**ANNAMALAI UNIVERSITY**

**(Affiliated Colleges)**

**214 – B.Sc. Computer Science**

Programme Structure and Scheme of Examination (under CBCS)

(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Part | Course Code | Study Components & Course Title | Credit | Hours/Week | Maximum Marks | | |
|  | CIA | ESE | Total |
|  |  | SEMESTER – I |  |  |  |  |  |
| I | 23UTAML11/  23UHINL11/  23UFREL11 | Language– I  nghJ jkpo; - I  Hindi-I/  French-I | 3 | 6 | 25 | 75 | 100 |
| II | 23UENGL12 | General English – I | 3 | 6 | 25 | 75 | 100 |
| III | 23UCSCC13 | Core – I: Python Programming | 5 | 5 | 25 | 75 | 100 |
| 23UCSCP14 | Core – II : Practical – I : Python Programming Lab | 5 | 5 | 25 | 75 | 100 |
| 23UMAFE15 | Elective - I (Generic / Discipline Specific):  Mathematical Foundations – I | 3 | 4 | 25 | 75 | 100 |
| IV | 23UTAMB16  23UTAMA16 | Skill Enhancement Course-1 (NME-I) /\*  Basic Tamil – I /  Advanced Tamil – I | 2 | 2 | 25 | 75 | 100 |
| 23UCSCF17 | Foundation Course:  Problem Solving Techniques | 2 | 2 | 25 | 75 | 100 |
|  |  | Total | 23 | 30 |  |  | 700 |
|  |  | SEMESTER – II |  |  |  |  |  |
| I | 23UTAML21/  23UHINL21/  23UFREL21 | Language– I  nghJ jkpo; - II  Hindi-II  French-II | 3 | 6 | 25 | 75 | 100 |
| II | 23UENGL22 | General English – II: | 3 | 6 | 25 | 75 | 100 |
| III | 23UCSCC23 | Core –III: Data Structure and Algorithms | 5 | 5 | 25 | 75 | 100 |
| 23UCSCP24 | Core – IV: Practical-II: Data Structure and Algorithms Lab | 5 | 5 | 25 | 75 | 100 |
| 23UMAFE25 | Elective - II (Generic / Discipline Specific)  Mathematical Foundations - II | 3 | 4 | 25 | 75 | 100 |
| IV | 23UTAMB26  23UTAMA26 | Skill Enhancement Course – 2 (NME-II) /\*  Basic Tamil – II /  Advanced Tamil - II | 2 | 2 | 25 | 75 | 100 |
| 23USECG27 | Skill Enhancement Course – 3  Internet and its Applications  (Common Paper) | 2 | 2 | 25 | 75 | 100 |
|  |  | Total | 23 | 30 |  |  | 700 |

Non-major (NME) Electives offered to other Departments

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| IV | 23UCSCS16 | Office Automation | 2 | 2 | 25 | 75 | 100 |
| 223UCSES26 | Advanced Excel | 2 | 2 | 25 | 75 | 100 |

\* PART-IV: NME / Basic Tamil / Advanced Tamil (Any one)

Students who have not studied Tamil upto 12th Standardand have taken any Language other than Tamil in Part-I, must choose Basic Tamil-I in First Semester & Basic Tamil-II in Second Semester.

Students who have studied Tamil upto 10th & 12th Standardand have taken any Language other than Tamil in Part-I, must choose Advanced Tamil-I in First Semester and Advanced Tamil-II in Second Semester.

|  |  |  |
| --- | --- | --- |
| SEMESTER: I  CORE - I | **23UCSCC13: PYTHON PROGRAMMING** | CREDIT: 5  HOURS: 5/W |

|  |  |  |
| --- | --- | --- |
| **Learning Objectives** | |  |
| **LO1** | To make students understand the concepts of Python programming. | |
| **LO2** | To apply the OOPs concept in PYTHON programming. | |
| **LO3** | To impart knowledge on demand and supply concepts | |
| **LO4** | To make the students learn best practices in PYTHON programming | |
| **LO5** | To know the costs and profit maximization | |
| **UNIT** | **Contents** | **No. of Hours** |
| I | **Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods. | **15** |
| II | **Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.** | **15** |
| III | **Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules. | **15** |
| IV | **Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries. | **15** |
| V | **Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files. | **15** |
| **TOTAL HOURS** | | **75** |

