IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)[Computer Science & Engineering (IoT)]

III Semester

S. No.	Course Code	Course type	Course Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam	Quiz/Assignment	End Sem	Term work / Lab Work &Sessional		L	T	P	
1.	**MA04**	BSC	Discrete Structure	60	25	15	–	–	**100**	2	1	–	3
2.	**IO01**	PCC	Analog and Digital Electronics	60	25	15	–	–	**100**	3	1	–	4
3.	**IO02**	PCC	Data Structure & Algorithm	60	25	15	–	–	**100**	2	1	–	3
4.	**IO03**	PCC	Introduction to IoT	60	25	15	–	–	**100**	3	–	–	3
5.	**HS03**	HSMC	Innovation and Creativity	–	–	–	–	100	**100**	–	–	2	1
6.	**IO01(P)**	LC	Analog and Digital Electronics Lab	–	–	–	60	40	**100**	–	–	2	1
7.	**IO02(P)**	LC	Data Structure & Algorithm Lab	–	–	–	60	40	**100**	–	–	2	1
8.	**IO03(P)**	LC	Introduction to IoT Lab	–	–	–	60	40	**100**	–	–	4	2
9.	**IO04(P)**	LC	Programming Practices Lab (Java)	–	–	–	60	40	**100**	–	–	4	2
10.	**LLC(02)**	LLC	Liberal Learning Course –II (NCC/NSO/NCA**)**	–	–	–	–	100	**100**	**–**	**–**	**2**	**1**
11.	**MLC(01)**	MLC	Professional Laws, Ethics, Gender, Human value and Harmony	100	–	–	–	-	100	1	–	–	0
		Total		**340**	**100**	**60**	**240**	**360**	**1100**	**11**	**3**	**16**	**21**

1HrLecture	1HrTutorial	2HrPractical
1 Credit	1 Credit	1 Credit

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III Semester

S. No.	Course Type	Course Code	Course Title	Scheme			Credits
				L	T	P	
1	BSC	MA04	Discrete Structure	2	1	–	3
2	PCC	IO01	Analog and Digital Electronics	3	1	–	4
3	PCC	IO02	Data Structure & Algorithm	2	1	–	3
4	PCC	IO03	Introduction to IoT	3	–	–	3
5	HSMC	HS03	Innovation and Creativity	–	–	2	1
6	LC	IO01(P)	Analog and Digital Electronics Lab	–	–	2	1
7	LC	IO02(P)	Data Structure & Algorithm Lab	–	–	2	1
8	LC	IO03(P)	Introduction to IoT Lab	–	–	4	2
9	LC	IO04(P)	Programming Practices Lab (Java)	–	–	4	2
10	LLC	LLC02	Liberal Learning Course –II	–	–	2	1
11	MLC	MLC 01	Professional Laws, Ethics, Gender, Human value and Harmony	1	–	–	0
Total Academic Engagement and Credits				**11**	**3**	**14**	**21**
				28			

Note:

- **Liberal Learning Course-II , LLC02 (Any One Course from NCC/NSO/NCA)**
  - **A. NCC**
  - **B. NSO**
    - Anyone Sports at State Level
  - **C. NCA**
    - (A) Music
    - (B) Dance
    - (C) Photography
    - (D) Cinematography
    - (E) Podcasting
    - (F) Theatre
    - (G) Painting

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III Semester

MA-04	Discrete Structure	2L:1T:0P(3hrs.)	3credits

Prerequisite: Nil

Course Objective:

This course introduces the applications of discrete mathematics in the field of computer science. It covers sets, logic, proving techniques, combinatory, functions, relations, Graph theory and algebraic structures.

Course Contents:

Module 1: (10hrs.)

Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job- Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

Module 2: (8hrs.)

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Module 3: (8hrs.)

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers.

Module 4: (08hrs.)

Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs.

Module 5:(10hrs.)

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms, linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, generating functions, Solution by method of generating functions.

Course Outcome:

1. Describe sets, relations, functions and mathematical induction.
2. Formulate and solve Groups and Rings problems
3. Apply Propositional logic and finite state automata to solve problems
4. Apply the Concepts of Graph theory to Solve real world problems.
5. Formulate and solve Poset and recurrence relations.

