / Parallel Programming (4) (DSE-3)	IOT enabled Web Technology/ Applications of IOT (4) (DSE-4)	Strategies In Industry 5.0 (4+1) (DSC-21)	MAJOR PROJECT (6) (Project Report) (DSE-5)					
								30	19	DSE=3 CORE=1
								180	141	

Legend:
 Ability Enhancement Compulsory Course (AECC) : 05
 Generic Elective (GE) : 01
 Skill Enhancement Course (SEC) : 03
 Discipline Specific Core : 21
 Discipline-Specific Elective (DSE) : 05
 Project Report : 01

6 B.Sc. (Computer Science and Internet of Things) Academic Year 2025-26 (CBCS)

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ANNEXURE-I
SCHEME OF INSTRUCTION FOR B. Sc. COMPUTER SCIENCE AND
INTERNET OF THINGS

YEAR – WISE AND SEMESTER WISE DISTRIBUTION OF SUBJECTS
SCHOOL OF INFORMATICS
B. SC. COMPUTER SCIENCE & INTERNET OF THINGS
FIRST SEMESTER, ACADEMIC YEAR 2025 – 26 OF 2025 – 28 BATCH (CBCS)

Sl. No.	Part	Subject code	Title of the Subject	Hour/ Week	Duration of the semester Exams	Marks			Credits
						Internal	External	Total	
THEORY									
1.	I	EN23101	General English-I (AECC-1)	3	3	40	60	100	3
2.	I	VE18101	Value Education and Personality Development (AECC-2)	2	3	40	60	100	2
3.	II	CSIOT25101	Fundamentals of IOT and Robotics (DSC-1)	5	3	40	60	100	4
4.	II	CSIOT25102	Matrices and Vector Calculus (DSC-2)	5	3	40	60	100	4
5.	II	BS24104	Problem Solving and Programming in C (DSC-3)	5	3	40	60	100	4
6.	II	CSIOT25103	Basic Electronics & Circuits (DSC-4)	4	3	40	60	100	4
PRACTICALS									
7.	II	CSIOT25105	Fundamentals of IoT and Robotics Lab (DSC-1)	2	3	40	60	100	1
8.	II	CSIOT25106	C-Programming Lab (DSC-3)	2	3	40	60	100	1
9.	II	CSIOT25107	Basic Electronics Lab (DSC-4)	2	3	40	60	100	1

*Ability Enhancement Compulsory Course (AECC)

* Discipline Specific Core (DSC)

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FUNDAMENTALS OF IOT AND ROBOTICS

Credits: 4

Semester: I

Course Code: CSIOT25101

No. of Lecture Hours: 75

OBJECTIVES:

The goal of the course is to familiarize the students with the fundamental concepts and techniques in robotic engineering and computer systems for their control and information processing.

OUTCOMES:

CO1: Students will be **Understand** fundamentals of IoT.

CO2: Students will be able to **classify** and familiarized with broad range of topics in robotics with emphasis on basics of manipulators, coordinate transformation and kinematics.

CO3: Students will be able **understand** the concepts of actuators and their implementation.

CO4: Students will be able to learn types of sensors and they can **apply** in real-time.

CO5: Students will be able to **demonstrate** with trajectory planning and Robotic control techniques.

UNIT- I**15hrs****Introduction to IoT:**

- | | |
|---|---|
| 1. Definition and Characteristics of IoT | 2 |
| 2. IoT Enabling Technologies | 2 |
| 3. IoT Levels and Deployment Templates | 3 |
| 4. IoT Use cases: Home, Government and Cities | 3 |
| 5. Environment and Energy System | 3 |
| 6. Agriculture, Health and Lifestyle | 2 |

UNIT II**15hrs****Implementation of IoT module:**

- | | |
|---|---|
| 1. Introduction to M2M, Differences between IoT and M2M | 3 |
| 2. Physical Design of IoT | 3 |
| 3. Logical Design of IoT | 2 |
| 4. Generic Block diagram (Logical Design) of IoT | 2 |
| 5. Raspberry Pi (pin description only) | 1 |
| 6. Raspberry Pi Interfaces, Linux on Raspberry Pi | 2 |
| 7. Other IoT devices | 2 |