|  |  |  |
| --- | --- | --- |
| **Course Outcomes** | | **Programme Outcomes** |
| CO | On completion of this course, students will | |
| CO1 | * Learn the basics of python, Do simple programs on python,   Learn how to use an array. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | * Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | * Work with List, tuples and dictionary, Write program using list, tuples and dictionary. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Usage of File handlings in python, Concept of reading and writing files, Do programs using files. | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** | | |
| 1 | ReemaThareja, “Python Programming using problem solving approach”, First Edition, 2017, Oxford University Press. | |
| 2 | Dr. R. NageswaraRao, “Core Python Programming”, First Edition, 2017, Dream tech Publishers. | |
| **Reference Books** | | |
| 1. | VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education. | |
| 2. | Mark Lutz, ”Learning Python”, Orielly. | |
| 3. | Adam Stewarts, “Python Programming”, Online. | |
| 4. | Fabio Nelli, “Python Data Analytics”, APress. | |
| 5. | Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication. | |
| **Web Resources** | | |
| 1. | <https://www.programiz.com/python-programming> | |
| 2. | https://www.guru99.com/python-tutorials.html | |
| 3. | https://www.w3schools.com/python/python\_intro.asp | |
| 4. | https://www.geeksforgeeks.org/python-programming-language/ | |
| 5. | https://en.wikipedia.org/wiki/Python\_(programming\_language) | |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | 2 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightage of course contributed to each PSO** | 15 | 14 | 15 | 15 | 13 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: I  CORE: II  Practical :I | **23UCSCP14: PYTHON PROGRAMMING LAB** | CREDIT: 5  HOURS: 5/W |

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| --- | --- | --- | --- |
| **Learning Objectives** | | | |
| **LO1** | Be able to design and program Python applications. | | |
| LO2 | Be able to create loops and decision statements in Python. | | |
| LO3 | Be able to work with functions and pass arguments in Python. | | |
| LO4 | Be able to build and package Python modules for reusability. | | |
| LO5 | Be able to read and write files in Python. | | |
| LAB EXERCISES | | | **Required Hours** |
| 1. Program using variables, constants, I/O statements in Python. 2. Program using Operators in Python. 3. Program using Conditional Statements. 4. Program using Loops. 5. Program using Jump Statements. 6. Program using Functions. 7. Program using Recursion. 8. Program using Arrays. 9. Program using Strings. 10. Program using Modules. 11. Program using Lists. 12. Program using Tuples. 13. Program using Dictionaries. 14. Program for File Handling. | | | **60** |
| **Course Outcomes** | | | |
| On completion of this course, students will | | | |
| CO1 | | Demonstrate the understanding of syntax and semantics of PYTHON language | |
| CO2 | | Identify the problem and solve using PYTHON programming techniques. | |
| CO3 | | Identify suitable programming constructs for problem solving. | |
| CO4 | | Analyze various concepts of PYTHON language to solve the problem in an efficient way. | |
| CO5 | | Develop a PYTHON program for a given problem and test for its correctness. | |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 1 | 3 | 2 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | 2 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightage of course contributed to each PSO** | 15 | 15 | 13 | 15 | 13 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: I  ELECTIVE: I | **23UMAFE15: I**  **(GENERIC / DISCIPLINE SPECIFIC) : MATHEMATICAL FOUNDATIONS – I** | CREDIT: 3  HOURS: 4/W |

**MATHEMATICAL FOUNDATIONS - I**

**UNIT-I: SYMBOLIC LOGIC**

Proposition, Logical operators, conjunction, disjunction, negation, conditional and Bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

**UNIT-II: SET THEORY**

Sets, set operations, Venn diagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets

Functions: Types of Functions, Composition of Functions.

**UNIT-III: BINARY OPERATIONS**

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

**UNIT-IV: DIFFERENTIATION**

Differentiation, Successive differentiation, Leibnitz theorem, Applications of differentiation, Tangent and normal, angle between two curves.

**UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY**

Straight Lines - Pair Straight Lines

**Text Book**

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai

**Reference Books**

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V. Sundaram & Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.
3. P. Duraipandian & Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.

**COURSE OUTCOMES**

The students after undergoing this course will be able to

CLO1: Understand operators and solve problems using operators

CLO2: Know the concept of set theory, relations and functions

CLO3: Solve problems using permutation and combination

CLO4: Know the concept of limits, differentiation

CLO5: Solve Problems on straight lines and pair straight lines

**Outcome Mapping:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 2 | 3 | 3 | 1 | 2 | 3 | 2 | 2 |
| CLO2 | 2 | 2 | 3 | 3 | - | 3 | 3 | 3 | 1 |
| CLO3 | 3 | 2 | 2 | 3 | - | - | 2 | 3 | 2 |
| CLO4 | 2 | 2 | 3 | 3 | 3 | - | 2 | 3 | 2 |
| CLO5 | 3 | 2 | 3 | 3 | 3 | - | 3 | 3 | 1 |

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| --- | --- | --- |
| SEMESTER: I | **23UCSCF17**  **FOUNDATION CORSE:**  **PROBLEM SOLVING TECHNIQUES** | CREDIT: 2  HOURS: 2/W |

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| --- | --- | --- |
| **Learning Objectives** | | |
| LO1 | Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving. | |
| LO2 | Implement different programming constructs and decomposition of problems into functions. | |
| LO3 | Use data flow diagram, Pseudo code to implement solutions. | |
| LO4 | Define and use of arrays with simple applications | |
| LO5 | Understand about operating system and their uses | |
| **UNIT** | **Contents** | **No. Of. Hours** |
| I | **Introduction:** History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. **Programming Languages:** Machine language, Assembly language, High-level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers. | **6** |
| II | **Data:** Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).**Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts.**Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming. | **6** |
| III | **Selection Structures:** Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures.  **Repetition Structures:** Counter Controlled Loops –Nested Loops– Applications of Repetition Structures. | **6** |
| IV | **Data:** Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters. | **6** |
| V | **Data Flow Diagrams:** Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. **Files:** File Basics-Creating and reading a sequential file- Modifying Sequential Files. | **6** |
| **TOTAL HOURS** | | **30** |

|  |  |  |
| --- | --- | --- |
| **Course Outcomes** | | **Programme Outcomes** |
| CO | On completion of this course, students will |  |
| CO1 | * Study the basic knowledge of Computers.   Analyze the programming languages. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO2 | Study the data types and arithmetic operations.  Know about the algorithms.  Develop program using flow chart and pseudocode. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO3 | Determine the various operators.  Explain about the structures.  Illustrate the concept of Loops | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO4 | Study about Numeric data and character-based data.  Analyze about Arrays. | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Explain about DFD  Illustrate program modules.  Creating and reading Files | PO1, PO2, PO3, PO4, PO5, PO6 |
| **Textbooks** | | |
| 1 | **Stewart Venit,** “Introduction to Programming: Concepts and Design”, Fourth Edition, 2010, Dream Tech Publishers. | |
| **Web Resources** | | |
| 1. | https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm | |
| 2. | http://www.nptel.iitm.ac.in/video.php?subjectId=106102067 | |
| 3. | <http://utubersity.com/?page_id=876> | |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 2 | 3 | 3 | 3 | 3 |
| **CO 4** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 3 | 3 | 2 |
| **Weightage of course contributed to each PSO** | 15 | 14 | 14 | 15 | 15 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: II  CORE: III | **23UCSCC23: DATA STRUCTURE AND ALGORITHMS** | CREDIT: 5  HOURS: 5/W |

