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**ADAMAS UNIVERSITY**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT**

**OF**

**COMPUTER SCIENCE AND ENGINEERING**

**Course Structure**

**For**

**Bachelor of Science (B.Sc.)**

**in**

**Computer Science**

**W.e.f. AY 2020-21**

**FIRST YEAR**

|  |  |  |  |  |  |  |  |  |
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| **SEMESTER -I** | | | | | | | | |
| **Sl. No** | **Type** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Contact**  **Hrs/wk** | **Credits** |
|  | THEORY | CSE11301 | COMPUTER PROGRAMMING | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | HEN11056 | COMMUNICATIVE ENGLISH | 2 | 0 | 0 | 2 | 2 |
|  | THEORY | MTH11211 | LINEAR ALGEBRA | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | CSE11302 | COMPUTER ORGANIZATION | 3 | 1 | 0 | 4 | 4 |
|  | PRACTICAL | CSE12303 | COMPUTER PROGRAMMING LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL | CSE12304 | COMPUTER ORGANIZATION LAB | 0 | 0 | 3 | 3 | 2 |
| **Total** | | | | **11** | **3** | **6** | **20** | **18** |

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| **SEMESTER -II** | | | | | | | | |
| **Sl. No** | **Type** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Contact**  **Hrs/wk** | **Credits** |
|  | THEORY | MTH11518 | DISCRETE MATHEMATICS | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | SDS11502 | PROBABILITY & STATISTICS | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | EVS11108 | ENVIRONMENTAL SCIENCE | 2 | 0 | 0 | 2 | 2 |
|  | THEORY | CSE11305 | DATA STRUCTURES | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | CSE11306 | PROGRAMMING IN JAVA | 3 | 1 | 0 | 4 | 4 |
|  | PRACTICAL | CSE12307 | DATA STRUCTURES LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL | CSE12308 | PROGRAMMING IN JAVA LAB | 0 | 0 | 3 | 3 | 2 |
| **Total** | | | | **14** | **4** | **6** | **24** | **22** |

**Total Credit (First Year): 40**

**SECOND YEAR**

|  |  |  |  |  |  |  |  |  |
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| **SEMESTER -III** | | | | | | | | |
| **Sl. No** | **Type** | **Course Code** | **Subject Name** | **L** | **T** | **P** | **Contact Hrs/week** | **Credits** |
|  | THEORY | ECS32191 | OPERATING SYSTEM | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS32193 | DESIGN AND ANALYSIS OF ALGORITHM | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS32195 | COMPUTER ARCHITECTURE | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS32197 | WEB DESIGN AND PROGRAMMING | 3 | 1 | 0 | 4 | 4 |
|  | PRACTICAL | ECS32291 | OPERATING SYSTEM LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL | ECS32293 | DESIGN AND ANALYSIS OF ALGORITHM LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL | ECS32297 | WEB PROGRAMMING LAB | 0 | 0 | 3 | 3 | 2 |
| **Total** | | | | **12** | **4** | **9** | **25** | **22** |

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| **SEMESTER -IV** | | | | | | | | |
| **Sl. No** | **Type** | **Course Code** | **Subject Name** | **L** | **T** | **P** | **Contact Hrs/week** | **Credits** |
|  | THEORY | ECS32192 | DATABASE MANAGEMENT SYSTEM | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS32194 | SOFTWARE ENGINEERING | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS32196 | COMPUTER NETWORKS | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS32198 | THEORY OF COMPUTATION | 3 | 1 | 0 | 4 | 4 |
|  | PRACTICAL | ECS32292 | DATABASE MANAGEMENT SYSTEM LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL | ECS32294 | SOFTWARE ENGINEERING LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL | ECS32296 | COMPUTER NETWORKS LAB | 0 | 0 | 3 | 3 | 2 |
| **Total** | | | | **12** | **4** | **9** | **25** | **22** |

