SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM - 16.

Reaccredited with B++ Grade by NAAC

(Affiliated to Periyar University)

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

OUTCOME BASED SYLLABUS

B.Sc. Computer Science

(For the students admitted in 2025 - 26)

(I Semester, II Semester, III Semester, IV Semester & V Semester)

Programme Outcomes:

PO1 To apply knowledge of computing appropriate to the discipline

PO2 To identify, formulate, and develop solutions to computational challenges based on ethical principles.

PO3 To design, implement, and evaluate a computational system to meet desired needs within realistic constraints.

PO4 To equip students with sufficient knowledge in web-based programming languages for research project management.

PO5 To use appropriate techniques, skills and tools necessary for sustainable development of societal and environmental contexts.

PO6 To apply programming skills with their enhanced creativity as an individual or team.

Programme Specific Outcomes

PSO1: Think in a critical and logical based manner

PSO2: Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences.

PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4: Understand, formulate, develop programming model with logical approaches to Address issues arising in social science, business and other contexts.

PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PSO6: Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM - 16.

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

B.Sc. Computer Science

PROGRAMME STRUCTURE UNDER CBCS

(For the students admitted in 2025-26)

Total Credits: 140 + 1 + Extra Credits (Maximum 28)

I SEMESTER

Part	Course	Course Title	Code	Hrs./ Week	Credits
I	Language	Tamil - I Hindi - I Sanskrit - I	25ULTC1 25ULHC1 25ULSC1	6	3
II	General English	English - I	25ULEC1	6	3
III	Core Course - I	Python Programming	25UCSCC1	5	5
III	Core Course - II	Python Programming - Practical	25UCSCCQ1	4	3
III	Elective - I (GE): Generic Course	Numerical Methods	25UCSMGEC1	5	5
IV	Skill Enhancement Course - I:	NME: Office Automation - Practical	25UCSSECQ1	2	2
IV	Skill Enhancement (Foundation Course)	Problem Solving Techniques	25UCSSEFC	2	2
		Total		**30**	**23**
V	Articulation and Idea Fixation Skills				
	Physical Fitness Practice - 35 hours per Semester				
	Society Connect Activity				
	Advanced Diploma in Computer Programming Level - 1 : Certificate Course - 100 hours per year				

II SEMESTER

Part	Course	Course Title	Code	Hrs./ Week	Credits
I	Language	Tamil- II Hindi- II Sanskrit- II	25ULTC2 25ULHC2 25ULSC2	6	3
II	General English	English- II	25ULEC2	6	3
III	Core Course - III	Data Structures and Algorithms	25UCSCC2	5	5
III	Core Course - IV	Data Structures and Algorithms - Practical	25UCSCCQ2	4	3
III	Elective - II (GE): Generic Course	Graph Theory and its Applications	25UCSMGEC2	5	5
		Computational Techniques in Mathematics using SageMath - Practical	25UCSMGECQ		
IV	Skill Enhancement Course - II	NME(IKS) : Foundation of Computer Science with Ethics	25UCSSEC2	2	2
IV	Skill Enhancement Course - III	Cyber Security- Practical	25UCSSECQ3	2	2
		Total		**30**	**23**
V	Articulation and Idea Fixation Skills - 1 Extra Credit				
	Physical Fitness Practice - 35 hours per Semester - 1 Extra Credit				
	Society Connect Activity - 1 Extra Credit				
	Advanced Diploma in Computer Programming Level - 1 : Certificate Course - 100 hours per year - 2 Extra Credits				
	Extra credits are given for extra skills and courses qualified in MOOC/NPTEL				

III SEMESTER

Part	Course	Course Title	Code	Hrs./ Week	Credits
I	Language	Tamil - III Hindi - III Sanskrit - III	25ULTC3/ 25ULHC3/ 25ULSC3	6	3
II	General English	English- III	25ULEC3	6	3
III	Core Course - V	Microprocessor and Microcontroller	25UCSCC3	5	5
III	Core Course - VI	Microprocessor and Microcontroller - Practical	25UCSCCQ3	4	3
III	Elective - III: Discipline Specific	Natural Language Processing	25UCSDSEC1	5	5
IV	Skill Enhancement Course - IV:	Web Designing - Practical (Entrepreneurial Skill)	25UCSSECQ4	1	1
IV	Skill Enhancement Course - V:	Introduction To HTML - Practical	25UCSSECQ5	2	2
IV	EVS	Environmental Studies	25UEVSC	1	-
IV	Health and Wellness	Health and Wellness	25UHAW		1
		Total		**30**	**23**
V	Articulation and Idea Fixation Skills				
	Physical Fitness Practice - 35 hours per Semester				
	Life Skills Promotion - 2 Hrs. per Semester (Out of College Hrs. - 1 Extra Credit)				
	Society Connect Activity				
	Advanced Diploma in Computer Programming Level -II : Diploma Course - 100 hours per year				
	Extra credits are given for extra skills the courses qualified in MOOC/NPTEL				

IV SEMESTER

Part	Course	Course Title	Code	Hrs./ Week	Credits
I	Language	Tamil - IV Hindi - IV Sanskrit - IV	25ULTC4/ 25ULHC4/ 25ULSC4	6	3
II	General English	English - IV	25ULEC4	6	3
III	Core Course - VII	Java Programming	25UCSCC4	5	5
III	Core Course - VIII	Java Programming - Practical	25UCSCCQ4	3	3
III	Elective - IV: Discipline Specific	Internet of Things and its Applications	25UCSDSEC2	5	5
IV	Skill Enhancement Course - VI :	Advanced Excel - Practical	25UCSSECQ6	2	2
IV	Skill Enhancement Course- VII :	PHP Programming – Practical	25UCSSECQ7	2	2
IV	EVS	Environmental Studies	25UEVSC	1	2
		Total		**30**	**25**
V	Articulation and Idea Fixation Skills - 1 Extra Credit				
	Physical Fitness Practice - 35 hours per semester - 1 Extra Credit				
	Life Skills Promotion 2 Hrs. per Semester - (Out of College Hrs. - 1 Extra Credit)				
	Society Connect Activity - 1 Extra Credit				
	Advanced Diploma in Computer Programming Level - II : Diploma Course - 100 hours per year - 2 Extra Credit				
	Extra credits are given for extra skills the courses qualified in MOOC/NPTEL				

*Internship/Field visit/ Industrial visit will be carried out during the summer vacation of the second year and 2 credits will be included in the Fifth Semester Mark Statement.

V SEMESTER

Part	Course	Course Title	Code	Hrs./ Week	Credits
III	Core Course - IX	Software Engineering	25UCSCC5	5	4
III	Core Course - X	Database Management System	25UCSCC6	5	4
III	Core Course - XI	Database Management System - Practical	25UCSCCQ5	5	4
III	Core Course - XII	Project and Viva Voce	25UCSPVV	5	4
III	Elective Course - V: Discipline Specific	Artificial Intelligence / Agile Project Management	25UCSDSEC3A/ 25UCSDSEC3B	4	3
III	Elective Course - VI: Discipline Specific	Big Data Analytics / Cryptography	25UCSDSEC4A/ 25UCSDSEC4B	4	3
IV	Value Education	Value Education	25UVE	2	2
IV	Summer Internship	Summer Internship	25UCSI	-	Data
		Total		**30**	**26**
V	Articulation and Idea Fixation Skills				
	Physical Fitness Practice - 35 hours per semester				
	Life Skills 2 Hrs. per semester (Out of College Hrs. - 1 Credit Extra)				
	Society Connect Activity				
	Advanced Diploma in Computer Programming Level - III : Advanced Diploma Course - 100 hours per year				
	Extra credits are given for extra skills the courses qualified in MOOC/NPTEL				

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
25UCSCC1	**Python Programming**	**Core**	**5**	**-**	**-**	**-**	**5**	**30**	**70**	**100**

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	Reema Thareja, "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, First Edition 2017	
2.	Mark Lutz, "Learning Python", Orielly, fifth Edition, February 2013	
3.	Adam Stewarts, "Python Programming", Online.	
4.	Fabio Nelli, "Python Data Analytics", APress, Third Edition, 2023.	
5.	Kenneth A. Lambert, "Fundamentals of Python First Programs", Cengage Learning, Third Edition, 2023.	
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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	2	2
CO4	3	3	3	3	2	3
CO5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	14	15	15	12	14

Strong - 3 **Medium - 2** **Low - 1**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
25UCSCCQ1	**Python Programming-Practical**	**Core**	-	-	4	-	3	30	70	100

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 Specific Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	1	3	2	3
CO3	3	3	3	3	2	2
CO4	3	3	3	3	2	3
CO5	3	2	3	3	3	3
Weightage of course contributed to each PSO	**15**	**14**	**13**	**15**	**12**	**14**

Strong - 3 **Medium - 2** **Low - 1**

Title of the Course		**NUMERICAL METHODS**					
Paper Number		**EC I (GENERIC)**					
Category	**ELECTIVE COURSE**	**Year**	**I**	**Credits**	5	**Course Code**	**25UCSMGEC1**
		Semester	**I**				

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**
	5	-	-	5

Pre-requisite	12th Standard Mathematics
Objectives of the Course	1. To introduce the various topics in Numerical methods. 2. To make understand the fundamentals of algebraic equations. 3. To apply interpolation and approximation on examples. 4. To solve problems using numerical differentiation and integration. 5. To solve linear systems, numerical solution of ordinary differential equations.