|  |  |  |  |
| --- | --- | --- | --- |
| **Learning Objectives** | | | |
| LO1 | To understand the concepts of ADTs | | |
| LO2 | To learn linear data structures-lists, stacks, queues | | |
| LO3 | To learn Tree structures and application of trees | | |
| LO4 | To learn graph strutures and and application of graphs | | |
| LO5 | To understand various sorting and searching | | |
| **UNIT** | **Contents** | | **No. of Hours** |
| I | Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementationsingly linked lists-circular linked lists-doubly-linked lists-applications of lists-Polynomial Manipulation- All operations-Insertion-Deletion-Merge-Traversal | | 15 |
| II | Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix topostfix expression-Queue ADT-Operations-Circular Queue- Priority Queue- deQueueapplications of queues. | | 15 |
| III | Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees- B-Tree- B+ Tree – Heap-Applications of heap. | | 15 |
| IV | Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity – Cut vertex- Euler circuits-Applications of graphs. | | 15 |
| V | Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Shell sort-Radix sort-Hashing-Hash functions-Separate chaining- Open Addressing-RehashingExtendible Hashing | | 15 |
|  | **Total** | | **75** |
| **Course Outcomes** | | **Programmeme Outcome** | |
| CO | On completion of this course, students will |  | |
| CO1 | Understand the concept of Dynamic memory management, data types, algorithms, Big O notation | PO1,PO6 | |
| CO2 | Understand basic data structures such as arrays, linked lists, stacks and queues | PO2 | |
| CO3 | Describe the hash function and concepts of collision and its resolution methods | PO2,PO4 | |
| CO4 | Solve problem involving graphs, trees and heaps | PO4,PO6 | |
| CO5 | Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data | PO5,PO6 | |
| **Text Book** | | | |
| 1 | 1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson  Education 2014, 4th Edition. | | |
| 2 | ReemaThareja, “Data Structures Using C”, Oxford Universities Press 2014, 2nd Edition | | |
| **Reference Books** | | | |
| 1. | Thomas H.Cormen, ChalesE. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms”, McGraw Hill 2009, 3rd Edition. | | |
| 2. | Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education 2003 | | |
| **Web Resources** | | | |
| 1. | https://www.programiz.com/dsa | | |
| 2. | https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/ | | |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 1 | 3 | 3 | 3 |
| **CO 3** | 3 | 3 | 3 | 2 | 3 | 2 |
| **CO 4** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO 5** | 3 | 3 | 3 | 3 | 3 | 3 |
| **Weightage of course contributed to each PSO** | 15 | 14 | 13 | 13 | 15 | 14 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: II  CORE: IV  PRACTICAL- II | **23UCSCP24: DATA STRUCTURE AND ALGORITHMS LAB**  [Note: Practicals may be offered through C / C++ / Python] | CREDIT: 5  HOURS: 5/W |

|  |  |  |  |
| --- | --- | --- | --- |
| **Learning Objectives** | | | |
| LO1 | To understand the concepts of ADTs | | |
| LO2 | To learn linear data structures-lists, stacks, queues | | |
| LO3 | To learn Tree structures and application of trees | | |
| LO4 | To learn graph strutures and and application of graphs | | |
| LO5 | To understand various sorting and searching | | |
| **Sl. No** | **Contents** | | **No. of Hours** |
| 1. | Write a program to implement the List ADT using arrays and linked lists. | | **60** |
| 2. | Write a programs to implement the following using a singly linked list.   * Stack ADT * Queue ADT | |
| 3. | Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT). | |
| 4. | Write a program to implement priority queue ADT. | |
| 5. | Write a program to perform the following operations:   * Insert an element into a binary search tree. * Delete an element from a binary search tree. * Search for a key element in a binary search tree. | |
| 6. | Write a program to perform the following operations   * Insertion into an AVL-tree * Deletion from an AVL-tree | |
| 7. | Write a programs for the implementation of BFS and DFS for a given graph. | |
| 8 | Write a programs for implementing the following searching methods:   * Linear search * Binary search. | |
| 9. | Write a programs for implementing the following sorting methods:   * Bubble sort * Selection sort * Insertion sort * Radix sort. | |
|  | **Total** | | **60** |
| **Course Outcomes** | | **Programmem Outcome** | |
| CO | On completion of this course, students will |  | |
| 1 | Understand the concept of Dynamic memory management, data types, algorithms, Big O notation | PO1,PO4,PO5 | |
| 2 | Understand basic data structures such as arrays, linked lists, stacks and queues | PO1, PO4,PO6 | |
| 3 | Describe the hash function and concepts of collision and its resolution methods | PO1,PO3,PO6 | |
| 4 | Solve problem involving graphs, trees and heaps | PO3,PO4 | |
| 5 | Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data | PO1,PO5,PO6 | |
| **Text Book** | | | |
| 1 | Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education 2014, 4th Edition. | | |
| 2 | ReemaThareja, “Data Structures Using C”, Oxford Universities Press 2014, 2nd Edition | | |
| **Reference Books** | | | |
| 1 | Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, “Introduction to Algorithms”, McGraw Hill 2009, 3rd Edition | | |
| 2. | Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education 2003 | | |
| **Web Resources** | | | |
| 1. | https://www.programiz.com/dsa | | |
| 2. | https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/ | | |