**Total Credit (Second Year): 44**

**THIRD YEAR**

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| **SEMESTER -V** | | | | | | | | |
| **Sl. No** | **Type** | **Course Code** | **Subject Name** | **L** | **T** | **P** | **Contact Hrs/week** | **Credits** |
|  | THEORY | ECS33185 | ARTIFICIAL INTELLIGENCE | 3 | 1 | 0 | 4 | 4 |
|  | THEORY | ECS33187 | WEB TECHNOLOGY | 3 | 1 | 0 | 4 | 4 |
|  | THEORY |  | ELECTIVE – I | 3 | 0 | 0 | 3 | 3 |
|  | THEORY |  | ELECTIVE – II | 3 | 0 | 0 | 3 | 3 |
|  | PRACTICAL |  | ELECTIVE – I LAB | 0 | 0 | 3 | 3 | 2 |
|  | PRACTICAL |  | ELECTIVE – II LAB | 0 | 0 | 3 | 3 | 2 |
| **Total** | | | | **12** | **2** | **6** | **20** | **18** |

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| **SEMESTER -VI** | | | | | | | | |
| **Sl. No** | **Type** | **Course Code** | **Subject Name** | **L** | **T** | **P** | **Contact Hrs/week** | **Credits** |
|  | THEORY | ECS33186 | COMPUTER GRAPHICS | 3 | 1 | 0 | 4 | 4 |
|  | THEORY |  | ELECTIVE – III | 3 | 0 | 0 | 3 | 3 |
|  | THEORY |  | ELECTIVE – IV  (INDUSTRY ORIENTED CERTIFICATION COURSE) | 0 | 0 | 0 | 0 | 3 |
|  | PROJECT | ECS33408 | PROJECT/DISSERTATION | 0 | 0 | 12 | 12 | 8 |
| **Total** | | | | **6** | **1** | **12** | **19** | **18** |

**Total Credit (Third Year): 36**

**Total Credits (Over three years): 40+44+36 = 120**

**LIST OF ELECTIVES:**

**ELECTIVE – I (Theory)**

1. Image and Video Processing (ECS33189)
2. Cryptography & Cyber Security (ECS33191)
3. Cloud Computing (ECS33193)

**ELECTIVE – I (Lab)**

1. Image and Video Processing Lab (ECS33289)
2. Cryptography & Cyber Security Lab (ECS33291)
3. Cloud Computing Lab (ECS33293)

**ELECTIVE – II (Theory)**

1. Computer Vision (ECS33195)
2. Internet of Things (IoT) (ECS33197)
3. Machine Learning (ECS33199)

**ELECTIVE – II (Lab)**

1. Computer Vision Lab (ECS33295)
2. Internet of Things (IoT) Lab (ECS33297)
3. Machine Learning Lab (ECS33299)

**ELECTIVE – III (Theory)**

1. Big Data Analytics (ECS33188)
2. Artificial Neural Network and Deep Learning (ECS33190)
3. Computer Communication Theory (ECS33192)

**ELECTIVE – IV (Theory)**

1. Internet of Things (IOT) using Augmented Reality (AR) (ECS33194)
2. AWS / Azure Cloud Computing Course (ECS33196)
3. SAS Global Certification Course for Big Data Analytics (ECS33198)

* **VLSI Design and Embedded System course need to be offered by the Department of ECE**

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**ADAMAS UNIVERSITY**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT**