Course Outcomes:

Students will be able to

CO1: Know how to solve various problems on numerical methods

CO2: Use approximation to solve problems

CO3: Differentiation and integration concept are applied

CO4: Apply, direct methods for solving linear systems

CO5: Find numerical solution of ordinary differential equations

Course Outline	**Unit–I(Hours: 15)** **Fundamentals of Algebraic Equation** Solution of algebraic and transcendental equations-Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method. **Chapter 3 (Sections 3.1, 3.2 & 3.4) & Chapter 4 (Sections 4.2 & 4.2.1)**
	Unit –II(Hours: 15) **Iterative, Interpolation and Approximation** Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices. Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation. **Chapter 4 (Sections 4.7 - 4.9), Chapter 13 (Section 13.1,13.2) & Chapter 8 (Sections 8.1-8.4, 8.5, 8.7)**
	Unit–III(Hours: 15) **Interpolation with Equal Interval** Difference operators and relations. -Interpolation with equal intervals – Newton's forward and backward difference formulae. **Chapter 5 (Section 5.1, 5.2) & Chapter 6 (Sections 6.1 - 6.3)**
	Unit–IV(Hours: 15) **Numerical Differentiation and Integration** Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule. **Chapter 9 (Sections 9.1- 9.4, 9.9 - 9.11 & 9.13)**
	Unit –V (Hours:15) **Initial Value Problems for Ordinary Differential Equations** Single step methods – Taylor's series method – Euler's method – Modified Euler's method – Runge Kutta method for solving(first, second, Third and 4th) order equations – Multi step methods **Chapter 11 (Sections 11.5, 11.9, 11.11 - 11.13 & 11.16 - 11.18)**

Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	P.Kandasamy, K. Thilagavathy, K.Gunavathy- Numerical Methods,First edition, S.Chand&CompanyLtd.
Reference Books	H.C.Saxena-FiniteDifferencesandNumericalAnalysis,S.ChandPublishers,2005.
Web resources	https://nptel.ac.in/

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSSECQ1	**Office Automation**	Skill Enhancement Course :NME	2	-	-	-	2	2	30	70	100

Learning Objectives	
LO1	Understand the basics of computer systems and its components.
LO2	Understand and apply the basic concepts of a word processing package.
LO3	Understand and apply the basic concepts of electronic spreadsheet software.
LO4	Understand and apply the basic concepts of database management system.
LO5	Understand and create a presentation using PowerPoint tool.

UNIT	Contents	No. of Hours
I	**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.	6
II	**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.	6
III	**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).	6
IV	**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.	6
V	**Set-Up MS Teams** Chat on MS Teams - Different features of MS Teams - Calendar - Schedule a call on MS Teams - Scheduling Assistant - Out of Office- Teams - How to setup Teams - Make multiple channels on Teams- Approvals - Using approvals on MS Teams- Uploading files and folders - Sharing Access on One Drive - Different Sharing Access - Password protect for sharing purpose - Creating Shared Library - Creating Shared Library - Recycle Bin - Recycle Bin - Introduction to SharePoint - Introduction to SharePoint - Create Site - Create Site - Different features of SharePoint - Different features of SharePoint	6
	Total	**30**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Possess the knowledge on the basics of computers and its components	PO1, PO2, PO3, PO6, PO8
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1, PO2, PO3, PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO3, PO5, PO7
CO4	Demonstrate the understanding of different automation tools.	PO3,PO4, PO5
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4, PO6,
Text Book		
1	PeterNorton,"IntroductiontoComputers"–TataMcGraw-Hill.	
Reference Books		
1.	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", Tata McGrawHill.	
Web Resources		
1.	https://www.udemy.com/course/office-automation-certificate-course/	
2.	https://www.javatpoint.com/automation-tools	

Mapping with Programme Specific Outcomes:

MAPPING TABLE						
CO/ PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	1	2	2	2
CO2	2	3	1	3	2	2
CO3	1	3	1	1	3	1
CO4	1	2	1	1	3	1
CO5	1	2	1	1	3	3
Weightage of course contributed to each PSO	**8**	**12**	**5**	**8**	**13**	**9**

Strong - 3 **Medium - 2** **Low - 1**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSSEFC	Problem Solving Techniques	Skill Enhancement (Foundation Course)	2	-	-	-	2	2	30	70	100

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 Specific Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	2	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	3	3	2
Weightage of course contributed to each PSO	**15**	**14**	**14**	**15**	**15**	**14**

Strong - 3 **Medium - 2** **Low - 1**

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCC2	**Data Structures and Algorithms**	**Core Course III**	**5**	**-**	**-**	**-**	**5**	**5**	**30**	**70**	**100**
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 structures 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 implementation singly 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 to postfix expression-Queue ADT-Operations-Circular Queue- Priority Queue- dequeue applications 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-Rehashing Extendible Hashing										15
	Total										**75**

Course Outcomes		Programme 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 Books		
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, Chales E.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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	1	3	3	3
CO3	3	3	3	2	3	2
CO4	3	2	3	2	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	13	13	15	14

Strong - 3 **Medium - 2** **Low - 1**

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCCQ2	**Data Structures and Algorithms - Practical**	**Core Course**	**-**	**-**	**4**	**-**	**3**	**5**	**40**	**60**	**100**

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 structures 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 linkedlists.	**60**
2.	Write 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 programs for the implementation of BFS and DFS for a given graph.	
8.	Write programs for implementing the following searching methods: • Linear search • Binary search.	
9.	Write programs for implementing the following sorting methods: • Bubble sort • Selection sort • Insertion sort • Radix sort.	
	Total No. of Hours	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 Books		
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, Chales E.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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	1	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	2	3
CO5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	14	13	15	12	15

Strong - 3 **Medium - 2** **Low - 1**

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="7">GRAPH THEORY AND ITS APPLICATIONS
(FOR I B.Sc. COMPUTER SCIENCE)</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="7">EC II (GENERIC)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">ELECTIVE</td><td>Year</td><td>I</td><td>Credits</td><td>3</td><td>Course Code</td><td>25UCSMGEC2</td></tr>
<tr><td>Semester</td><td>II</td><td colspan="4"></td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td>3</td><td colspan="2">-</td><td colspan="2">-</td><td>3</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="7">Basic knowledge in data and representations</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="7">1. Definition of graph, sub graph their representations, degree and algebraic operations.
2. Connected graphs, walks, trails, paths and blocks
3. Matching, colourability and directed graphs
4. Eulerian and Hamiltonian graphs and trees
5. Shortest path and traveling salesman problem</td></tr>
<tr><td colspan="9">Course Outcomes:
Students will be able to
CO1: acquire knowledge in graphs, subgraphs and operations on graphs
CO2: understand the connectivity of graphs
CO3: assimilate the concept of colouring with a chromatic number, directed graphs, matching
CO4: learn the Concepts of Eulerian and Hamiltonian graphs and trees
CO5: explain applications of connector problem, shortest path problem and travelling salesman problem.</td></tr>
<tr><td colspan="2">Course Outline</td><td colspan="7">Unit - I(Hours: 12)
Graphs and Subgraphs: Introduction - Definition and Examples - Degrees - Subgraphs - Matrices - Operations on graphs.
Chapter 2 (Sections 2.1 to 2.3, 2.8 & 2.9)</td></tr>
<tr><td colspan="7">Unit - II(Hours: 12)
Connectedness: Introduction - Walks, Trails and Paths - Connectedness and components - Blocks - Connectivity.
Chapter 4 (Sections 4.1 to 4.4).</td></tr>
<tr><td colspan="7">Unit - III(Hours: 12)
Matching: Introduction - Matchings - Matchings in Bipartite Graphs.
Colourability: Introduction - Chromatic number and Chromatic index - The five colour Theorem - Four colour Problem - Chromatic polynomials.
Directed graphs: Introduction - Definitions and Basics properties - paths and Connections - Diagraphs and Matrices.
Chapter 7 (Sections7.0-7.2)
Chapter 9 (Sections 9.0 -9.4)
Chapter 10 (Sections 10.0-10.3)</td></tr>
<tr><td colspan="7">Unit - IV(Hours: 12)
Eulerian and Hamiltonian Graphs: Introduction - Eulerian graphs - Hamiltonian graphs.
Trees: Introduction - Characterisation of trees - Centre of a tree.
Chapter 5 (Sections 5.0 - 5.2) &Chapter 6 (Sections 6.0-6.2)</td></tr>
</table>