UNIT III**15hrs****Actuators**

- | | |
|--|---|
| 1. Characteristics of Actuating Systems | 3 |
| 2. Actuating Devices and Control | 2 |
| 3. Use of Reduction Gears | 3 |
| 4. Comparison of Hydraulic, Electric Actuators | 2 |
| 5. Pneumatic Actuators | 2 |
| 6. Hydraulic Actuators | 3 |



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UNIT IV

15hrs

Introduction to Robotics:

- | | |
|---|---|
| 1. Classification, Component | 2 |
| 2. Characteristics, Applications | 2 |
| 3. Robotics Kinematics, Position Analysis | 3 |
| 4. Robots as Mechanisms | 2 |
| 5. Matrix Representation | 2 |
| 6. Transformation Matrices | 2 |
| 7. Forward and Inverse Kinematics | 2 |

UNIT V

Robot Controls:

15hrs

- | | |
|--|---|
| 1. Point to Point Control, Continuous Path Control | 3 |
| 2. Intelligent Robot | 3 |
| 3. Control System for Robot Joint | 3 |
| 4. Control Actions | 3 |
| 5. Feedback Devices. | 3 |

ESSENTIAL READING:

1. Introduction to IoT by Sudip Misra, Anadarup Mukherjee and Arjit Roy Cambridge University Press and Assessment 1st Edition 2022.
2. The Internet of Things Revised and Updated Edition by Samuel Greengard MIT Press 2021.
3. Fundamental of IoT by Dr. Mathura K, Dr. Brahampal Singh, Dr. Ravindra Kumar, Dr. Mahboob Alam Phoenix International Publication House 2023.
4. Introduction to IoT by Manjuladevi V, Julie Violet Joyslin S, Notion Press 2023.
5. Saeed B. Niku, Introduction to Robotics Analysis, Controls, Application, Willey, 2019, Third Edition.

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PROBLEM SOLVING AND PROGRAMMING IN 'C'

Credits : 4

Subject Code : BS24104

Semester: I

No. of Lecture Hours: 75

Objective: To understand major programming constructs this serves as the basis for any programming language.

Course Outcomes:

CO1: Explain Basic concepts of C programming

CO2: Develop programs using 'C' control structures.

CO3: Organize data using arrays and strings

CO4: Sub divides larger problems into smaller ones using 'C' functions.

CO5: Create programs using the concept of structures, union and file handling in 'C'.

UNIT – I	15Hrs
1. Introduction to C programming	2
2. Structure of C program	2
3. Files used in a C program	3
4. Compiling and executing C program	3
5. C tokens, Constants, Character set in C, Keywords	3
6. Identifiers	2
 UNIT – II	 15Hrs
1. Data Types in C, Enumerated data types, typedef	2
2. Variables and scope of a variables	2
3. Data input and output statements in C	2
4. Operators and expressions	3
5. Type conversion and Type Casting	3
6. Conditional Branching Statement – if, if-else, if-else-if, switch case	3
 UNIT – III	 15Hrs
1. Iterative Statements – while loop, do-while loop, for loop	3
2. Nested loops, break and continue statements, goto statement	3
3. Arrays - Single and double dimensional arrays	3
4. String- string input output functions	3
5. String manipulation functions	3
 UNIT-IV	 15Hrs
1. Function- Declaring, defining and invoking functions	2
2. Categories of functions-Built-in functions	2
3. Passing parameters to functions – call by value & call by reference	2
4. Storage classes	1
5. Recursion.	2



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- | | |
|---|---|
| 6. Pointers - Declaration, passing pointer to functions | 2 |
| 7. Pointers and one dimensional arrays | 2 |
| 8. Dynamic memory allocations. | 2 |

UNIT – V

15Hrs

- | | |
|---|---|
| 1. Structures - Simple structures, nested structure, Array of structures | 2 |
| 2. Unions-Differences between Structures and Unions. | 2 |
| 3. File handling - Various modes, File operations – fopen(), fclose() | 2 |
| 4. File input output functions – fputc(), fgetc(), fputs(), fgets(),
getw(), putw(), getc(), putc(), fprintf(), fscanf(), getchar(), putchar() | 3 |
| 5. Random accessing file – fseek(), ftell(), rewind() | 3 |

ESSENTIAL READING

1. TharejaReema. 2016. **Programming in C**. 2nd edition. New Delhi : OUP.
2. Kanetkar Yashwant. 2018. **Let us C**. 16th Edition. New Delhi : BPB.
3. Gottfried Byron. 2010. **Programming with C (Schaum's Outline Series)**. 3rd Edition. New Delhi: McGraw Hill Education

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BASIC ELECTRONICS AND CIRCUITS

Credits: 4

Course Code: CSIOT25102

Semester: I

No. of Lecture Hours: 60

Objectives:

- To introduce the fundamentals of electronics
- To introduce the terminology, laws and applications
- To expose a variety of active and passive components

Outcome: Students will be able to understand and analyze the basics of electronic components and their applications.