**OF**

**COMPUTER SCIENCE AND ENGINEERING**

**Syllabus**

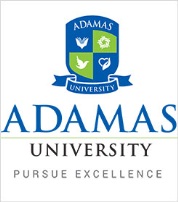
**For**

**Bachelor of Science (B.Sc.)**

**In**

**Computer Science**

**W.e.f. AY 2020-21**

**ADAMAS UNIVERSITY**

**B. Sc. in Computer Science**

**SEMESTER – I**

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| **COMPUTER PROGRAMMING** | | **CSE11301** | **3-1-0** | **4 Credits** | |
| **Module 1:**  **Basic Concepts of Programming:** Introduction to components of a Computer System (disks, memory, processor, where a program is stored and executed, operating systems, compilers, etc.), Idea of Algorithm: steps to solve logical and numerical problems, Representation of Algorithms: Flowchart/Pseudo code with examples, From Algorithms to Programs; source code, variables and memory locations, Syntax and Logical Errors in compilation, Object and Executable code | | | | | **[06]** |
|  |  | | | | |
| **Module 2:**  **Basics of C Programming :**Characters used in C, Identifiers, Keywords, Data type & sizes, Constants &Variables, Various Operators used such as Arithmetic Operators, Relational & Logical Operators, Increment & Decrement Operators, Assignment Operators, Conditional or Ternary Operators, Bitwise Operators & Expressions; Standard Input & Output, formatted input scanf( ), formatted output printf( ); Flow of Control, if-else, switch-case, Loop Control Statements, for loop, while loop, do-while loop, nested loop, break, continue, goto, label and exit( ) function | | | | | **[12]** |
|  | | | | | |
| **Module 3:**  **Functions and Pointers:** Definition of Function, Declaration or Prototype of Function, Various types of Functions, Call by Value, Call by Reference, Recursion, Tail Recursion, Definition of Pointer, Declaration of Pointer, Operators used in Pointer, Pointer Arithmetic, Functions with Pointer | | | | | **[14]** |
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| **Module 4:**  **Arrays and String:** Definition, Single and Multidimensional Arrays, Representation of Arrays - Row Major Order, and Column Major Order, Application of arrays – searching and sorting, Sparse Matrices and their representations. Definition of a String, Declaration of a String, Initialization of a String, Various String Handling Functions with example  **Structures and Unions:** Definition of a Structure, Declaration of a Structure & Structure Variable, Initialization of a Structure, Operators used in Structure, Structure within Structures, Union, Difference between a Structure and a Union  **Files:** Types of File, File Processing, Handling Characters, Handling Integers, Random File Accessing, Errors During File Processing | | | | | **[22]** |
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| **Module 5:**  **Overview of Stacks and Queues:** Introduction to Stack, Primitive operations on Stack, Real-life applications of Stack, Introduction to Queues, Primitive operations on Queues, Real-life applications of Queues. | | | | | **[06]** |

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| **Text Books:** |
| “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press. |
| **Reference Books:** |
| “Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company |
| “How to Solve it by Computer”, 2nd Impression by R. G. Dromey, Pearson Education |

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| **COMMUNICATIVE ENGLISH** | | | **HEN11056** | **2-0-0** | **2 Credits** | |
| **Module 1:**  Communication Level 1   * Basics of Communication * Means of Communication * Barriers of Communication | | | | | | **[5]** |
|  |  | | | | | |
| **Module 2:**  Grammar and Syntax Level 1   * Tense * Idioms * One Word Substitutes * Articles * Prepositions * Sentence-making * Voice Change * Synonyms and Antonyms | | | | | | **[6]** |
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| **Module 3:**  Reading and Listening Skills Level 1   * Active Listening * Types of Listening * Listening Exercises * Reading Exercises | | | | | | **[7]** |
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| **Module 4:**  Speaking Skills Level 1   * Introduction * Description * Narration * Extempore | | | | | | **[7]** |
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| **Module 5:**  Writing Skills Level 1   * Composition * Letter Writing—simple applications * Essay/ Paragraph writing (argumentative and descriptive) | | | | | | **[5]** |
| **Text Books:** | | | | | | |
| 1 | | Spoken English and Functional Grammar. P. C. Das. | | | | |
| 2 | | Essential Grammar in Use. Raymond Murphy. | | | | |
| **Reference Books:** | | | | | | |
| 1 | | A Practical Course in English Pronunciation. J Sethi, KamleshSadanand and D.V. Jindal. | | | | |
| 2 | | English for Technical Communication. NP Sudarshana and C Savitha. | | | | |

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| **LINEAR ALGEBRA** | **MTH11211** | **3-1-0** | **4 Credits** |