	Unit - V (Hours:12) **Some Applications:** Introduction - Connector problem – shortest path problem - Transformation and kinematic Graph - Designing one way traffic systems - Applications without Solutions. **Chapter 11 (Sections 11.0 to 11.5)**
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	S. Arumugam, S. Ramachandran, Invitation to graph theory,Scitech Publications, Chennai, 2001.
Reference Books	1. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker 2. Clark J and Holton DA, First look at Graph Theory, Allied Publishers 1995 3. Rosen H, Discrete Mathematics and Its Application, Mc Graw Hill , 2007 4. Narsingh Deo, Graph Theory with Application to Engineering and Computer Science, Prentice Hall of India 2010(Reprint)
Web resources	1. https://d3gt.com/ 2. https://www.coursera.org/courses?query=graph%20theory

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="7">Computational Techniques in Mathematics using SageMath - Practical</td></tr>
<tr><td colspan="2">Paper Number</td><td colspan="7">EC II (GENERIC)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">ELECTIVE COURSE</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">25UCSMGECQ</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>-</td><td>-</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="2">Pre-requisite</td><td colspan="7">Python</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="7">6. Develop students' ability to solve systems of linear equations and compute eigenvalues and eigenvectors using SageMath
7. Equip students with numerical methods for interpolation and integration
8. Able to solving first and second-order differential equations, using Euler's and Runge-Kutta methods in SageMath
9. Use computational tools to solve problems in graph theory</td></tr>
<tr><td colspan="9">Course Outcomes:
Students will be able to
CO1: use SageMath to solve linear systems and compute eigenvalues and eigenvectors
CO2: apply interpolation techniques and execute numerical integration methods using SageMath
CO3: apply Euler's and Runge-Kutta methods to solve differential equations in SageMath
CO4: create and analyze different graph structures in SageMath and solve shortest path problems
CO5: apply SageMath to find matchings and colorings in graphs</td></tr>
<tr><td colspan="2" rowspan="5">Course Outline</td><td colspan="7">Unit - I(Hours: 6)
Numerical solutions of System of linear equations - Eigen values and Eigen vectors</td></tr>
<tr><td colspan="7">Unit - II(Hours: 6)
Interpolation- Numerical integration using Trapezoidal, Simpson's 1/3 rule.</td></tr>
<tr><td colspan="7">Unit - III(Hours: 6)
Solving first and second order differential equations-Euler's Method-Fourth order Runge-Kutta method</td></tr>
<tr><td colspan="7">Unit - IV(Hours: 6)
Undirected graph - Directed graph - Bipartite graph - Trees - Shortest path problems</td></tr>
<tr><td colspan="7">Unit –V (Hours: 6)
Matchings - Matchings in Bipartite Graphs - Matching polynomial - Graph coloring</td></tr>
<tr><td colspan="2">Skills acquired from the course</td><td colspan="7">Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</td></tr>
<tr><td colspan="2">Recommended Text</td><td colspan="7">1. Computational Mathematics with Sagemath, Prof. Ajit Kumar, Department of Mathematics, Institute of Chemical Technology, Mumbai.
2. Graph Theory, The sage development team, 2024.</td></tr>
<tr><td colspan="2">Reference Books</td><td colspan="7">Computational Mathematics with SageMath</td></tr>
<tr><td colspan="2">Web resources</td><td colspan="7">https://doc.sagemath.org/html/en/reference/graphs/index.html
https://doc.sagemath.org/html/en/reference/graphs/sage/graphs/distances_all_pairs.html
https://www.youtube.com/watch?v=rU0fvGRltWs</td></tr>
</table>

Course Code: 25UCSSEC2	Foundation of Computer Science with Ethics		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 : Skill Enhancement Course - II : NME (IKS)	Year & Semester: I Year II Semester		Admission Year: 2025-26
Pre-requisite	None		

Learning Objectives:

- To introduce students to the fundamental concepts and significance of computer science.
- To develop students' algorithmic thinking and problem-solving skills.
- To introduce students to the Indian Knowledge System and its relevance to computer science.
- To instill ethical considerations in computer science and emphasize the importance of responsible technology development.

Unit - I : Indian Contributions to Algorithmic Thinking

Exploration of ancient Indian mathematical and computational contributions, such as the development of algorithms for numerical calculations found in texts like the Sulba Sutras.- Relationship of early algorithms to modern algorithmic thinking in computer science.

Unit - II : Indian Philosophy and Ethics in Computing

Focus on Indian philosophical traditions, like Dharma and Karma - Application of ethical considerations in computer science - philosophies - responsibility and ethical decision-making in technology development.

Unit - III : Sanskrit and Natural Language Processing

Structured nature of the Sanskrit language and its relevance to natural language processing in computer science - Influence of Sanskrit grammar and linguistics in the development of language processing algorithms.

Unit - IV : Ancient Indian Architecture and Computer Systems Design

The relationship of architectural principles found in ancient Indian temple design to modern computer systems design - concepts of symmetry, modularity, and scalability.

Unit - V : Indian Traditional Knowledge and Sustainability in Computing

Relationship between traditional Indian knowledge to sustainable living and ecology, and application of eco-friendly technology and sustainable computing practices.

Books for References:

1. Computing with Python: An Introduction to Python for Science & Engineering by Charles Severance.
2. Ethics in Computing: A Concise Module by Miguel R. Luévano
3. The Man Who Knew Infinity: A Life of the Genius Ramanujan by Robert Kanigel
4. Computational Approaches to Sanskrit: Natural Language Processing by Amba Kulkarni and Gerard Huet
5. Indian Mathematics: Engaging with the World from Ancient to Modern Times edited by George Gheverghese Joseph
6. Computational Sustainability by Carla P. Gomes, Adele E. Howe, and Diana Marculescu
7. Relevant research papers, case studies, and online resources.

Course Outcomes: (for students: To know what they are going to learn)	
CO1	Understand the historical and cultural context of Indian knowledge systems and their relevance to computer science.
CO2	Understand ethical principles and responsible practices in computer science
CO3	Understand algorithmic thinking and problem-solving
CO4	Understand System and its Holistic approach

Course Code: 25UCSSECQ3	Cyber Security - Practical		Credits: 2
Lecture Hours: (L) per week:	Tutorial Hours: (T) per week	Lab Practice 2 Hours: (P)per week	Total: (L+T+P) per week: 2
Course Category: Skill Enhancement Course - III	Year & Semester: I Year II Semester		Admission Year: 2025-26
Pre-requisite	Basic Computer Knowledge		

Learning Objectives:

1. Deliver the fundamental understanding of Cyber Security.
2. Familiarize basic methods in Cyber Security
3. Explain various Cyber Security applications in society
4. Identify the key issues in online modes and safety methods used.

1. Checklist for reporting cyber crime at Cyber crime Police Station.
2. Checklist for reporting cyber crime online. 3. Reporting phishing emails.
3. Demonstration of email phishing attack and preventive measures.
4. Basic checklist, privacy and security settings for popular Social media platforms.
5. Reporting and redressal mechanism for violations and misuse of Social media platforms.
6. Configuring security settings in Mobile Wallets and UPIs. 8. Checklist for secure net banking.
7. Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
8. Setting and configuring two factor authentication in the Mobile phone.
9. Security patch management and updates in Computer and Mobiles.
10. Managing Application permissions in Mobile phone.
11. Installation and configuration of computer Anti-virus.
12. Installation and configuration of Computer Host Firewall. 15. Wi-Fi security management in computer and mobile

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Outline the concepts of Cyber security	PO1, PO2
2	Apply the skill to practice the Cyber security platforms	PO1, PO2, PO3, PO4, PO5, PO6
3	Analyse the extensive procedures for Cyber security	PO1, PO2, PO3, PO4, PO5
4	Predict the performance of real time applications in Cyber security	PO1, PO2, PO3, PO4, PO5, PO6

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	1	1
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
Weightage of course contributed to each PSO	12	12	11	10	10	10

Strong - 3 **Medium - 2** **Low - 1**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCC3	**Microprocessor and Microcontroller**	Core	5	-	-	-	5	5	30	70	100

Learning Objectives	
LO1	To introduce the internal organization of Intel 8085 Microprocessor.
LO2	To know about various instruction sets and classifications
LO3	To enable the students to write assembly language programs using 8085.
LO4	To interface the peripheral devices to 8085 using Interrupt controller and DMA interface.
LO5	To provide real-life applications using microcontroller.