List of Text/Reference Books:

1. C. L. Liu, “Elements of Discrete Mathematics” Tata McGraw-Hill Edition.
2. J Trembley, R Manohar; “Discrete Mathematical Structure with Application CS”, 2001 McGraw Hill.
3. Kenneth H. Rosen, “Discrete Mathematics and its applications”, 7th Ed., McGraw Hill.
4. R K Bisht, H S Dhami, “Discrete Mathematics”,2015, Oxford University Press
5. P C Biswal, “Discrete Mathematics & Graph Theory”, 4th ed., PHI

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III Semester

IO01	Analog and Digital Electronics	3L:1T:0P(4hrs.)	4credits

Prerequisite: - Engineering Physics

Course Objective:

1. The course is designed to acquire a basic knowledge of analog and digitallogic levels and application of different electronics circuits.
2. To impart how to design analog and digital circuits.
3. To understand the basic software tools for the design and implementation of digital circuits and systems.

Course Contents:

Module 1 (8 Hrs.)

Semiconductor device: -Theory of P-N junction, temperature dependence and break down Characteristics, junction capacitances, Zener diode, Varactor diode, PIN diode, Photo diode, Transistors BJT, working principal, characteristics, and region of operation, Load line biasing methods, Transistor as an amplifier, gain, bandwidth, frequency response, various FET, MOSFET

Module 2 (8 Hrs.)

Feedback amplifier, negative feedback, Operational amplifier characteristics, slew rate, bandwidth, offset voltage, basic current, application of Op-amp, voltage to current and current to voltage converters, comparators, Schmitt trigger, 555 timer and its application- Multivibrators.

Module 3 (8 Hrs.)

Combinational logic circuits: Adder, subtractor, Carry Look Ahead adder, BCD adder, Binary\decoder/encoder, code-converters, designing of combinational Circuits. Sequential logic: flip flops, D, T, S-R, J-K, race around condition and its remedies, Edge Level triggered circuits, Shift registers, Asynchronous and synchronous counters, their types and state diagrams.

Module 4 (8 Hrs.)

Logic Families and its Specifications: RTL, DTL, TTL, ECL, CMOS, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices, PLDs

Module 5 (8 Hrs.)

Digital-to-analog conversion (DAC) - R-2R ladder Type, Weighted converter using Op-amp and transistor. Analog-to-digital Conversion (ADC) -Counter type, Successive Approximations Register, Flash type.

Course Outcomes:

Students earned credits will develop ability to

1. Illustrate basic postulates of Boolean algebra. To design Boolean functions by applying the methods for simplifying Boolean expressions.
2. Illustrate fundamental concepts and design of digital combinational circuits.
3. Illustrate the basic methods for the design of sequential circuits.
4. Illustrate the operation of Logic families and analyze and design of programmable logic devices.
5. Illustrate the basic operation of ADC and DAC.

List of Textbooks/ Reference Books:

1. R. P. Jain, “Modern digital Electronics”, Tata McGraw Hill, 4th edition, 2009.
2. W. H. Gothmann, “Digital Electronics- An introduction to theory and practice”, PHI, 2nd edition, 2006.
3. D. V. Hall, “Digital Circuit and System”, Tata McGraw Hill, 1989.
4. S. Salivahanan S. Arivazhagan, “Digital Circuits and Design”, VikasPublishing.
5. M. Morris Mano, “Digital Logic and Computer Design”, Pearson India Education, 1st edition, 2012
6. Douglas Perry, “VHDL Programming by example”, McGraw Hill, 1 st edition, 2002.
7. J. Bhaskar, “VHDL: Primer”, P T R Prentice Hall, 3rd edition, 1999.
8. NPTEL Course Link:https://nptel.ac.in/courses/106/108/106108099/

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[Computer Science & Engineering (IOT)]

III Semester

IO02	**Data Structure & Algorithm**	**2L:1T:0P(3hrs.)**	**3credits**

Pre requisite: C language

Course Objective:

The objective of this course is to understand different types of data structures and algorithms used in programs.

Course Contents:

Module 1: (10hrs.)

Review of C programming language. Introduction to Data Structure: Concepts of Data and Information, Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Analysis of algorithm: Time Complexity and Space Complexity, Data structures operations and its cost estimation, Basic of Asymptotic notation. Introduction to linear data structures- Arrays, String, representation & Operations, Linked List: Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.

Module 2: (10hrs.)

Stacks: Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Queue simulation, Application of queues.

Module 3: (10hrs.)

Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search, AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B*tree and red-black tree.

Module 4: (08hrs.)

Graphs: Introduction, Classification of graph: Directed and Undirected graphs, etc., Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS),Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.

Module 5:(08hrs.)