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| **Module 1:**  Matrices of real and complex numbers, algebra of matrices, symmetric and skew-symmetric matrices. Hermitian and skew-Hermitian matrices, orthogonal matrices, definition & basic properties of determinants, minors and cofactors, adjoint of a square matrix, invertible matrix, non-singular matrix, inverse of an orthogonal matrix, elementary operations on matrices, echelon matrix, rank of a matrix, determination of rank of a matrix, elementary matrices. | | | **[14]** |
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| **Module 2:**  Systems of linear equations and the invariance of its solution set under row-equivalence, row reduction and echelon forms, the matrix equation AX= B, solution sets of linear systems, applications of linear systems. | | | **[10]** |
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| **Module 3:**  Row space and column space of matrix, row rank and column rank of matrix, equality of row rank, column rank and rank of a matrix, linear system of equations, solution space, Solutions of system of equations by Matrix method, Rank-Nullity theorem. | | | **[12]** |
| **Module 4:**  Eigenvalues and eigenvectors of square matrices, Cayley-Hamilton theorem, simple properties of eigenvalues and eigenvectors, AM and GM., Eigen values, Eigen Vectors and Characteristic Equation of a matrix, the dimension of the solution space of a system of independent homogeneous linear equations. | | | **[10]** |
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| **Module 5:**  **Vector space & Linear Transformation:** Definitions and examples of vector spaces, subspaces, linear combination of vectors, linear span, dimension of a vector space, linear independence, basis and dimension, dimension of subspaces. Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation. | | | **[14]** |
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| **Text Books:** | | | |
| 1 | S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999. | | |
| 2 | S. K. Mapa, Higher Algebra- Abstract and Linear, revised Ninth Edition, Sarat Book House, 2003. | | |
| 3 | R. Larson, Elementary Linear Algebra, 8th Edition, Cengage Learning ,2017 | | |
| **Reference Books:** | | | |
| 1 | A. Kurosh, Higher Algebra, Mir Publisher. | | |
| 2 | Hoffman and Kunze, Linear algebra, Pearson. | | |
| 3 | John Smith, Modern Engineering Mathematics, 5th Edition, Pearson Education. | | |

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| **COMPUTER ORGANIZATION** | | **CSE11302** | **3-1-0** | **4 Credits** | |
| **Module 1:**  **Basic Structure of Computers (Qualitative Discussion):**  Computer Types, Basic Functional Units, Basic Operational Concept, Bus Structure, Software, Performance, Multiprocessor and Multicomputer, IAS Computer, Historical perspectives. | | | | | **[05]** |
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| **Module 2:**  **Register Transfer and Micro-operation**:  Register Transfer Language, Register Transfer, Bus and Memory Transfers, Three State Bus Buffers, memory Transfer, Arithmetic and Logical micro-operations, Shift and Arithmetic shifts. | | | | | **[05]** |
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| **Module 3:**  **Basic Computer Organization and Design**:  Instruction Codes, Stored Program Organization, Indirect Address, Computer Registers, Common Bus System, Computer Instruction, Timing and Control, Instruction Cycle, fetch Decode, Register Reference Instructions, Memory Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic. | | | | | **[05]** |
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| **Module 4:**  **CPU Organization**: Arithmetic and Logic Unit (ALU)- Combinational ALU, 2'S Complement Addition, Subtraction Unit, Booths Algorithm for Multiplication, Division Hardware using Restoration Division Algorithm. General register organization, Control Word, Accumulator Based, Register Based, Stack Type CPU organization. | | | | | **[06]** |
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| **Module 5:**  **Control Unit**: Hardwired Control Unit, Micro-programmed Control Unit: Control memory, Address Sequencing, conditional branching, mapping of instructions, subroutine, Design of Control Unit | | | | | **[07]** |
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| **Module 6:**  **CPU Registers:** Program Counter, Stack Pointer Register, Memory Address Register, Instruction Register, Memory Buffer Register, Flag registers, Temporary Registers. | | | | | **[06]** |
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| **Module 7:**  **Instructions:** Operational Code, Operands, Zero, One, Two and Three Address Instruction, Instruction Types, Addressing modes, Data Transfer and Manipulation instructions, Program control instructions. | | | | | **[03]** |
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| **Module 8:**  **CISC and RISC processors**: Introduction, relative merits and De-merits. | | | | | **[03]** |
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| **Module 9:**  **Input / Output Organization**: Polling, Interrupts, subroutines, Memory mapped IO, IO mapped IO, DMA, I/O Bus and Protocol, SCSI, PCI, USB, Bus Arbitration. | | | | | **[02]** |
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| **Module 10:**  **Computer Peripherals**: VDU, Keyboard, Mouse, Printer, Scanner (Qualitative approach). | | | | | **[08]** |
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| **Module 11:**  **Memory:** (Primary memory: ROM, PROM, EPROM, EEPROM, Flash memory, RAM: SRAM, DRAM, Asynchronous DRAMs, Synchronous DRAMs, Structure of Larger Memories, RAMBUS Memory, Cache Memory: Mapping Functions, Replacement Algorithms, interleaving, Hit and Rate penalty, Virtual memories, Address Translation, Memory Management requirements, Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems. | | | | | **[10]** |