UNIT	**Contents**	**No. of Hours**
I	Digital Computers - Microcomputer Organization-Computer languages - Microprocessor Architecture and its operations - Microprocessor initiated operations and 8085 Bus organization- Internal Data operations and 8085 registers - Peripheral or External initiated operations.	15
II	8085 Microprocessor- Pinout and Signals- Functional block diagram - 8085 Instruction Set and Classifications.	15
III	BCD to Binary and Binary to BCD conversions - ASCII to BCD and BCD to ASCII conversions - Binary to ASCII and ASCII to Binary conversions. BCD Arithmetic - BCD addition and Subtraction - Multibyte Addition and Subtraction - Multiplication and Division.	15
IV	The 8085 Interrupts- RIM AND SIM instructions-8259 Programmable Interrupt Controller-Direct Memory Access (DMA) and 8257 DMA controller.	15
V	Introduction to Microcontroller - Microcontroller Vs Microprocessor - 8051 Microcontroller architecture - 8051 pin description. Timers and Counters- Operating Modes- Control Registers. Interrupts- Interrupts in 8051 - Interrupts Control Register- Execution of interrupt.	15
Total		**75**

Course Outcomes		Programmes Outcomes
CO	On completion of this course, students will able to	
CO1	Remember basic binary codes and conversions for microprocessor programming and the Intel 8085 architecture.	PO1
CO2	Understand the 8085-instruction set to write programs independently using various logics.	PO1, PO2
CO3	Apply different types of instructions to convert binary codes, develop program on multibyte arithmetic operations and analyze outcomes	PO4, PO6
CO4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.	PO4, PO5, PO6
CO5	Create real time applications using microcontroller.	PO3, PO6
Text Book		
1	R. S. Gaonkar- "Microprocessor Architecture- Programming and Applications with 8085"- 5th Edition- Penram International Publications,2009. [For unit I to unit IV]	
2	Soumitra Kumar Mandal, Microprocessors and Microcontrollers Architectures, Programming and Interfacing using 8085, 8086, 8051, Tata McGraw Hill Education Private Limited,2012 [for unit V].	
Reference Books		
1.	Mathur, “Introduction to Microprocessor”, 3rd Edition, Tata McGraw Hill 1993.	
2.	Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005.	
3.	Krishna Kant, “Microprocessors and Microcontrollers Architectures, Programming and System Design 8085, 8086, 8051, 8096, PHI”, 2008	
Web Resources		
1.	E-content from open source libraries	
2.	https://www.bing.com/, https://theopennotes.in/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	3	2
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	2	3	2
Weightage of course contributed to each PSO	15	15	14	12	14	10

Strong - 3, Medium - 2 & Low - 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCCQ3	**Microprocessor and Microcontroller - Practical**	Core	-	-	4	-	3	4	40	60	100

Learning Objectives	
LO1	To introduce the internal organization of Intel 8085 Microprocessor.
LO2	To know about various instruction sets and classifications
LO3	To enable the students to write assembly language programs using 8085.
LO4	To interface the peripheral devices to 8085 using Interrrupt controller and DMA interface.
LO5	To provide real-life applications using microcontroller.

	Details
	Addition and Subtraction 1. 8 - bit addition 2. 16 - bit addition 3. 8 - bit subtraction 4. BCD subtraction II. Multiplication and Division 1. 8 - bit multiplication 2. BCD multiplication 3. 8 - bit division III. Sorting and Searching 1. Searching for an element in an array. 2. Sorting in Ascending and Descending order. 3. Finding the largest and smallest elements in an array. 4. Reversing array elements. 5. Block move. IV. Code Conversion 1. BCD to Hex and Hex to BCD 2. Binary to ASCII and ASCII to binary 3. ASCII to BCD and BCD to ASCII V. Simple programs on 8051 Microcontroller 1. Addition 2. Subtraction 3. Multiplication 4. Division 5. Interfacing Experiments using 8051 1. Realisation of Boolean Expression through ports. 2. Time delay generation using subroutines. 3. Display LEDs through ports

Course Outcomes		Programme Outcome
CO	**On completion of this course, students will**	
CO1	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the architecture of 8085o introduce the internal organization of Intel 8085 Microprocessor..	PO1
CO2	Understanding the 8085-instruction set and their classifications, enables the students to write the programs easily on their own using different logic	PO1, PO2
CO3	Applying different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multibyte arithmetic operations.	PO4, PO6
CO4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.	PO4, PO5, PO6
CO5	An exposure to create real time applications using microcontroller.	PO3, PO5

Text Book	
1	R. S. Gaonkar, " Microprocessor Architecture- Programming and Applications with 8085"- 5th Edition- Penram International Publications,2009. [For unit I to unit IV]
2	Soumitra Kumar Mandal, "Microprocessors and Microcontrollers Architectures, Programming and Interfacing using 8085, 8086, 8051", Tata McGraw Hill Education Private Limited,2011. [for unit V].
Reference Books	
1.	Mathur, "Introduction to Microprocessor",3rd Edition,Tata McGraw Hill,1993.
2.	Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design‖, Pearson Education, 2005.
3.	Krishna Kant, Microprocessors and Microcontrollers- Architectures, Programming and System Design 8085, 8086, 8051, 8096‖, PHI, 2008
Web Resources	
1.	E-content from open-source libraries
2.	https://www.bing.com/

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	**15**	**14**	**11**	**15**	**15**	**10**

Strong - 3 Medium - 2 Low - 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
25UCSDSEC1	NATURAL LANGUAGE PROCESSING	Elective Discipline Specific	-	5	-		5	30	70	100

Learning Objectives	
LO1	To understand approaches to syntax and semantics in NLP.
LO2	To learn natural language processing and to learn how to apply basic algorithms in this field.
LO3	To understand approaches to discourse, generation, dialogue and summarization within NLP.
LO4	To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc.
LO5	To understand current methods for statistical approaches to machine translation.

UNIT	Contents	No. Of. Hours
I	**Introduction:** Natural Language Processing tasks in syntax, semantics, and pragmatics- Issue- Applications- The role of machine learning- Probability Basics- Information theory- Collocations -N-gram Language Models- Estimating parameters and smoothing- Evaluating language models.	**15**
II	**Word level and Syntactic Analysis:** Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging.Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.	**15**
III	**Semantic analysis and Discourse Processing:** Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure.	**15**
IV	**Natural Language Generation:** Architecture of NLG Systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.	**15**
V	**Information retrieval and lexical resources:** Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval- valuation Lexical Resources: WorldNet-Frame Net Stemmers- POS Tagger- Research Corpora SSAS.	**15**
Total hours		**75**

Course Outcomes		Programme Outcomes
CO	**On completion of this course, students will able to**	
CO1	Describe Natural Language Processing fundamentals and explain the advantages, disadvantages, and business applicability of various NLP Technologies.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Distinguish between various NLP techniques, considering their assumptions, strengths, and weaknesses.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Analyze and model large volume text data generated from a range of real-world applications.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop robotic process automation to manage business processes.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1.	Daniel Jurafsky, James H. Martin, Speech & language processing‖, Pearson publications, 2nd Edition, 2008,	
2.	Allen, James. Natural language understanding. Pearson, 2nd Edition,1995.	
Reference Books		
1.	Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog‖, Springer, 2nd Edition, 2014,	
Web Resources		
1.	https://en.wikipedia.org/wiki/Natural_language_processing	
2.	https://www.techtar.get.com/searchenterpriseai/definition/natural-language-processing-NLP	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	2	3	3	3	2	3
CO3	3	3	3	3	3	3
CO4	3	2	3	3	2	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	14	15	15	13	15

Strong - 3 Medium - 2 Low - 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	External	Total
25UCSSECQ4	**WEB DESIGNING - Practical (Entrepreneurial Skill)**	Skill Enhancement Course - (SEC)	1	-	-	-	1	1	40	60	100

Learning Objectives	
LO1	Understand the basics of HTML and its components
LO2	To study about the Graphics in HTML
LO3	Understand and apply the concepts of XML and DHTML
LO4	Understand the concept of JavaScript
LO5	To identify and understand the goals and objectives of the Ajax