CO1: Able to understand what is electronics and terms related to it.

CO2: Understanding the passive components and their connections, sources & laws

CO3: Understanding the fundamentals of alternating current and terminology

CO4: Analyze semiconductors and understand the working of a diode and its applications.

CO5: Able to understand the construction and working of transistor, power supply.

UNIT-I

12Hrs

Introduction to Electronics-I:

- | | |
|---|---|
| 1. Definition and applications of electronics | 1 |
| 2. Electric current, potential difference | 1 |
| 3. Electric Resistance, factors affecting the electric resistance | 2 |
| 4. Conductance and conductivity | 2 |
| 5. AC, DC, Ohm's law | 3 |
| 6. Electronic components(Passive only) | 3 |

UNIT-II

12Hrs

Introduction to Electronics-II:

- | | |
|--|---|
| 1. Resistor and its colour code | 2 |
| 2. Resistors in series and parallel | 2 |
| 3. Capacitor, Factors affecting capacitance | 2 |
| 4. Capacitors in series and parallel | 2 |
| 5. Concept of voltage and current sources | 2 |
| 6. Kirchhoff's current law & Kirchhoff's voltage law | 2 |

UNIT-III

12Hrs

AC Fundamentals:

- | | |
|--|---|
| 1. Types of Alternating current and voltage | 1 |
| 2. Important terms of AC: Cycle, time period, frequency, Amplitude | 1 |
| 3. Peak to Peak Value, Instantaneous Value, Root Mean square Value | 2 |
| 4. Average Value, Phase, Phase Difference | 1 |
| 5. Mathematical representation of a signal: rectangular form, polar form | 2 |

Semiconductors:

- | | |
|--|---|
| 6. Intrinsic and Extrinsic Semiconductors | 2 |
| 7. n-type and p-type semiconductors | 2 |
| 8. Effect of temperature on semiconductors | 1 |



UNIT-IV **12Hrs**

Diodes:

- | | |
|--|---|
| 1. Semiconductor diode, formation of depletion layer | 2 |
| 2. Biasing the PN junction diode(Forward & reverse) | 2 |
| 3. VI characteristics of PN Junction diode, Diode applications | 3 |
| 4. Zener diode, Reverse characteristics of Zener diode | 3 |
| 5. Zener as Voltage Regulator | 2 |

UNIT-V **12Hrs**

Transistors:

- | | |
|---|---|
| 1. Junction transistor Structure | 1 |
| 2. Working of NPN transistor | 1 |
| 3. Transistor circuit configurations | 1 |
| 4. Input & Output characteristics of a transistor in CE configuration | 2 |
| 5. Basic CE amplifier circuit | 2 |
| 6. Thermal run away & Heat sink | 1 |
| 7. Voltage Regulator and voltage regulation | 2 |
| 8. Block diagram of DC power supply. | 2 |

SUGGESTED READING:

1. Basic Electrical and Electronics Engineering, R Muthusubramanian, S Salivahanan, 2nd Edition 2024.
2. Basic Electronics Circuits – Problems and Solutions by K Vasadevan Springer International Publishing Agent 2022.
3. Electronic Devices and Circuits by S. Salivahanan, N. Suresh Kumar 5th Edition Tata McGrew Hill 2021.
4. Applied Electronics. R S Sedha, Revised Edition, S Chand Publications 2022.