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| **Text Books:** | |
| 1 | “Computer Organization and Design: The Hardware/Software Interface”, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier. |
| 2 | “Computer Organization and Embedded Systems”, 6th Edition by CarlHamacher, McGraw Hill Higher Education. |
| **Reference Books:** | |
| 1 | “Computer Architecture and Organization”, 3rd Edition by John P. Hayes, WCB/McGraw-Hill |
| 2 | “Computer Organization and Architecture: Designing for Performance”, 10th Edition by William Stallings, Pearson Education. |
| 3 | “Computer System Design and Architecture”, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education |

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| **COMPUTER PROGRAMMING LAB** | **CSE12303** | **0-0-3** | 1. **Credits** |

**List of Programs:**

1. Familiarization with LINUX commands and vi editor.
2. Programs to demonstrate Decision Making, Branching and Looping, Use of break and continue statement etc.
3. Implementation involving the use of Arrays with subscript, String operations and pointers.
4. Implementation involving the use of Functions and Recursion.
5. Implementation involving the use of Structures and Files.

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| **COMPUTER ORGANIZATION LAB** | **CSE12304** | **0-0-3** | **2 Credits** |

(1). Construct an Arithmetic Unit capable of performing 4-bit subtraction and Addition using 2's complement method. Use Parallel Adders and other necessary logic gates.

(2). Construct a logical Unit using logic gates capable of performing 4-bit, Bitwise ORing, ANDing, XORing and inversion.

(3). Construct an 4-bit ALU unit which can perform the following operation; Selection Function S1 S0 0 0 Addition 0 1 Subtraction 1 0 XOR-ing 1 1 Complement

(4). Construct a 2-bit Carry Look Ahead Adder using logic gates.

(5). Study and Construct a 1-digit BCD/Decimal adder using parallel adders and other necessary logic gates.

(6). Construct a Binary Multiplier using basic logic gates. 9 | Page

(7). Construct a Binary Divider using basic logic gates.

(8). Subtraction with 1's complement method using parallel adders and other necessary logic gates.

(9). Construction of BCD Subtractor with 9'S complement method using parallel adders and logic gates. (10). Construction of BCD Subtractor with 10'S complement method using parallel adders and logic gates.

(11). Binary magnitude comparators (up to 4 bits) using parallel adder and logic gates.

(12). Construct a Binary 4-bit and 8-bit adder using logic gates.

(13). Construct a Serial in Serial out 4-Bit register.

(14). Construct a 4-Bit Universal Shift register.

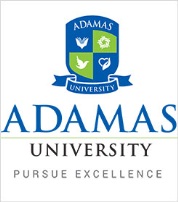
(15). Construct a 4 bit ring counter.

(16). Construct a 4 - Bit Johnson Counter.

(17) Construct RAM (4-bit) and extend it

(18). Horizontal and Vertical Cascading of Memory modules.

(19). Code converters using memory modules.