List of Practicals

1. Introduction to HTML Tags and Page Structure
2. Working with Text, Paragraphs, and Line Breaks
3. Create Paragraphs and Line Breaks
4. Emphasizing Text, Headings, and Horizontal Rules
5. Lists and Font Styling
6. Text Alignment and Links
7. Creating Tables and Frames
8. Resize and Align Images
9. Adding Multimedia
10. HTML Forms for Data Collection
11. Create a Simple XML Document
12. Adding CSS to the webpages.
13. Combining CSS with XML
14. Accessing HTML & CSS through the DOM
15. Dynamic Content, Styles, and Positioning
16. Data Binding
17. Simple Java Script Programs
18. JavaScript Variables, Functions, Conditions, Loops, and Repetition
19. Forms and Validations
20. Create a JavaScript program that uses a loop to repeat actions

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
CO1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
CO2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
CO3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
CO4	Ability to develop a java script	PO1, PO2, PO3, PO7
CO5	An ability to develop web application using Ajax.	PO2, PO6, PO7

Text Book	
1	Pankaj Sharma, "Web Technology", SK Kataria & Sons Bangalore 2011.
2	Mike Mcgrath, "Java Script", Dream Tech Press 2006, 1st Edition.
3	Achyut S Godbole & AtulKahate , "Web Technologies" , 2002, 2nd Edition.
Reference Books	
1.	Laura Lemay, RafeColburn, Jennifer Kyrnin , "Mastering HTML, CSS & Javascript Web Publishing", 2016.
2.	DT Editorial Services (Author), "HTML 5 Black Book" (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Paperback 2016, 2nd Edition.
Web Resources	
1.	NPTEL & MOOC courses titled Web Design and Development.
2.	https://www.geeksforgeeks.org

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	**15**	**12**	**10**	**11**	**12**	**13**

Strong - 3 **Medium - 2** **Low - 1**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
25UCSSECQ5	INTRODUCTION TO HTML	Skill Enhancement Course (SEC)	2	-	-		2	40	60	100

Learning Objectives	
LO1	Insert a graphic within a web page.
LO2	Create a link within a web page.
LO3	Create a table within a web page.
LO4	Insert heading levels within a web page.
LO5	Insert ordered and unordered lists within a web page. Create a web page.

1. Create a HTML document with the following formatting options:
    i. Bold
    ii. Italics
    iii. Underline
    iv. Headings (Using H1 to H6 heading styles)
    v. Font (Type, Size and Color)
    vi. Background (Colored background/Image in background)
    vii. Paragraph
    viii. Line Break
    ix. Horizontal Rule
2. Create a HTML document which consists of:
    i. Ordered List
    ii. Unordered List
    iii. Nested List
    iv. Image
3. Create a HTML document which implements Internal linking as well as external linking.
4. Create a table using HTML which consists of columns for Roll No., Student‘s name and grade.
5. Create a form using HTML which has the following types of controls. Text Box Option / Radio Button Check Boxes Reset and Submit Buttons
6. Create a HTML document having multiple frames.
7. Create HTML document with image as a background and Create link using image.

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the page formatting. Concept of list	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Concept of adding images Understand the table creation.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	"Mastering HTML5 and CSS3 Made Easy", TeachUComp Inc., 2014.	
2	Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS",2018,1st Edition.	
Web Resources		
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf	
2.	https://www.w3schools.com/html/default.asp	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	2	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	2	3	3
Weightage of course contributed to each PSO	14	15	14	14	15	15

Strong-3 Medium-2 Low-1

Programme Title	**: B. Sc. Computer Science**	
Course Title	**: Environmental Studies**	
Course Code	**: 25UEVSC**	**Hours/Week : 1**
Semester	**: III & IV**	**Credits: 2**

Course Objectives

- To educate the students regarding the environmental issues and problems.
- To give an exposure towards the scientific and socio – economic dimensions of the environment.
- To impart and enhance the basic knowledge about environment and develop concern towards it.
- To develop the ability to evaluate the measures for the improvement and protection of environment.
- To sensitize the students on the various environmental issues.
- To integrate different disciplines and fields that intersect with environmental concerns
- To make the younger generations aware of the values of natural resources.

Course Outcomes

- Demonstrate critical thinking skills in relation to environmental issues.
- Develop an integrative approach to environmental issues with a focus on sustainability.
- Bring an awareness, knowledge and appreciation of intrinsic values of ecological processes and communities.
- Reflect critically about their roles and identities as citizens, consumers and an environmentalist in the complex, interconnected world.
- Apply systems, concepts and methodologies to analyse and understand interactions between social and environmental processes.
- Understand the transactional character of environmental problems and ways of addressing them, including interactions across local to global scales.

UNIT I - FUNADAMENTALS

Environment-Definition: Scope, Structure and Function of Ecosystems- Producers. Consumers and Decomposers-Energy flow in the Ecosystem-Ecological Succession - Food Chain, Food Webs and Ecological Pyramids - Concept of Sustainable Development.

UNIT II - NATURAL RESOURCES

Renewable Resources-Air, Water, Soil, Land and Wildlife resources; Non-Renewable Resources-Minerals, Coal, Oil and Natural Gas; Environmental problems related to the Extraction and use of Natural Resources.

UNIT III- BIODIVERSITY

Biodiversity – Definition – values-consumption use, Productive social, Ethical, Aesthetic and option Values Threats to Biodiversity-Hotspots of Biodiversity-conservation of Biodiversity: In-situ, Ex-situ, Bio-Wealth National and Global Level.

UNIT IV- ENVIRONMENTAL POLLUTION

Definition - Causes, Effects and Mitigation Measures - Air, Water and Soil Pollution. Noise Pollution, Thermal pollution, Nuclear Hazards, Solid Wastes, Acid Rain, Climate Change and Global Warming, Environmental Laws and Regulations in India-Earth Summit.

UNIT V - POLLUTION AND ENVIRONMENT

Population Explosion - Environment and Human Health - HIV/AIDS- Women and Child Welfare- Resettlement and rehabilitation of people, Role of Information Technology in Environmental Health. Environmental Awareness. Environmental Disaster Management - Fire Safety and Prevention.

Field work

- Visit to area to document environmental assets: river/forest/flora/fauna, etc.,
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystem-pond, river, Delhi ridge, etc., (Equal to 5 lectures)

References:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M.,&Guha, R. 1993. This Fissured land: An Ecological History of India. Univ. of California Press.
3. Gleeson,B. and Low, N.(eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ.Press.
5. Groom,Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science,
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8. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64).Zed Books.
9. McNeill, John R. 2000. Something New Under the Sun:An Environmental History of the Twentieth Century.
10. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
11. Pepper,I.L., Gerba, C.P.&Brusseau, M.L.2011. Environmental and Pollution Science. Academic Press.
12. Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
13. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
14. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental Law and policy in India. Tripathi 1992.
15. Sengupta, R. 2003. Ecoloy and economics: An approach to sustainable development. OUP.
16. Singh,J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation.S. Chand publishing, New Delhi.
17. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics John Wiley & Sons.
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19. Warren, C. E. 1971, Biology and Water pollution Control. WB Saunders.
20. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
21. World Commission on Environment and Development 1987. Our common Future. Oxford University Press.

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext	Total
25UCSCC4	**Java Programming**	Core	5	-	-	-	5	5	30	70	100

Learning Objectives	
LO1	To provide fundamental knowledge of object-oriented programming
LO2	To equip the student with programming knowledge in Core Java from the basics up.
LO3	To enable the students to use AWT controls, Event Handling and Swing for GUI.
LO4	To provide fundamental knowledge of object-oriented programming.
LO5	To equip the student with programming knowledge in Core Java from the basics up.