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FUNDAMENTALS OF IOT AND ROBOTICS – LAB

Credits: 1

Course Code: CSIOT25105

Semester: I

No of practical hrs: 30

Objectives:

- To get the knowledge on Hardware and Software environment and library installation of IOT
- To understand about the working of various sensors
- To get knowledge on IoT case studies

Outcomes:

- Gained knowledge about the working of sensors and Actuators
- Acquired knowledge about IOT applications

Topics

1. Setting up the Hardware and Software environment and library installation
2. Interfacing output devices
 1. LED
 2. Relay
 3. DC Motor
3. Interfacing input devices
 1. Switch
 2. IR sensor
4. Interfacing 16x2 LCD
 1. Displaying message
 2. Scrolling messages on LCD
 3. LM 35
5. Working with analog read and analog write functions
 1. Reading data from Potentiometer and displaying it on LCD
 2. Interfacing Servo Motor and controlling using Potentiometer
6. Interfacing Ultrasonic sensor for safety parking system and creating an excel dataset
7. Interfacing DHT sensor and recording the values and creating an excel dataset
8. Working on different API for communication – Thing Speak or Ubidots for Desktop platform and BLYNK for mobile platform
9. Recording data from DHT, IR and Ultrasonic sensor onto ThinkSpeak or Ubidots and BLYNK
10. Controlling output devices from cloud platforms

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C PROGRAMING LAB

Credits: 1

Course Code: CSIOT25106

Semester: I

No. of Practical Hours: 30

Objective: To develop applications using structured programming.

Outcome: Students will be able to write, compile and debug programs in C language.

1. Programs to implement various arithmetic operators
2. Programs to find area of circle, area of rectangle, area of square
3. Programs to find gross salary of employee
4. Programs using if, if-else, if-else if-condition statements
5. Program to stimulate calculator using switch case
6. Programs using break and continue
7. Program to print sum of "N" natural numbers
8. Program to print factorial of given numbers using loops
9. Program to print multiplication table of a given number
10. Program to LOYOLA five times
11. Program to find sum of digits and reverse of a given number
12. Program to check if the given number is palindrome or not
13. Program to find the Fibonacci series
14. Program to check the year is leap year or not
15. Program to find swap of two numbers
16. Program to print a pattern
17. Program to solve quadratic equation
18. Programs to display array elements, sum of array elements, smallest, greatest array elements
19. Program to check if the given number is Armstrong number
20. Programs using 2-D array
21. Program to find the element in an array
22. Program to perform operations on matrices (addition, subtraction, multiplication, transpose)
23. Programs using strings and functions
24. Program to find call by value and call by reference
25. Program to find factorial using recursion
26. Program to find the sum of array elements using pointers
27. Program to accept and display book details using structures
28. Program to maintain employee details using structures
29. Program to Read a file and display its content using files
30. Program to count number of space, tabs and newlines in a file

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BASIC ELECTRONICS AND CIRCUITS PRACTICALS

Credits: 1

Course Code: CSIOT25107

Semester: I

No. of Practical Hours: 30

Objectives:

- Describe physical models of basic components.
- Design and construct simple electronic circuits to accomplish a specific function.
- Understand their capabilities and limitations.

Outcome: Students will be able to verify the passive components and their working, Measurement of parameters using CRO, working of diodes, transistors.

1. Study of resistors using colour code
2. Resistances in series and parallel
3. Capacitances in series and parallel
4. Study of Kirchhoff's laws
5. Measurement of frequency using CRO
6. Measurement of amplitude using CRO
7. Measurement of Phase using CRO
8. VI Characteristics of PN junction diode
9. VI Characteristics of Zener diode
10. Input and output characteristics of transistor in CE configuration

Note: Student has to perform minimum of Six experiments

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SCHEME OF INSTRUCTION FOR B. Sc. COMPUTER SCIENCE AND INTERNET OF THINGS

**YEAR – WISE AND SEMESTER WISE DISTRIBUTION OF SUBJECTS
SCHOOL OF INFORMATICS
B. SC. COMPUTER SCIENCE & INTERNET OF THINGS
SECOND SEMESTER, ACADEMIC YEAR 2025 – 26 OF 2025 – 28 BATCH (CBCS)**