**Mapping with Programme Outcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** | **PSO 5** | **PSO 6** |
| **CO 1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 2** | 3 | 3 | 1 | 3 | 2 | 3 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO 5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightage of course contributed to each PSO** | 15 | 15 | 13 | 15 | 13 | 15 |

**S-Strong-3 M-Medium-2 L-Low-1**

|  |  |  |
| --- | --- | --- |
| SEMESTER: II  ELECTIVE- II | **23UMAFE25: (GENERIC/DISCIPLINE SPECIFIC)**  **MATHEMATICAL FOUNDATIONS- II** | CREDIT: 3  HOURS: 4/W |

**UNIT-I: MATRICES**

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermitian, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by Cramer’s rule.

**UNIT-II: MATRICES**

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem,

**UNIT-III: INTEGRATION**

Integration Simple problems, integration of rational function involving algebraic expressions of the form

Integrations using simple substitutions, integrations involving trigonometric functions of the form , integration by parts.

**UNIT-IV : INTEGRATION**

Applications of Integration for (i) Area under plane curves, (ii) Volume of solid of revolution.

**UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION**

Planes, straight lines.

**Text Book.**

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai

**Reference Books**

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V. Sundaram & Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.
3. Manicavachagompillay & Natarajan. Analytical Geometry part II - Three Dimension S. Viswanathan (printers & publication) Put Ltd., 1991.

**COURSE OUTCOMES**

On successful completion of the course, the students will be able to

CLO1: Understand different types of matrix operators

CLO2: Know the concept of Consistency and Inconsistency of linear equations

CLO3: Solve different forms of Integration

CLO4: Find the Area and volume using integration for real world problems.

CLO5: Know the concept of Planes, straight lines

**Outcome Mapping:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | POs | | | | | | PSOs | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 |
| CLO1 | 3 | 2 | 3 | 3 | 1 | 2 | 3 | 2 | 2 |
| CLO2 | 2 | 2 | 3 | 2 | - | 3 | 3 | 3 | 1 |
| CLO3 | 3 | 3 | 2 | 3 | - | - | 3 | 3 | 2 |
| CLO4 | 3 | 3 | 3 | 3 | 3 | - | 2 | 3 | 2 |
| CLO5 | 3 | 2 | 3 | 2 | 3 | - | 3 | 3 | 1 |

**Skill Enhancement Course-1 (NME-I)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code: 23UCSCS16** | | Office Automation | | | **Credits: 2** |
| **Lecture Hours: (L)**  **per week: 2** | | **Tutorial Hours :**  **(T) per week** | **Lab Practice**  **Hours: (P)per week** | | **Total: (L+T+P)**  **per week: 2** |
| **Course Category : SEC-1** | | **Year & Semester: I Year I Semester** | | **Admission Year:** | |
| **Pre-requisite** | | Basic skills in Computer operations | | | |
| **Learning Objectives:** (for teachers: what they have to do in the class/lab/field)   * The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. * The course is highly practice oriented rather than regular class room teaching. * To acquire knowledge on editor, spread sheet and presentation software. | | | | | |
| **Course Outcomes:** (for students: To know what they are going to learn)  **CO1:** Understand the basics of computer systems and its components.  **CO2:** Understand and apply the basic concepts of a word processing package.  **CO3:** Understand and apply the basic concepts of electronic spreadsheet software.  **CO4:** Understand and apply the basic concepts of database management system.  **CO5:** Understand and create a presentation using PowerPoint tool. | | | | | |
| **Recap:** (not for examination) Motivation/previous lecture/ relevant portions required for the  course) [ This is done during 2 Tutorial hours) | | | | | |
| **Units** | **Contents** | | | | **Required Hours** |
| **I** | **Introductory concepts:** Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX– Windows. Introduction to Programming Languages. | | | | **17** |
| **II** | **Word Processing:** Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options, merge. | | | | **17** |
| **III** | **Spreadsheets:** Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics. | | | | **17** |
| **IV** | **Database Concepts:** The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS – Access). | | | | **17** |
| **V** | **Power point:** Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers. | | | | **17** |
| Extended Professional Component (is a part of internal component  only, Not to be included in the  External Examination question  paper) | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC –  CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) | | | |  |
| Skills acquired from the  course | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | |  |
| **Learning Resources:**   * **Recommended Texts**   1. Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.   * **Reference Books**  1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw- Hill.  * **Web resources :** Web content from NDL / SWAYAM or open source web resources | | | | | |