** ADAMAS UNIVERSITY**

**B. Sc. in Computer Science**

**SEMESTER – II**

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| **DISCRETE MATHEMATICS** | **MTH11518** | **3-1-0** | **4 Credits** |

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| **Module 1:**  Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a function, Sum and Product of Functions, Injective, Surjective and Bijective functions, Composition of Functions, Inverse of functions.  Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference.  Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive Definitions and Inductive proofs.  First-Order Predicate Calculus: Syntax, Semantics, Validity and Satisfiability | | | **[14]** |
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| **Module 2:**  Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.  The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.  Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Discrete Probability, Generalized Permutations and Combinations, Generating Permutations.  Advanced Counting Techniques: Recurrence relations and their solutions, Divide and Conquer Relations, Generating Functions, Inclusion-Exclusion Principle. | | | **[16]** |
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| **Module 3:**  Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semigroups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields, Boolean Algebra, Boolean Expression and Boolean Function, Identities of Boolean Algebra, Duality. Boolean Ring | | | **[15]** |
| **Module 4:**  Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Shortest Path Problems, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, Rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Spanning trees and Minimum Spanning Trees | | | **[15]** |
|  | |  | |
| **Text Books:** | | | |
| 1 | Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill. | | |
| 2 | Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co Inc. | | |
| 3 | C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill. | | |
| **Reference Books:** | | | |
| 1 | J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It’s Application to Computer Science”, TMG Edition, TataMcgraw-Hill | | |
| 2 | Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. | | |
| 3 | Schaum’s Outlines Series, Seymour Lipschutz, Marc Lipson, Discrete Mathematics, Tata McGraw - Hill. | | |

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| **Probability & Statistics** | **SDS11502** | **3-1-0** | **4 Credits** |

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| **Module 1**  **Statistics:** Definition, scope and limitation, presentation of data, diagrammatic and graphical representation of data, measures of central tendency, mean, median and mode, geometric and harmonic mean of group and ungrouped data and their limitations, concept of dispersion, absolute and relative measure of dispersion, range, variance, standard deviation , Coefficient of variation | | **[10]** |
|  |  | |
| **Module 2:**  **Correlation and Regression:** Scatter diagram, Karl-Pearson’s correlation, rank correlation and its uses of correlation in business regression, regression lines, regression coefficients, properties of regression coefficients and related problems. | | **[14]** |
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| **Module 3:**  **Probability theory and Random Variable:** Basic terminologies, classical and axiomatic definition of probability, tree diagrams, conditional probability, mutually exclusive events and independent events, Bayes’ theorem or inverse probability rule and its applications, random variable, discrete and continuous random variables, probability distribution of a random variable, Probability mass function and density function, expectation value, mean and variance of a random variable and theorems on expectation. | | **[8]** |
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| **Module 4:**  **Discrete and continuous probability distributions:** Discrete probability distributions: Binomial distribution, geometrical and Hypergeometric distributions, Poisson distribution, Negative Binomial distribution, continuous probability distribution: uniform, exponential and Normal distributions, Normal approximation to Binomial and Poisson distributions its applications. | | **[8]** |
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| **Text Books:** | |
| 1 | Goon, Gupta and Dasgupta, Fundamentals of Statistics, The world press private ltd., Kolkata. |
| 2 | V Sundarapandian, Probability, Statistics and Queuing Theory, PHI |
| **Reference Books:** | |
| 1 | S.P. Gupta, Statistical Methods, Sultan Chand & Sons |
| 2 | S K Nag, N K Nag, Statistics, Kalyani Publishers |
| 3 | Dipak Chatterjee, Elements of Statistics, Scitech publications. |

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| **ENVIRONMENTAL SCIENCE** | **EVS11108** | **2-0-0** | **2 Credits** |