Sorting: Introduction, Classification of sorting method, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods. Case Study: Application of various data structures in operating systems, DBMS etc.

Course Outcome:

1. Understand basic data structures such as arrays, linked lists, stacks and queues
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. Understand the basic operations of trees and its types.
4. Understand the basic concept of graph and its operations.
5. Demonstrate and implement searching sorting algorithms.

List of Text/Reference Books:

1. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures" Computer Science Press.
2. Mark Allen Weiss "Algorithms, Data Structures, and Problem Solving with C++", Pearson Education (US) 1996
3. R.G. Dromey"HowtoSolveitbyComputer",2ndImpressionby,PHI
4. AM Tanenbaum, Y Langsam & MJ Augustein, "Data structure using C and C++", 2nd Ed., 2006 , Prentice Hall India.
5. Robert Kruse, Bruse Leung, "Data structures & Program Design in C", 2nd Ed., 1997, Pearson Education.
6. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education.
7. Richard, Gilberg Behrouz, Forouzan ,"Data structure – A Pseudocode Approach with C", 2nd Ed., Thomson press.

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[Computer Science & Engineering (IOT)]

III Semester

IO03	Introduction to IoT	3L: 0T: 0P (3 hrs.)	3 credits

Pre requisite: Basic electronics and computer

Course Objective: The objective of this course is to understand internet of things and how it's different from other systems, and components of IoT.

Course Contents:

Module1: (8hrs.)
Definition and Characteristics of IoT, embedded system vs IoT, Overview of Governance, Privacy and Security Issues, Applications of IoT, IntroductiontoMicroprocessors,8-bitvs16-bitprocessors.

Module2: (10hrs.)
Basic Structure of Computer: Structure of Desktop Computers, CPU: General Register Organization Memory Register, Instruction Register, Control Word, Stack Organization, Instruction Format, ALU, I/O System, bus, CPU and Memory Program Counter, Bus Structure, Register Transfer Language-Bus and Memory Transfer, addressing modes. Control Unit Organization: Basic Concept of Instruction, Instruction Types, Micro Instruction Formats, Fetch and Execution cycle, Hardwired control unit, Micro- programmed Control unit micro program sequencer Control Memory, Sequencing and Execution of Micro Instruction.

Module3: (10hrs.)
I/O Organization: I/O Interface–PCI Bus, SCSI Bus, USB, Data Transfer: Serial, Parallel, Synchronous, Asynchronous Modes of Data Transfer, Direct Memory Access (DMA), I/O Processor.

Module4: (8hrs.)
Memory Organization: Main memory-RAM, ROM, Secondary Memory –Magnetic Tape, Disk, Optical Storage, Cache Memory: Cache Structure and Design, Mapping Scheme, Replacement Algorithm, Improving Cache Performance, Virtual Memory, memory management hardware.

Module5: (10hrs.)
Microcontroller, Features, Microcontrollers vs Microprocessors, GPIO, UART, USB ports and connectors: Types, Standards and Speeds, Multiprocessors: Characteristics of Multiprocessor, Concept of Pipelining, Vector Processing, Array Processing, RISC And CISC

Course Outcome:

1. Understand basic of Internet of Things, its governance and applications.
2. Introduce the concept of processors and importance of memory.
3. Understand the basic of computer organization.
4. Understand the concept of control unit.
5. Introduce the concept of microcontroller and its features.

List of Text/Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Peter Waher, 'Learning Internet of Things', Packt Publishing, 20153. Editors Ovidiu Vermesan
3. Morris Mano: Computer System Architecture, PHI.
4. William Stallings: Computer Organization and Architecture, PHI
5. The 8051Microcontroller and Embedded Systems using assembly and C”, Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006/ Pearson,2006.
6. NPTEL Course Link:https://nptel.ac.in/courses/106/105/106105166/

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III Semester

HS03	**Innovation and Creativity**	**0L:0T:2P(2hrs.)**	**1credit**

Prerequisite: Nil

Course Objective:

1. To give an insight into creativity and innovation
2. To develop an appreciation for innovation among students, and
3. To enhance sensitivity to creativity and innovation

Course Contents:

Module 1: Overview of Creativity(08hrs.)

Meaning and concept of creativity, Process, Nature and characteristics of creativity,Factors affecting creativity.

Module 2: Overview of Innovation(08hrs.)

Difference between Invention & Innovation, Importance & Principles of Innovation, Process of Innovation, Domain wise Innovations, How to safe guard innovations.