UNIT	**Contents**	**No. of Hours**
I	**Introduction :** Review of Object Oriented concepts - History of Java Java buzz words - JVM architecture - Data Types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.	15
II	**Inheritance**: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. **Packages**: Definition - Access Protection – Importing Packages. **Interfaces**: Definition – Implementation - Extending Interfaces. **Exception Handling**: *try – catch- throw - throws – finally* - Built-inexceptions - Creating own Exception classes.	15
III	**Multithreaded Programming**: Thread Class - Runnable interface – Synchronization –Using synchronized methods– Using synchronized statement- Inter thread Communication –Deadlock. **I/O Streams:** Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.	15

IV	AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers. Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes	15
V	Swing: Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel,JTextField - JTextArea - JList - JComboBox - JScrollPane.	15
	Total	**75**

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO5
CO4	Implement AWT and Event handling.	PO2, PO6
CO5	Use Swing to create GUI.	PO1, PO3, PO6

Text Books:	
1.	Herbert Schildt, " The Complete Reference Java", Tata McGraw Hill, New Delhi, 7th Edition, 2010
2.	Gary Cornell, "Core Java 2 Volume I - Fundamentals", Addison Wesley, 1999
References:	
1.	Head First Java, O'Rielly Publications,
2.	Y. Daniel Liang, "*Introduction to Java Programming"*, Pearson Education India, 7th Edition , 2010.
Web Resources	
1.	https://javabeginnerstutorial.com/core-java-tutorial
2.	http://docs.oracle.com/javase/tutorial/
3.	https://www.coursera.org/

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	1
Weightage of course contributed to each PSO	14	14	13	14	14	11

Strong - 3, Medium - 2, Low - 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCCQ4	**Java Programming - Practical**	Core	-	-	3	-	3	3	40	60	100

Learning Objectives	
LO1	To provide fundamental knowledge of object-oriented programming.
LO2	To equip the student with programming knowledge in Core Java from the basics up.
LO3	To enable the students to know about Event Handling.
LO4	To enable the students to use String Concepts.
LO5	To equip the student with programming knowledge in to creat GUI using AWT controls.

EXCERCISE	**Details**
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer
2	Write a Java program to multiply two given matrices.
3	Write a Java program that displays the number of characters, lines and words in a text
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.
5	Write a program to do String Manipulation using CharacterArray and perform the following string operations: a. String length b. Finding a character at a particular position c. Concatenating two strings
6	Write a program to perform the following string operations using String class: a. String Concatenation b. Search a substring c. To extract substring from given string
7	Write a program to perform string operations using String Buffer class: a. Length of a string b. Reverse a string c. Delete a substring from the given string

8	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	45
9	Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.	
10	Write a program to demonstrate the use of following exceptions. a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception	
11	Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes	
12	Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.	
13	Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).	
14	Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.	
15	Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown.	
	Total	**45**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1
2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
4	Implement AWT and Event handling.	PO4, PO5, PO6
5	Use Swing to create GUI.	PO3, PO6
Text Book		
1	Herbert Schildt, "The Complete Reference Java", Tata McGraw Hill, New Delhi, 2010, 7th Edition.	
2.	Gary Cornell, "Core Java 2 Volume I *Fundamentals",* Addison Wesley, 1999, 7th Edition	
Reference Books		
1.	Head First Java, O'Rielly Publications,	
2.	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.	
Web Resources		
1.	https://www.w3schools.com/java/	
2.	http://java.sun.com	
3.	http://www.afu.com/javafaq.html	

Mapping with Programme Outcomes:

PO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**2**	**2**	**1**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**
Weightage of course contributed to each PSO	**14**	**14**	**13**	**14**	**14**	**12**

Strong - 3 Medium - 2 Low - 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSDSEC2	**Internet of Things and its Applications**	Elective	5	-	-	-	5	5	30	70	100

Course Objective		
C1	Use of Devices, Gateways and Data Management in IoT.	
C2	Design IoT applications in different domain and be able to analyze their performance	
C3	Implement basic IoT applications on embedded platform	
C4	To gain knowledge on Industry Internet of Things	
C5	To Learn about the privacy and Security issues in IoT	
UNIT	**Details**	**No. of Hours**
I	IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.	**15**
II	M2M to IoT - A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	**15**
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction,	15

	Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views	
IV	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management	15
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	15
	Total	**75**
Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
4	Perform analytics on data streams.	PO4, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO5
Text Book		
1	Vijay Madisetti and ArshdeepBahga, ―Internet of Things: (A Hands-on Approach)‖, Universities Press (INDIA) Private Limited , 1st Edition, 2014,	

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	3	3
CO3	3	2	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	12	11	15	15	14

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSSECQ6	**Advanced Excel - Practical**	Skill Enha. Course (SEC)	2	-	-	-	2	2	40	60	100

Learning Objectives	
LO1	Handle large amounts of data
LO2	Aggregate numeric data and summarize into categories and subcategories
LO3	Filtering, sorting, and grouping data or subsets of data
LO4	Create pivot tables to consolidate data from multiple files
LO5	Presenting data in the form of charts and graphs

LAB EXERCISES

1. Create Student mark table and write the conditional expression and logical operators to find the total, average marks and find result.
2. Create a bar chart for the product sales data.
3. `Apply VLOOKUP` to find the price of a product based on its product code
4. Set a data validation rule to allow only prices between 100 and 2000.
5. Sort the data first by Score in descending order, then by Age in ascending order.
6. Set a dropdown list of products (Laptop, Phone, Tablet) for column A.
7. Create a PivotTable to summarize total sales by region.
8. Calculate the current age of each person based on their birthdate.
9. If you want to increase the price of a product so the total sales reach $1500, What should be the new price for the "Phone" (with 2 units sold)?

A	B
Product	1200
Laptop	800
Phone	600
Tablet	600

10. Create a bar chart for the product sales data.

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Learn No-SQL databases and management.	PO3, PO8
Text Book		
1	Excel 2019 All	
2	Bill Jelen and Michael Alexander ,"Microsoft Excel 2019 Pivot Table Data Crunching",1st Edition, 2019.	
Reference Books		
1	Greg Harvey, "Excel 2019 All-in-One for Dummies", 1st Edition, 2028.	
Web Resources		
1	https://www.simplilearn.com	
2	https://www.javatpoint.com	
3	https://www.w3schools.com	

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**2**	**2**	**3**	**3**	**3**
CO3	**3**	**3**	**2**	**3**	**3**	**3**
CO4	**3**	**2**	**2**	**3**	**3**	**3**
CO5	**3**	**2**	**2**	**3**	**3**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**10**	**15**	**15**	**15**

Strong - 3 Medium - 2 Low - 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSSECQ7	**PHP Programming - Practical**	Skill Enha. Course (SEC)	2	-	-	-	2	2	40	60	100

Learning Objectives	
LO1	To provide the necessary knowledge on basics of PHP.
LO2	To design and develop dynamic, database-driven web applications using PHP version.
LO3	To get an experience on various web application development techniques.
LO4	To learn the necessary concepts for working with the files using PHP.
LO5	To get a knowledge on OOPS with PHP.

1. Create a PHP file that declares a set of variables for your dynamic website and outputs them in different HTML tags.
2. Create a PHP file that checks a user's age and returns whether they are a child, teenager, or adult.
3. Create a switch statement that checks the day of the week and displays an appropriate message.
4. Create a PHP script that prints numbers from 1 to 10 using a while loop.
5. Modify the previous script to print numbers from 1 to 10 using a for loop.
6. Create an array of fruits and modify one of the elements.
7. Create a function in PHP to calculate the sum of an array of numbers. Use this function to display the sum of an array that contains five user-defined numbers.
8. Create a form that lets users select their favorite fruits, then use PHP to store the form selection in an array and display the selected items.
9. Create a PHP script that writes some text into a file and reads it back.
10. Create PHP script for managing Sessions and Cookies
11. Create a PHP script that starts a session, stores the user's name, and displays it on subsequent visits. Also, provide an option to destroy the session and log out the user.
12. Create a PHP script that sets a cookie for the user's favorite color, and another script that reads and displays that cookie.

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Write PHP scripts to handle HTML forms	PO1,PO4,PO6
CO2	Write regular expressions including modifiers, operators, and meta characters.	PO2,PO5
CO3	Create PHP Program using the concept of array.	PO3,PO4,PO5.
CO4	Create PHP programs that use various PHP library functions	PO2,PO3,PO5
CO5	Manipulate files and directories.	PO3,PO5,PO6.

Text Book	
1	Lynn mighley and Michael Morrison., "Head First PHP & MySQL: A Brain-Friendly Guide", 1st Edition, 2009.
2	Alan Forbes, "The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL",2015.
Reference Books	
1.	Steven Holzner, "PHP: The Complete Reference", 1st Edition, 2007.
2.	DT Editorial Services, "*HTML 5 Black Book"(Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)*, Paperback 2016, 2ndEdition.
Web Resources	
1.	Opensource digital libraries: PHP Programming
2.	https://www.w3schools.com/php/default.asp

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCC5	**Software Engineering**	Core	5	-	-	-	4	5	30	70	100

Learning Objectives	
LO1	Gain basic knowledge of analysis and design of systems
LO2	Ability to apply software engineering principles and techniques
LO3	Model a reliable and cost-effective software system
LO4	Ability to design an effective model of the system
LO5	Perform Testing at various levels and produce an efficient system.