Sl. No.	Part	Subject code	Title of the Subject	Hour/ Week	Duration of the semester Exams	Marks			Credits
						Internal	External	Total	
THEORY									
1.	I	EN23201	General English-II (AECC-3)	3	3	40	60	100	3
2.	I	IC23201	Indian Heritage and Culture (AECC-4)	2	3	40	60	100	2
3.	II	BS24204	Data Structures with C (DSC-5)	5	3	40	60	100	4
4.	II	CSIOT25201	Discrete Mathematics (DSC-6)	5	3	40	60	100	4
5.	II	CSIOT25202	Digital Logic Design (DSC-7)	4	3	40	60	100	4
6.	II	CSIOT25203	Computer Organization (DSC-8)	5	3	40	60	100	4
PRACTICALS									
8.	II	CSIOT25205	Data Structures with C Lab (DSC-5)	3	3	40	60	100	1
9.	II	CSIOT25206	Digital Logic Design Lab (DSC-7)	3	3	40	60	100	1


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DATA STRUCTURES WITH C

Credits : 4
Subject Code : BS24204

Semester : II
No. of Lecture hours: 75

Objective: To focus on different methods of sorting, searching, storing data and understanding time and storage efficiency.

Outcomes: Students will be able to

CO1: Choose appropriate data structures to represent data items in real world problems

CO2: Illustrate non-linear data structures like linked list

CO3: Organize the data using sorting various linear data structures and determine time complexity

CO4: Construct data with nonlinear data structure using trees.

CO5: Explain the concept of graphs and b trees

UNIT I	15hrs
1. Introduction to Data Structures	2
2. Stacks- Definition and various operations performed on stacks	4
3. Queues - Definition and various operations performed on queues Stack applications	4
4. Notations - Prefix, Postfix, Infix	2
5. Conversions -Infix to Postfix, Infix to Prefix	3
UNIT II	15hrs
1. Data Representation, Concept of linked list	2
2. Advantages of Linked List, Types of linked list	2
3. Linear Linked list - Various operations performed on singly linked list	3
4. Doubly Linked List - Various operations performed on singly linked list	3
5. Circular Linked List	2
6. Applications of Linked Lists	3
UNIT III	15hrs
1. Trees - Definition and properties	2
2. Binary Trees-Definition and Representation of Binary trees	2
3. Operations: Insertion, deletion, search	3
4. Tree traversal techniques- in order. pre order. post order	2
5. AVLtrees - Definition and representation of AVL Trees	3
6. Operationson AVL trees- insertion, deletion	3
UNIT IV	15hrs
1. Sorting methods	2
2. Bubble sort	2
3. Insertion sort	3
4. Selection sort	2
5. Merge sort	2
6. Quick sort	2
7. Searching methods	2

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UNIT - V

15hrs

- | | |
|--|---|
| 1. Graphs Terminology & Representations
Definition and representation of graph | 2 |
| 2. Graph Traversal -BFS, DES | 3 |
| 3. B-Trees Definition and representation of B-Trees
Operations on B- Tree-insertion, deletion, search | 2 |
| 4. File Structures - Physical Storage Media File Organization | 2 |
| 5. Sequential Files, Indexing and Hashing, Primary indices, Secondary indices | 2 |
| 6. Indexing and Hashing Comparisons. | 2 |

ESSENTIALREADING

1. Kanetkar, Yashvanth, 2020, 14th Edition, Data Structures through C
2. Tanenbaum, A.M. Langsam, Y. Augenstein, M.J. Data Structures Using C. New Delhi: Pearson Education

SUGGESTED READINGS:

1. Balagurusamy, E. C Programming & Data Structures. Tata McGrawHill.
2. KrishnaMoorthy.R. IndiraniKumaravel, G. 2008. Data Structures Using C. Tata McGraw Hill Publishing Company Lid

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DIGITAL LOGIC AND DESIGN

Credits: 4

Semester: II

Subject Code: CSIOT25201

No. of Lecture hours: 60

Objectives:

- To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- To prepare students to perform the analysis and design of various digital electronic circuits.

Course Outcome:

CO1: Convert different type of codes and number systems which are used in digital communication and computer systems.

CO2: Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

CO3: Analyse different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO4: Design different types of with memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

CO5: Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.