Module 3: Tools for Innovation(08hrs.)

Traditional V/s Creative Thinking, Individual Creativity Techniques: Meditation, Self-Awareness, & Creative Focus Group Creative Techniques: Brain Storming, off The Wall Thinking

Module 4: Evaluation of Effectiveness of Innovation(08hrs.)

Legal Aspects like IPR, patent filing, copyright, Patenting Procedures, Design patents etc.

Module 5:Innovation Management(08hrs.)

Concept, Scope, Characteristics, Evolution of Innovation Management, Significance, Factors Influencing Innovation. Organizational Aspects- Economic Aspects like venture capital, angel investors.

Case Studies on Innovation business ideas i.e. RedBus, Flipkart, Ola, Big Basket, Patented products, Chemical products and Materials, special patents of procedures.

Course Outcomes:

After completion of the course the student will be able to

1. Analyze creativity concepts and principles & process for problem solving.
2. Understand innovation & apply creativity for innovation.
3. Understand innovative products or services.
4. Apply design thinking tools techniques for IPR.
5. Understand the concept of Innovation Management.

Textbooks:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking", TataMcGraw Hill, First Edition,2019.
2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly, 2017.

Reference Books:

1. Michael G. Luchs, Scott Swan, Abbie Griffin, "Design Thinking – New Product Essentials from PDMA", Wiley, 2015.
2. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

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III Semester

IO01(P)	**Analog and Digital Electronics Lab**	**0L:0T:2P(2hrs.)**	**1credit**

Prerequisite: Engineering Physics

Course Objective: The course is designed to acquire basic knowledge of analog and digital logic levels and the application of different electronics circuits. To impart how to design analog and digital Circuits. To understand the basic software tools for the design and implementation of digital circuits and systems.

Course Contents:

Module 1: (04hrs.)
Semiconductor device: - Theory of P-N junction, Zener diode, Varactor diode, PIN diode, Photo diode, Transistors BJT, FET and MOSFET

Module 2: (04hrs.)
Feedback amplifier, Operational amplifier characteristics, voltage to current and current to voltage converters, 555 timer and its application- Multivibrators

Module 3: (04hrs.)
Combinational logic circuits: Adder, subtractor, Carry Look Ahead adder, BCD adder, Binary \decoder/encoder, code-converters, designing of combinational Circuits.
Sequential logic: flip flops, D, T, S-R, J-K, Shift registers, Asynchronous and synchronous counters, their types and state diagrams.

Module 4: (04hrs.)
Logic Families and its Specifications: RTL, DTL, TTL, ECL, CMOS, FPGA, Logic implementation using Programmable Devices, PLDs

Module 5:(08hrs.)

Digital-to-analog conversion (DAC)-R-2R ladder Type, Weighted converter using Op-amp and transistor. Analog-to-digital Conversion (ADC)-Countertype, Successive Approximations Register, Flash type

Course Outcome:

Students earned credits will develop ability to

1. Illustrate basic postulates of Boolean algebra. To design Boolean functions by applying the methods for simplifying Boolean expressions.
2. Illustrate fundamental concepts and design of digital combinational circuits.
3. Illustrate the basic methods for the design of sequential circuits.
4. Illustrate the operation of Logic families and analyze and design of programmable logic devices
5. Illustrate the concept of ADC and DAC.

List of Text/Reference Books:

1. R.P.Jain, "Modern digital Electronics", Tata McGraw Hill,4th edition, 2009.
2. W. H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.
3. D. V. Hall, "Digital Circuit and System", Tata Mc Graw Hill, 1989.
4. S. Salivahanan & S. Arivazhagan, "Digital Circuits and Design", Vikas Publishing.
5. M.Morris Mano,"Digital Logic and Computer Design", Pearson India Education, 1st edition, 2012
6. Douglas Perry, "VHDL Programming by example", McGraw Hill, 1st edition, 2002.
7. J. Bhaskar, "VHDL: Primer", PTR Prentice Hall, 3rd edition, 1999.
8. NPTEL Course Link: https://nptel.ac.in/courses/106/108/106108099/

List of Experiment:

1. To study and implement V-I characteristics of diode. (Installation and Analysis)
2. To study and implement Zener diode Voltage regulator.
3. To study and implement Half wave rectification.
4. To study and implement Full wave rectification.
5. To study and implement BJT as an amplifier.
6. Verification and interpretation of truth table for AND,OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates.
7. Design and Implement Half Adder and Half subtractor.
8. Design and Implement Multiplexer, De-multiplexer.
9. Design and Implement BCD to Gray Code Converters.
10. Design and Implement Encoder, Decoder.
11. Verify the truth table of RS, JK, T and D flip-flops using NAND & NOR gates.