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| **Module 1:**  **Basics of Environmental Sciences:** Definition, Scope and objectives, classification of environment, interrelationship between the components, ecology and ecosystem, structural and functional component of ecosystem, energy flow in an ecosystem, biogeochemical cycles, human impact on the environment, The IPAT equation, Ecological foot print, ecology and environment, ecosystem concept, energy flow in an ecosystem | **[6]** |
| **Module 2:**  **Energy resources:** Concept of energy, SI Units of Work, Heat and Power, World energy use, Energy consumption pattern in India and U.S., Environmental aspects of energy utilization Renewable and non-renewable sources; Fossil fuel: types, use and environmental impacts, Solar energy: Solar Radiation – Passive and active solar systems – Flat Plate Collector – Solar direct Thermal Application– Fundamentals of Solar Photo Voltaic Conversion- advantages and disadvantages of Solar Power generation, Wind Energy: site selection, Wind turbine: basic working principle and types, advantages and disadvantages of Wind Power generation, Hydroelectric power : How it is generated, advantages and disadvantages, Biomass energy: various types, generations of biofuel, Biogas, Geothermal Energy: source, advantages and disadvantages | **[8]** |
| **Module 3:**  **Air pollution and control:** Classification of air pollutants, Criteria air pollutants and their impacts, Major global impacts of air pollution on man: Global warming, Ozone layer depletion, Acid rain; Air quality standards, Air pollution control methods | **[6]** |
| **Module 4:**  **Water pollution fundamentals and control strategies:** Water quality: physical, chemical and biological characteristics, drinking water quality standard, effluent water quality, waste water sources and constituents, waste water treatment: preliminary treatment, primary treatment, secondary treatment, activated sludge process, lagoons, trickling filters, rotating biological contractor | **[6]** |
| **Module 5:**  **Solid waste management:** Sources and generation of solid wastes, their characterization, chemical composition and classification. Different methods of disposal and management of solid wastes, Recycling of waste material. Waste minimization technologies. Hazardous Wastes Management and Handling Rules, 1989 | **[4]** |

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| **Text Books:** | |
| 1 | “Principles of Environmental Science”, 4th edition by Cunningham, W.P. and Cunningham, M.A. (2002),Tata McGraw-Hill Publishing Company, New Delhi |
| 2 | “Introduction to Environmental Engineering”, 2nd Ed. by Davis, M. L. and Cornwell D. A. McGraw Hill, Singapore. |
| **Reference Books:** | |
| 1 | “Introduction to Environmental Engineering and Science”, by Masters, G.M., Prentice Hall of India, Second Indian Reprint. |
| 2 | “Wastewater Engineering: Treatment and Reuse”, 4th Edition, Metcalf and Eddy, Inc. McGraw-Hill, Inc., New York, 2002 |

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| **DATA STRUCTURES** | | **CSE11305** | **3-1-0** | **4 Credits** | |
| **Module 1:**  **Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.  **Arrays:** Array Definition: 1D array and 2D array, Different array operations: Insertion, deletion, traversing etc.; Algorithms for various operations and Complexity Analysis,  **Searching:** Linear Search and Binary Search Techniques and their complexity analysis. | | | | | **[10]** |
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| **Module 2:**  **Stacks and Queues:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis. | | | | | **[14]** |
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| **Module 3:**  **Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis. | | | | | **[10]** |
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| **Module 4:**  **Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.  **Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis. | | | | | **[14]** |
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| **Module 5:**  **Sorting and Hashing**: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. | | | | | **[12]** |

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| **Text Books:** | |
| 1 | “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press. |
| 2 | “Introduction To Algorithms”, [Thomas H.Cormen](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Thomas+H..+Cormen%22), [Thomas H Cormen](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Thomas+H+Cormen%22), [Charles E Leiserson](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Charles+E+Leiserson%22), [Ronald L Rivest](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Ronald+L+Rivest%22), Clifford Stein . |
| **Reference Books:** | |
| “Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company | |
| “How to Solve it by Computer”, 2nd Impression by R. G. Dromey, Pearson Education | |

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| **PROGRAMMING IN JAVA** | **CSE11306** | **3-1-0** | **4 Credits** |