UNIT-I

12Hrs

Number system and Logic gates:

- | | |
|--|---|
| 1. Conversions of Binary, octal, Decimal & hexadecimal number systems | 3 |
| 2. Complements (1's and 2's complement methods), | 1 |
| 3. Binary addition and subtraction (1's and 2's complement methods). | 2 |
| 4. Binary Codes-decimal Codes, Error detection codes, reflected Code | 2 |
| 5. Logic gates- OR, AND, NOT, XOR, NAND, NOR, gates and their Truth tables | 1 |
| 6. Design of basic gates using the Universal gates- NAND and NOR gates. | 1 |

UNIT-II

12Hrs

Logic families and Boolean algebra:

- | | |
|---|---|
| 1. Transistor-Transistor Logic: TTL totem pole output, open collector output
Tri-state gate | 2 |
| 2. CMOS (Complementary metal oxide semi-conductor) – NAND gate | 1 |
| 3. Boolean algebra- Laws and identities, DeMorgan's Theorems. | 1 |
| 4. Simplification of Boolean expressions using Boolean identities | 2 |
| 5. Reduction of Boolean expressions using Karnaugh Maps – | |
| 6. Sum of Products (SOP) representation (up to four variables) including don't care conditions. | 6 |

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UNIT-III

12Hrs

Combinational Circuits:

- | | |
|---|---|
| 1. Introduction, Design procedure | 2 |
| 2. Half adder, Full adder and parallel adder logic circuits | 3 |
| 3. Sub tractors | 1 |
| 4. Code conversion(BCD to Excess-3 Code) | 1 |
| 5. Multiplexer | 2 |
| 6. De-Multiplexer | 1 |
| 7. Decoder (3 to 8) | 1 |
| 8. Encoder (8 to 3). | 1 |

UNIT-IV

12Hrs

Sequential Circuits:

- | | |
|--|---|
| 1. Introduction, Difference between Combinational and sequential | 2 |
| 2. Flip-flops - SR, D, JK, T and Master-Slave JK | 4 |
| 3. Flip flop excitation tables | 2 |
| 4. Shift Registers : Types of Shift Registers (SISO, SIPO, PISO, PIPO) | 2 |
| 5. 4-bit bidirectional universal shift register | 2 |

UNIT -V

12Hrs

Counters:

- | | |
|--|---|
| 1. Design of counters | 2 |
| 2. 4-bit Asynchronous (Ripple) counter | 2 |
| 3. Modulo-N counter | 2 |
| 4. synchronous counter. | 2 |
| 5. Memory: ROM, PROM, EPROM, EEPROM | 2 |
| 6. SRAM & DRAM | 2 |

ESSENTIAL READINGS:

1. Fundamentals of Digital Circuits by Ananad Kumar, 4th Edition PHI Publications 2023
2. Digital Logic Design by Sonali Singh BPP Publications 1st Edition 2017.
3. Digital Electronics G. K. Kharate 2013 Oxford University Press.
4. Jain R.P. 2009. Modern digital electronics. 4th edition New Delhi: McGraw Hill Education.
5. Mano Morris M. 2008. Digital logic and Computer design. 3rd edition. New Delhi. Prentice Hall

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COMPUTER ORGANIZATION

Credits: 4
Subject Code: CSIOT25201

Semester: II
No. of Lecture hours: 75

Objectives:

- To have a thorough understanding of the basic structure and operation of adigital computer. To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and to study the hierarchical memory system including cache memories and virtual memory.

Course Outcome: Students will be able to

CO1: Explain about how data transferred from one register to another register

CO2: Construct designing of control unit and Central Processing Unit

CO3: Classify different types of computer arithmetic operations

CO4: Categorize all peripheral devices and memory

CO5: To design new computer architecture of their own so that it could be solve the computer stakeholder problems in future.

Unit –I

15hrs

- | | |
|--|---|
| 1. Register Transfer and Microoperations: Register Transfer language & Register Transfer | 2 |
| 2. Bus and Memory Transfer | 1 |
| 3. Arithmetic Microoperations | 2 |
| 4. Logic Microoperations | 2 |
| 5. Shift Microoperations & Arithmetic Logic Shift Unit | 2 |
| 6. Basic Computer Organization and Design: Instruction Codes | 1 |
| 7. Computer Registers | 1 |
| 8. Computer Instructions and Timing and Control | 1 |
| 9. Instruction Cycle | 1 |
| 10. Memory Reference Instructions | 1 |
| 11. Input-Output and Interrupt | 1 |

