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 பொது தமிழ் - 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		Skill Enhancement Course-1 (NME-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 பொது தமிழ் - 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		Skill Enhancement Course – 2 (NME-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

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

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:

	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

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

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 $\frac{1}{ax^2+bx+c}, \frac{1}{\sqrt{a^2+bx+c}}, \frac{px+q}{ax^2+bx+c}, \frac{px+q}{\sqrt{a^2+bx+c}}$

Integrations using simple substitutions, integrations involving trigonometric functions of the form $\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x}$, 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	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)	

be included in the External Examination question paper)		
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-	**15**

	Filtering data for selected view - advanced filter options- Working with Reports Creating subtotals- Multiple-level subtotal.	
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	Knowledge, Problem Solving, Analytical ability,	

acquired from the course	Professional Competency, Professional Communication and Transferrable Skill	

Learning Resources:

- **Recommended Tex**

  Excel 2019 All-in-One For Dummies – 2018- Greg Harvey

- **Reference Books**

  Microsoft Excel 2019 Pivot Table Data Crunching-2019,Bill Jelen and Michael Alexander

- **Web resources:** Web resources from NDL Library, E-content from open source libraries