UNIT	**Contents**	**No. of Hours**
I	**Introduction**: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering. **Software Life Cycle Models**: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.	15
II	**Requirements Analysis and Specification:** Requirements gathering and analysis, Software requirements specification (SRS) **Software Design**: Good software design, cohesion and coupling, neat arrangement, software design approaches, object- oriented vs function-oriented design	15
III	**Function-Oriented Software Design:** Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design. **User-Interface design:** Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.	15
	Coding and Testing: Coding, code review, testing, testing in the large vs testing in the small; unit testing; black-box testing; white-box testing;	

IV	debugging; program analysis tools; integration testing; system testing; some general issues associated with testing. **Software Reliability and Quality Management:** Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.	15
V	**Computer Aided Software Engineering:** CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. **Software Maintenance:** Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost.	15
	Total	**75**

Course Outcomes		
CO	On completion of this course, students will;	**Programme Outcomes**
CO1	Gain basic knowledge of analysis and design of systems	PO1
CO2	Ability to apply software engineering principles and techniques	PO1, PO2
CO3	Model a reliable and cost-effective software system	PO4, PO6
CO4	Ability to design an effective model of the system	PO4, PO5, PO6
CO5	Perform Testing at various levels and produce an efficient system.	PO3, PO6

Text Books	
1.	Rajib Mall, "Fundamentals of Software Engineering", Prentice-Hall of India, 5th Edition, 2018
References Books	
1.	Richard Fairley, "Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd", 1st Edition 1997.
2.	Roger S. Pressman, "Software Engineering", McGraw-Hill, 7th Edition, 2010.
3.	James A. Senn, Analysis & Design of Information Systems, McGraw- Hill International Editions , 2nd Edition, 1989.

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	2	3
CO2	3	2	2	2	1	2
CO3	3	3	3	2	3	2
CO4	3	3	3	2	2	2
CO5	3	3	3	2	2	2
Weightage of course contributed to each PO/PSO	15	13	14	10	10	11

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSCC6	**Database Management System**	Core	5	-	-	-	4	5	30	70	100

Learning Objectives	
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
LO2	To understood the concepts of data base management system, design simple Database models
LO3	To learn and understand to write queries using SQL, PL/SQL.
LO4	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
LO5	To understood the concepts of data base management system, design simple Database models

UNIT	**Contents**	**No. of Hours**
I	**Database Concepts :** Database Systems - Data vs Information - Introducing the database -File system - Problems with file system - Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction	15
II	**Design Concepts:** Relational database model - logical view of data-keys - Integrity rules - relational set operators - data dictionary and the system catalog - relationships - data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram	15
III	**Normalization of Database Tables**: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. **Introduction to SQL**: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.	15
IV	**Advanced SQL**: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join.**Sub Queries and Correlated Queries**: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function	15

V	**PL/SQL**:A Programming Language: History - Fundamentals - Block Structure - Comments - Data Types - Other Data Types - Variable Declaration -Assignment operation - Arithmetic operators. **Control Structures and Embedded SQL**: Control Structures - Nested Blocks - SQL in PL/SQL - Data Manipulation - Transaction Control statements. **PL/SQL Cursors and Exceptions**: Cursors - Implicit Cursors, Explicit Cursors and Attributes - Cursor FOR loops - SELECT…FOR UPDATE - WHERE CURRENT OF clause - Cursor with Parameters - Cursor Variables - Exceptions - Types of Exceptions.	15
	Total	**75**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).	PO4, PO6
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO5

Text Book	
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", 9th, 2008.
2	Nilesh Shah, "Database Systems Using Oracle", Pearson Education India, 2nd Edition, 2016.
Reference Books	
1.	Abraham Silberschatz, Henry F. Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication, 6th Edition, 2011.
2.	Shio Kumar Singh, "Database Systems: Concepts, Design and Applications", Pearson publications, 2nd Edition, 2011.
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	**15**	**12**	**10**	**11**	**12**	**13**

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	Extern al	Total
25UCSCCQ5	**Database Management System Practical**	Core	-	-	5	-	4	5	40	60	100
Learning Objectives											
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.										
LO2	To understood the concepts of data base management system, design simple Database models										
LO3	To learn and understand to write queries using SQL, PL/SQL.										
LO4	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.										
LO5	To understood the concepts of data base management system, design simple Database models										

List of Exercises:	No. of Hours
I. SQL 1. DDL Commands 2. DML Commands 3. TCL Commands ***II. PL/SQL*** 4. Fibonacci Series 5. Factorial 6. String Reverse 7. Sum Of Series 8. Trigger ***III. CURSOR*** 9. Student Mark Analysis Using Cursor ***IV. APPLICATION*** 10. Library Managementsystem 11. Student Mark Analysis	75
Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
CO2	Define the integrity constraints. Understand the basic concepts Model, Entity-Relationship Model.	PO1, PO2
CO3	Design database schema considering normalization and relationships Understand and construct database using Structured Query Language practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4, PO6
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5	Learn to design Data base operations and implement using PL/SQL basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO4
Text Book		
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", 9th Edition, 2009.	
2	Nilesh Shah, "Database Systems Using Oracle", Pearson Education India, 2nd Edition, 2016	
Reference Books		
1.	Abraham Silberschatz, Henry F. Korth and S.Sudarshan, Database System Concepts‖, McGraw Hill International Publication, 6th Edition, 2011.	
2.	Shio Kumar Singh, Database Systems: Concepts, Design and Applications, Pearson publications, 2nd Edition, 2011.	
Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	3	3	2
CO2	3	3	1	2	2	2
CO3	2	2	3	3	3	3
CO4	2	2	3	3	3	1
CO5	2	3	3	3	3	3
Weightage of course contributedto each PSO	**12**	**12**	**13**	**14**	**14**	**11**

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	External	Total
25UCSPVV	**Project and Viva Voce**	Core	-	-	5	-	4	5	40	60	100

Course Objectives:

1. Introduce real time applications
2. Familiarize Modular programming
3. Enhance the creativity in applications
4. Establish top down approach in programming
5. Apply database connectivity to any front end

Course Outcomes (CO) : On completion of the course, students should be able to

CO Number	CO Statement	Programme Outcomes
CO	On completion of this course, Students will	
CO1	Show the process of software development	**PO1, PO2, PO3, PO6**
CO2	Experiment with the programming concepts and tools they learnt.	**PO1, PO2, PO3, PO4**
CO3	Classify the various requirements for the project developed.	**PO1, PO2, PO3, PO5**

Mapping with Programme Outcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	3	3
CO2	3	3	3	3	3	1
CO3	3	2	2	2	3	3
Weightage of course contributedto each PSO	**9**	**7**	**7**	**6**	**9**	**7**

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSDSEC3A	**Artificial Intelligence**	Elective	4	-	-	-	3	4	30	70	100

Course Objective	
C1	To learn various concepts of AI Techniques.
C2	To learn various Search Algorithm in AI.
C3	To learn probabilistic reasoning and models in AI.
C4	To learn about Markov Decision Process.
C5	To learn various type of Reinforcement learning.

UNIT	Contents	No. of Hours
I	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	12
II	Search Algorithms : Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.	12
III	Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	12
IV	Markov Decision process : MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	12
V	Reinforcement Learning : Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning - Q learning .	12
	Total	**60**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the various concepts of AI Techniques.	PO1
2	Understand various Search Algorithm in AI.	PO1, PO2
3	Understand probabilistic reasoning and models in AI.	PO4, PO6

4	Understand Markov Decision Process.	PO4, PO5, PO6
5	Understand various type of Reinforcement learning Techniques.	PO3, PO4

Text Book	
1	Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, 3rd Edition, 2009
2	Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill Book Company
Reference Books	
1.	Trivedi, M.C., A Classical Approach to Artificial Intelligence‖, Khanna Publishing House, Delhi.
2.	SarojKaushik, Artificial Intelligence‖, Cengage Learning India, 2011
3.	David Poole and Alan Mackworth, Artificial Intelligence: Foundations for Computational Agents‖, Cambridge University Press 2010
Web Resources	
1.	https://github.com/dair-ai/ML-Course-Notes
2.	https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html
3.	https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghLMZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**1**	**2**
CO2	**3**	**3**	**2**	**2**	**3**	**3**
CO3	**3**	**3**	**2**	**3**	**3**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**3**
CO5	**3**	**2**	**2**	**2**	**3**	**3**
Weightage of course contributed to Each PSO	**15**	**12**	**10**	**11**	**12**	**13**

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSDSEC3B	**Agile Project Management**	Elective	4	-	-	-	3	4	25	75	100

Learning Objectives	
LO1	Learning of software design, software technologies and APIs.
LO2	Detailed demonstration about Agile development and testing techniques.
LO3	Learning about Agile Planning and Execution.
LO4	Understanding of Agile Management Design and Quality Check.
LO5	Detailed examination of Agile development and testing techniques.