**Skill Enhancement Course-2 (NME-II)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code: 23UCSES26** | | **Advanced Excel** | | | **Credits: 2** |
| **Lecture Hours: (L)**  **per week: 2** | | **Tutorial Hours :**  **(T) per week** | **Lab Practice**  **Hours: (P)per week** | | **Total: (L+T+P)**  **per week: 2** |
| **Course Category : SEC-3** | | **Year & Semester :I Year II Semester** | | **Admission Year:** | |
| **Pre-requisite** | | Basic knowledge in office automation / Excel | | | |
| **Learning Objectives:** (for teachers: what they have to do in the class/lab/field)  The objective of this course is to help the students learn the advanced features of Excel, to summarise, analyse, explore, and present visualisations of data in the form of charts, graphs. | | | | | |
| **Course Outcomes:** (for students: To know what they are going to learn)  **CO1:** Handle large amounts of data  **CO2:** Aggregate numeric data and summarise into categories and subcategories  **CO3:** Filtering, sorting, and grouping data or subsets of data  **CO4:** Create pivot tables to consolidate data from multiple files  **CO5:** Presenting data in the form of charts and graphs | | | | | |
| **Recap:** (not for examination) Motivation/previous lecture/ relevant portions required for the  course) [ This is done during 2 Tutorial hours) | | | | | |
| **Units** | **Contents** | | | | **Required Hours** |
| **I** | Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- VlookUP with Exact Match, Approximate Match- Nested VlookUP with Exact Match- VlookUP with Tables, Dynamic Ranges- Nested VlookUP with Exact Match- Using VLookUP to consolidate Data from Multiple Sheets | | | | **15** |
| **II** | Data Validations - Specifying a valid range of values - Specifying a list of valid values- Specifying custom validations based on formula - Working with Templates Designing the structure of a template- templates for standardization of worksheets - Sorting and Filtering Data -Sorting tables- multiple-level sorting- custom sorting- Filtering data for selected view - advanced filter options- Working with Reports Creating subtotals- Multiple-level subtotal. | | | | **15** |
| **III** | Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- data consolidation feature to consolidate data- Show Value As % of Row, % of Column, Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers. | | | | **15** |
| **IV** | More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- WhatIf Analysis - Goal Seek- Data Tables- Scenario Manager. | | | | **15** |
| **V** | Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Sparklines, Inline Charts, data Charts- Overview of all the new features. | | | | **15** |
| Extended Professional Component (is a part of internal component  only, Not to be included in the  External Examination question  paper) | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC –  CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) | | | |  |
| Skills acquired from the  course | Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill | | | |  |
| **Learning Resources:**   * **Recommended Tex**   Excel 2019 All-in-One For Dummies – 2018- [Greg Harvey](https://www.amazon.in/Greg-Harvey/e/B001H6OOBM/ref=dp_byline_cont_book_1)   * **Reference Books**   Microsoft Excel 2019 Pivot Table Data Crunching-2019,[Bill Jelen](https://www.amazon.in/Bill-Jelen/e/B001JP1GMG/ref=dp_byline_cont_book_1)  and [Michael Alexander](https://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Michael+Alexander&search-alias=stripbooks)   * **Web resources:** Web resources from NDL Library, E-content from open source libraries | | | | | |