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[Computer Science &Engineering (IOT)]

III Semester

IO02(P)	**Data Structure &Algorithm Lab**	**0L:0T:2P(2hrs.)**	**1credit**

Pre requisite: C language

Course Objective:

The objective of this course is to understand different types of data structures and algorithms used in program.

Course Contents:

Module 1: (04hrs.)

Arrays, String, &their representation & Operations. Linked List: Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc.

Module 2:(04hrs.)

Stacks: Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion, Example of recursion.

Module 3:(04hrs.)

Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dequeue and Priority Queue, Queue simulation, Application of queues.

Module 4:(04hrs.)

Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search, Graphs: Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS).

Module 5:(08hrs.)

Sorting: Introduction, Classification of sorting method, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods.

Course Outcome:

1. Understand basic data structures such as arrays, linked lists, stacks and queues
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. Understand the basic operations of trees and its types.
4. Understand the basic concept of graph and its operations.
5. Demonstrate and implement searching sorting algorithms.

List of Text/Reference Books:

1. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures" Computer Science Press.
2. Mark Allen Weiss "Algorithms, Data Structures, and Problem Solving with C++", Pearson Education (US) 1996
3. R.G. Dromey"HowtoSolveitbyComputer",2nd Impression by,PHI
4. AM Tanenbaum, Y Langsam & MJ Augustein, "Data structure using C and C++", 2nd Ed., 2006 , Prentice Hall India.
5. Robert Kruse, Bruse Leung, "Data structures & Program Design in C", 2nd Ed., 1997, Pearson Education.
6. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education.
   Richard, Gilberg Behrouz, Forouzan ,"Data structure – A Pseudo code Approach with C", 2nd Ed., Thomson press.

List of Experiments:

Write a Program:

1. To perform insertion and deletion operations on array.
2. To perform multiplication operation on matrix
3. To implement single linked list.
4. To implement doubly linked list.
5. To calculate factorial of number using recursion.
6. To demonstrate static implementation of stack.
7. To demonstrate dynamic implementation of stack.
8. To demonstrate static implementation of Linear queue.
9. To demonstrate dynamic implementation of Linear queue.
10. To implement circular queue.
11. To implement binary search tree.
12. To perform BFS and DFS operations on graph.
13. To perform binary search operation.
14. To perform sorting operation using bubble sort.
15. To perform sorting operation using insertion sort.

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[Computer Science & Engineering (IOT)]

III Semester

IO03(P)	Introduction to IoT Lab	0L:0T:4P(4hrs.)	2credits

Pre requisite: Basic electronics and computer

Course Objective:

Students to be familiarize the basic principles of IoT and computer architecture, Design and Multiprocessing, Types of data transfer, Concept of semiconductor memories which is useful for research work in field Computer System.

Course Contents:

Module 1:(04hrs.)
Definition and Characteristics of IoT, embedded system vs IoT, Overview of Governance, Privacy and Security Issues, Applications of IoT,

Module 2:(04hrs.)
Introduction to Binary number systems, 1's & 2's Complement, Arithmetic Operations, Half adder, Half subtractor, Full Adder and Full Subtractor.

Module 3:(04hrs.)
Introduction to Assembly Language, Programming Arithmetic and Logic Operations, Shift Operations, Program Loops.

Module 4:(04hrs.)
Memory Hierarchy, Main Memory, Types of Memory, Memory Allocation Methods, Virtual Memory, Page Replacement Algorithms.

Module 5:(08hrs.)
Characteristics of Multiprocessor, RISC and CISC, Study of Multi core Processor–Intel, AMD.

Course Outcome:

1. Explain the basic structure & components of the computer system, 8085 Micro Processor.
2. Demonstrate the concepts of computer arithmetic.
3. Demonstrate the concepts of Assembly Language.
4. Illustrate memory organization and memory management techniques.
5. State the core concepts of multiprocessors.