UNIT	Contents	No. of Hours
I	**Introduction: Modernizing Project Management:** Project Management Needed a Makeover - Introducing Agile Project Management. **Applying the Agile Manifesto and Principles:** Understanding the Agile manifesto - Outlining the four values of the Agile manifesto -Defining the 15 Agile Principles - Adding the Platinum Principles - Changes as a result of Agile Values - The Agile litmus test. **Why Being Agile Works Better:** Evaluating Agile benefits - How Agile approaches beat historical approaches - Why people like being Agile.	12
II	**Being Agile** **Agile Approaches:** Diving under the umbrella of Agile approaches - Reviewing the Big Three: Lean, Scrum, Extreme Programming - Summary **Agile Environments in Action:** Creating the physical environment - Low-tech communicating - High-tech communicating - Choosing tools. **Agile Behaviours in Action:** Establishing Agile roles - Establishing new values - Changing team philosophy.	12

III	**Agile Planning and Execution** **Defining the Product Vision and Roadmap:** Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog. **Planning Releases and Sprints:** Refining requirements and estimates – Release planning – Sprint planning. **Working Throughout the Day:** Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. **Showcasing Work, Inspecting and Adapting:** The sprint review - The sprint retrospective. **Preparing for Release:** Preparing the product for deployment (the release sprint) - Preparing the operational support - Preparing the organization for product deployment - Preparing the marketplace for product deployment	12
IV	**Agile Management** **Managing Scope and Procurement:** What‘s different about Agile scope management - Managing Agile scope - What‘s different about Agile procurement - Managing Agile procurement. **Managing Time and Cost:** What‘s different about Agile time management - Managing Agile schedules - What‘s different about Agile cost management - Managing Agile budgets. **Managing Team Dynamics and Communication:** What‘s different about Agile team dynamics - Managing Agile team dynamics - What‘s different about Agile communication - Managing Agile communication. **Managing Quality and Risk:** What‘sdifferent about Agile quality - Managing Agile quality - What‘s different about Agile risk management - Managing Agile risk.	12

V	**Implementing Agile** **Building a Foundation:** Organizational and individual commitment - Choosing the right pilot team members - Creating and environment that enables Agility - Support Agility initially and over time. **Being a Change Agent:** Becoming Agile requires change – why change doesn‘t happen on its own -Platinum Edge‘s Change Roadmap - Avoiding pitfalls - Signs your changes are slipping. **Benefits, Factors for Success and Metrics:** Ten key benefits of Agile project management - Ten key factors for project success - Ten metrics for Agile Organizations.	12
	Total	**60**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
CO1	Understanding of software design, software technologies and APIs using Agile Management.	PO1
CO2	Understanding of Agile development and testing techniques.	PO1, PO2
CO3	Understanding about Agile Planning and Execution using Sprint.	PO4, PO5
CO4	Understanding of Agile Management Design, scope, Procurement, managing Time and Cost and Quality Check.	PO4, PO5, PO6
CO5	Analysing of Agile development and testing techniques.	PO2, PO4

Text Book	
1	Mark C. Layton, Steven J. Ostermiller, "Agile Project Management for Dummies", Wiley India Pvt. Ltd., 2nd Edition, 2018.
2	Jeff Sutherland, Scrum, "The Art of Doing Twice the Work in Half the Time", Penguin, 2014.
Reference Books	
1.	Mark C. Layton, David Morrow, "Scrum for Dummies", 2nd Edition, Wiley India Pvt. Ltd., 2018.
2.	Mike Cohn, "Succeeding with Agile - Software Development using Scrum", Addison-Wesley Signature Series, 2010.
3.	Alex Moore, "Agile Project Management", 2020.
4.	Alex Moore, Scrum, 2020.
5.	Andrew Stellman and Jennifer Greene, "Learning Agile: Understanding Scrum, XP, Lean, and Kanban, Shroff/O'Reilly", First Edition, 2014.
Web Resources	
1.	www.agilealliance.org/resources

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	11	10

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
25UCSDSEC4A	**Big Data Analytics**	Elective	4	-	-	-	3	4	30	70	100

Course Objective	
C1	Understand the Big Data Platform and its Use cases, Map Reduce Jobs
C2	To identify and understand the basics of cluster and decision tree
C3	To study about the Association Rules, Recommendation System
C4	To learn about the concept of stream
C5	Understand the concepts of NoSQL Databases

UNIT	Contents	No. of Hours
I	Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics -Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications -Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High- Performance Architecture - HDFS - Map Reduce and YARN - Map Reduce Programming Model	12
II	CONTROL STRUCTURES AND VECTORS – Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations	12
III	Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation - Hybrid Recommendation Approaches.	12

IV	Introduction to Streams Concepts - Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream - Filtering Streams - Counting Distinct Elements in a Stream - Estimating moments - Counting oneness in a Window - Decaying Window - Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.Using Graph Analytics for Big Data: Graph Analytics	12
V	NoSQL Databases : Schema-less Models : Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding - Hbase - Analyzing big data with twitter - Big data for E- Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.	12
	Total	**60**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO5
4	Perform analytics on data streams.	PO3, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO4
Text Book		
1	Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets‖, Cambridge University Press, 2012.	
Reference Books		
1.	David Loshin, Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph‖, Morgan Kaufmann/Elsevier Publishers, 2013	
2.	EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data‖, Wiley publishers, 2015.	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.sas.com/en_us/insights/analytics/big-data-analytics.html	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	**15**	**14**	**11**	**15**	**15**	**13**

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
25UCSDSEC4B	**CRYPTOGRAPHY**	**Elective**	4	-	-	-	3	25	75	100

Learning Objectives	
LO1	To understand the fundamentals of Cryptography
LO2	To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
LO3	To understand the various key distribution and management schemes.
LO4	To understand how to deploy encryption techniques to secure data in transit across data networks
LO5	To design security applications in the field of Information technology

UNIT	**Contents**	**No. Of. Hours**
I	**Introduction:** The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.	**12**
II	**Classical Encryption Techniques:** Symmetric cipher model – **Substitution Techniques:** Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography	**12**
III	**Block Cipher and DES:** Block Cipher Principles – DES – The Strength of DES – **RSA:** The RSA algorithm.	**12**
IV	**Network Security Practices**: IP Security overview - IP Security architecture – Authentication Header. **Web Security**: SecureSocketLayer and Transport Layer Security – Secure Electronic Transaction.	**12**
V	Intruders – Malicious software – Firewalls.	**12**
	TOTAL HOURS	**60**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply the different cryptographic operations of public key cryptography	PO1, PO2, PO3, PO4, PO5, PO6

CO4	Apply the various Authentication schemes to simulate different applications.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand various Security practices and System security standards	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	**William Stallings,** Cryptography and Network Security Principles and Practica‖.	
Reference Books		
1.	**Behrouz A. Foruzan,** Cryptography and Network Security‖, Tata McGraw-Hill, 2007.	
2	**AtulKahate**, *Cryptography and Network Security*‖, Second Edition, 2003,TMH.	
3	**M.V. Arun Kumar**, *Network Security*‖, 2011, First Edition,USP.	
	Web Resources	
1	https://www.tutorialspoint.com/cryptography/	
2	https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	2
CO2	3	2	3	2	3	3
CO3	3	3	3	2	3	3
CO4	2	3	3	3	2	3
CO5	3	2	3	3	3	3
Weightage of course contributed to each PSO	14	13	15	12	14	14

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

QUESTION PAPER PATTERN

Time: 3 Hours **Maximum Marks: 70**

Section – A (20 x 1 = 20 Marks)

Answer all questions
Choose the Correct Answer

1. 2. 3. 4.	From Unit I
5. 6. 7. 8.	From Unit II
9. 10. 11. 12.	From Unit III
13. 14. 15. 16.	From Unit IV
17. 18. 19. 20.	From Unit V

Section – B (5 x 4 = 20 Marks)

Answer all questions.

21. a)	(or)	b)	from Unit I
22. a)	(or)	b)	from Unit II
23. a)	(or)	b)	from Unit III
24. a)	(or)	b)	from Unit IV
25. a)	(or)	b)	from Unit V

Section – C (3 x 10 = 30 Marks)

Answer any Three questions.

26. Question from Unit I
27. Question from Unit II
28. Question from Unit III
29. Question from Unit IV
30. Question from Unit V