Unit –II

15hrs

- | | |
|---|---|
| 1. Microprogrammed Control: Control Memory & Address Sequencing | 2 |
| 2. Microprogram Example | 2 |
| 3. Design of Control Unit | 2 |
| 4. Central Processing Unit: Introduction, General Register Organization | 2 |
| 5. Stack Organization | 3 |
| 6. Instruction Format & Addressing Modes | 2 |
| 7. Data Transfer and Manipulation & Program Control | 2 |



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Unit –III	15hrs
1. Pipeline and Vector Processing: Parallel Processing, Pipelining	1
2. Arithmetic Pipeline, Instruction Pipeline	2
3. Computer Arithmetic: Addition and Subtraction	3
4. Multiplication Algorithms	3
5. Division Algorithms	3
6. Floating-Point Arithmetic Operations	3
Unit –IV	15hrs
1. Input-Output Organization: Peripheral Devices & I/O Interface	2
2. Asynchronous Data Transfer	2
3. Modes of Transfer	2
4. Direct Memory Access	1
5. Input-Output Processor- CPU IOP Communication and Serial Communication	2
6. Memory Organization: Memory Hierarchy	2
7. Main Memory, Auxiliary Memory	2
8. Associative Memory, Cache Memory	2
Unit –V	15hrs
1. Parallel And Super Scalar Processor: Introduction to parallel processors	2
2. Parallel computer models- multiprocessors and multi computer	2
3. Multi vector and SIMD computer	3
4. Conditions of parallelism	2
5. System interconnect architectures performance	2
6. Concurrent access to memory and cache coherency	2
7. Superscalar Processors.	2

ESSENTIAL READING

1. Computer Organization and Architecture 11th Edition by William Stallings Pearson Education 2022.
2. Computer System Architecture 3rd Edition by Morris Mano Pearson Education 2017.
3. Computer Organization and Architecture by Dr. K Danesh Dr. P Santosh Kumar, SIP Publication 2024.

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Data Structures with C Lab

Credits : 1
Subject Code : CSIOT25205

Semester : II
No. of Lecture hours: 30

Objectives: To implement data structures for problem solving To implement and analyze the searching algorithms in the context of specific engineering problems

Outcomes:

1. Choose the appropriate data structure for problem solving.
2. Code, debug and demonstrate the working nature of different types of data structures and their applications.
3. Analyze and Compare various linear and non-linear data structure.
4. Document the results and operations of various Data Structure.

List of Experiments

1. Program to find transpose of a sparse matrix
2. Program to find the sum of two 2-D arrays of order 2X2
3. Program to find the transpose of a matrix
4. Program to find the upper triangle of an array
5. Program to find the trace of a 2-D array
6. Program to find the lower triangle of an array
7. Program to find the addition of two sparse matrix
8. Program to perform linear search
9. Program to implement binary search
10. Program to implement bubble sort
11. Program to implement insertion sort
12. Program to implement selection sort
13. Program to implement quick sort
14. Program to implement merge sort on 2 sorted lists
15. Program to implement stack operations using array
16. Program to implement queue operations using array
17. Program to implement stack operations using linked list
18. Program to implement queue operations using linked list
19. Program to convert infix expression to postfix
20. Program to evaluate a postfix expression
21. Program to create a linked list
22. Program to concatenate two lists
23. Programs to perform insertion and deletion operations on the linked list
24. Program to copy a list into another list
25. Program to split a list into two linked lists
26. Program to search for a node in the list.
27. Program to find the number of elements in the list
28. Program to illustrate tree traversal techniques.

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DIGITAL LOGIC & DESIGN PRACTICAL

Credit:1

Semester: II

Course Code: CSIOT25206

No. of practical hours: 30

Objectives:

- To implement simple logic operations using combinational logic circuits.
- To design combinational and sequential logic circuits in virtual and real environments.

Outcome: Students will be able to implement and design simple logical operations using combinational and sequential logic circuits.

List of Experiments:

1. Study of Logic Gates.
2. Design of Adders and Subtractors (Half, Full and Binary).
3. Study of Magnitude Comparator.
4. Code Converter (Binary to Gray and Gray to Binary).
5. Parity Generators and Checkers.
6. Study and Design of RS, JK Flip Flops using gates and IC's.
7. Design of Registers using Flip Flops and ICs.
8. Design of Counters using Flip Flops and ICs.
9. Simulation experiments: Adder, subtractors.
10. Simulation experiments: RS & JK flipflops.

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