List of Text/Reference Books:

1. Morris Mano, "Computer System Architecture"3rd Ed., 2007,PHI
2. Alan Clements: "Computer Organization and Architecture", 2012,Cengage Learning
3. Subrata Ghosal: "Computer Architecture and Organization", 2011, Pearson Education
4. William stalling, "Computer Organization and Architecture" 10th Ed., 2016, Pearson Education
5. M. Usha, T. S. Shrikant:"Computer System Architecture & Organization", 2019, WilleyIndia
6. Chaudhuri, P. Pal: "Computer Organization and Design", 3rd Ed. PHI

List of Experiments:

1. Study of Arduino Uno Board, Installation of Arduino IDE
2. Program that reads an analog value from a potentiometer and display it to serial monitor.
3. Program that reads the blink rate (0 to 9) from the serial monitor and blink function decide the delay (blink rate*100) of inbuilt LED of Arduino Uno Board
4. Case study of Desktop Computers
5. Write program to demonstrate Flags in microprocessor 8085.
6. Write a program to add the contents of memory locations 4000H and 4001H and place the result in memory location 4002H.
7. Write a program to multiply two 8-bit numbers stored in memory locations 2200H and 2201H by repetitive addition and store the result in memory locations 2300H and 2301H.
8. Program for simulate memory allocation strategies (First fit, Best fit, Worst fit).
9. Programs for page replacement algorithms.
10. Case study of RISC and CISC.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering
Bachelor of Technology (B.Tech.)
[Computer Science & Engineering (IOT)]
III Semester

IO04(P)	**Programming Practices Lab (Java)**	**0L:0T:4P(4 hrs.)**	**2credits**

Prerequisite: C and C++ language

Course Objective:

Interpret good knowledge in C++ programming language and enable them to build Programs.

Course Contents:

Module 1:(04hrs.)
Introduction of C++, Programming paradigms, Language translator, Structure of C++ program. Declaration, Expression, and statements: Data types, Variables, Constants, Operator and expression, Operator precedence and associativity & Control statements.

Module 2:(04hrs.)
Array: Declaration & Initialization, 2-D Array & Multidimensional Array. Function: Declaration, Definition and call, Inline function, Main function argument, Reference variable, Function overloading, Default argument, Parameter passing, Recursion, Scope of variable, Return-by-value and Return-by-reference.

Module 3:(04hrs.)
Class: Class, Members, Constructor and destructor, Copy constructor, parameterized constructor, Static member, Scope of class names. Dynamic memory management: Operators new and delete.

Module 4:(04hrs.)
Introduction, Polymorphism, Overloading, Parametric and inclusion polymorphism Inheritance: inheritance and Types of inheritance, Virtual base class, Virtual function, Abstract class, Overriding and hiding, Dynamic binding of functions.

Module 5:(08hrs.)
Class template, Member function inclusion, Function template, Specialization, Inheritance, Namespace. Concept of exception handling, Catch block, Nested try-catch block, Conditionexpressioninthrowexpression,Constructor&destructor,Runtimestandardexception.Standardlibraryfunction,Inputandoutput,Iostreamclasshierarchy,Classios,otherstreamclasses,Basics of file handling.

Course Outcome:

1. Explain the basic structure & components of the computer system, 8085 Micro Processor.
2. Demonstrate the concepts of computer arithmetic.
3. Demonstrate the concepts of Assembly Language.
4. Illustrate memory organization and memory management techniques.
5. State the core concepts of multiprocessors.

List of Text/Reference Books:

1. Morris Mano, "Computer System Architecture" 3rd Ed. 2007, PHI
2. Alan Clements:"Computer Organization and Architecture", 2012, Cengage Learning
3. Subrata Ghosal: "Computer Architecture and Organization", 2011, Pearson Education
4. William stalling, "Computer Organization and Architecture" 10th Ed., 2016, Pearson Education
5. M. Usha, T. S. Shrikant: "Computer System Architecture & Organization", 2019, Willey India
6. Chaudhuri, P. Pal: "Computer Organization and Design", 3rd Ed. PHI

List of Experiments:

1. Case study of Desktop Computers
2. Study of Multiplexer and Demultiplexer
3. Write Program to demonstrate Flags in microprocessor 8085.
4. Study of Half Adder and Half Subtractor.
5. Study of Full Adder and Full Subtractor.
6. Write a program to add the contents of memory locations 4000H and 4001H and place the result in memory location 4002H.
7. Write a program to multiply two 8-bit numbers stored in memory locations 2200H and 2201H by repetitive addition and store the result in memory locations 2300H and 2301H.
8. Program for simulate memory allocation strategies(First fit, Best fit, Worst fit).
9. Programs for page replacement algorithms.
10. Case study of RISC and CISC.