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| **Module 1:**  **OOP concept:** Data abstraction, encapsulation, inheritance, polymorphism, classes and objects; Properties of OOP, Procedural and object oriented programming paradigms.  Introduction to Java, data types, variables, constants, scope and validity of variables, various operators, operator hierarchy, expressions, data type conversion and casting, enumerated types, control flow and scope of blocks, conditional statements, loops, break and continue statements, stand-alone java programs, arrays, console input-output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, method overloading and overriding, recursion, garbage collection, building and exploring string class. | **[12]** |
| **Module 2:**  **Inheritance:** Inheritance hierarchy, sub and super classes, Member accessing rules, super keyword, preventing inheritance: using final classes and methods, the Object class and its methods.  **Polymorphism:** dynamic binding, method overriding, abstract classes and methods.  **Interfaces:** Interfaces and Abstract classes, definition and implementation of interfaces, accessing through interface references, extending interfaces.  **Inner classes:** uses of inner classes, Various inner classes: local inner class, anonymous inner class, static inner class.  **Packages:** Definition, Creation and Access of a Package, Understanding “classpath”, importing packages. | **[14]** |
| **Module 3:**  **Exception handling:** errors/exceptions occur in OOP, Benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions; usage of try-catch block, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, user defined exceptions.  **Multithreading:** multiple processes vs. multiple threads, states of a thread, creating threads, interrupting threads, thread priorities, thread synchronization, inter-thread communication, producer-consumer pattern. | **[12]** |
| **Module 4:**  **Collection Framework:** Introduction to Collections, Overview of Collection frame work, Generics, Basic Collection classes: Array List, Vector, Hash table  **Files:** streams- byte streams, character streams, text input/output, binary input/output, random access file operations, File management.  **Connecting to Database:** JDBC / ODBC connection | **[10]** |
| **Module 5:**  **GUI Programming:** AWT class hierarchy, Fundamentals of Swing, Swing vs. AWT, Containers - JFrame, JApplet; Overview of swing, Applications of swing, Layout management - Layout manager types - border, grid and flow.  **Event handling:** Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation of event model, handling of a button click, handling of mouse events, Adapter classes.  **Applets:** Basics, Inheritance hierarchy for applets, applets vs. applications, life cycle of an applet, passing parameters to applets, security issues. | **[12]** |

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| **Text Books:** | |
| 1 | “Java Fundamentals - A comprehensive Introduction”, Illustrated Edition by DaleSkrien, Herbert Schildt, McGraw-Hill Education. |
| 2 | “Java for Programmers”, 2nd Edition by Paul Deitel and Harvey Deitel, Pearson Education. |
| **Reference Books:** | |
| 1 | “Thinking in Java”, Low Price Edition by Bruce Eckel, Pearson Education |

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| **DATA STRUCTURES LAB** | **CSE12307** | **0-0-3** | **2 Credits** |

**List of Programs:**

1. Write a menu based C program to insert a node at the beginning, after a specified position, at the end of a singly linked list.
2. Write a menu based C program to delete a node from the beginning, from a specified position, from the end of a singly linked list.
3. Write a menu based C program to display the data part of the nodes in reverse order, reverse the list and sort the elements of a singly linked list.
4. Write a menu based C program to insert a node at the beginning, after a specified position, at the end of a doubly linked list.
5. Write a menu based C program to delete a node from the beginning, from a specified position, from the end of a doubly linked list.
6. Write a menu based C program to display the data part of the nodes in reverse order, reverse the list and sort the elements of a doubly linked list.
7. Write a menu based C program to insert, delete and display operation of a linear queue by using singly linked list.
8. Write a menu based C program to insert, delete and display operation of a linear queue by using an array.

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| **PROGRAMMING IN JAVA LAB** | **CSE12308** | **0-0-3** | **2 Credits** |

**List of Programs:**

1. Assignments based on class, constructor.
2. Assignments based on overloading.
3. Assignments based on inheritance, overriding.
4. Assignments based on wrapper class, arrays.
5. Assignments based on developing interfaces- multiple inheritances, extending interfaces
6. Assignments based on creating and accessing packages
7. Assignments based on multithreaded programming
8. Assignments based on applet programming