SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN
(AUTONOMOUS)
MADURAI – 625 002.

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

B.Sc. COMPUTER SCIENCE

SYLLABUS TO BE INTRODUCED FROM THE ACADEMIC YEAR 2024 – 2025 (UNDER C.B.C.S)

Programme	Undergraduate
Programme Code:	
Name of the Programme	B.Sc Computer Science
Duration of the Programme	3 years(6 Semesters)
Year	2024-2027
Eligibility for Admission	As Per DCE Norms 1. Pass in +2 or equivalent exam
	2. Mathematics should be studied in +2.

INDEX

Profile of the Department

The Department of Computer Science was established in the year 1993 with B. Sc Computer Science. In the academic year 2007-2008 B.Sc. Computer Science (Shift II) was started and introduced M.Sc. Computer Science in 2017, M. Phil Computer Science and Ph.D. Computer Science during the academic year 2018 – 2019. The sanctioned strength is 60 (25 + 25) for undergraduate Programmes and 20 for postgraduate Programme. Full time and Part-time Research Programmes are offered and it was approved by Madurai Kamaraj University, Madurai. The Department is functioning successfully with eight regular staff members and Four guest lecturers.

One well-equipped connected Computer lab is installed with a variety of software in the latest trends in computing such as Dot Net, Java-based packages, Design packages, R-Tool, Python, Networking, Windows Programming, Linux Programming, and other programming languages.

We focus on the areas for research such as Big Data, Cloud Computing, Grid Computing, Data Mining and Warehousing, Digital Image Processing, Artificial Intelligence, Wireless Networks, Algorithms etc, Our Faculty members acted as Resource Persons, Chairpersons and Presented papers in many International / National level Conferences, Workshops, and Seminars and also published research papers in various reputed Journals.

Scope of the Programme

Apply a broad understanding of the fundamental theories, concepts, and applications of Computer Science in their career. Analyse a multifaceted computing problem and to apply principles of computing and other relevant disciplines to identify solutions and compare alternative solutions to computing problems. Apply Computer Science theory and software development fundamentals to produce computing-based solutions. To attain an ability to use current techniques, skills, and tools necessary for computing practice. To affiance in a wide range of careers and/or graduate studies in computer science or related fields with a zeal for lifelong learning. To communicate effectively, both orally and in writing and engaged in collaborative teamwork. Recognize the social and ethical errands of a professional working in the discipline. The mission of the department is to impart computer education to the students in the rural area of Madurai district, so that they become enlightened and intelligent, and to improve the standards of their life, as well as to produce graduates who excel in research and service. We also aim to inculcate the attitudes and values for the empowerment of women that will motivate them towards the continuous process of learning and leadership. We strive to educate ground-breaking skills and technology for the benefit of learners through incessant up gradation of curriculum.

PROGRAMME OUTCOME

PO1	Exhibit advanced comprehensive knowledge in the core and elective subjects with relevant practical experience
PO2	Develop professional competency as a team player in diverse interdisciplinary settings
PO3	Gain real time experience through demonstrations, internship and project for further career prospects
PO4	Demonstrate problem solving, decision making and communication skills to interact with all stakeholders
PO5	Identify research problems with creativity and sensitivity to attain sustainable solutions. Translate the acquired knowledge and skills to evolve as a sensible global citizen.

PROGRAMME SPECIFIC OUTCOME

PSO1	Enhance Professional Skills
PSO2	Attain the ability to Design and Develop computer applications,
PSO3	Evaluate and recognize potential risks and provide innovative solutions.
PSO4	Acquire Successful Entrepreneurship skills
PSO5	Explore technical knowledge in diverse areas of Computer applications and experience an environment conducive in cultivating skills for higher studies.

COURSE STRUCTURE ABSTRACT

Part	Course	Total No. ofPapers	Hours	Credit	Marks
I	Tamil	4	24	12	400
II	English	4	24	12	400
III	Core Course -Major(CCM)	15	69	60	1500
III	GEC– Elective Course (Allied)	6	24	20	600
III	DSEC –Elective Course	4	18	12	400
III	Internship	1	--	2	100
IV	Skill Enhancement Course (SEC-6 & NM)	7	13	13	700
IV	Foundation Course	1	2	2	100
IV	E.V.S.	1	2	2	100
IV	Value Education	1	2	2	100
IV	Extension Activity/NSS/NCC/SPORTS	1	-	1	100
IV	Professional Competency Skill	1	2	2	100
Total		**46**	**180**	**140**	**4600**

Part	Course Code	Title of the Course	Whether Syllabus Revision was carried out in 2024-25	If yes, percentage of content added or replaced
III	U23CS3	Data Structure and Algorithms	Yes	10%
III	U23CS4P	Data Structure and Algorithms Lab	Yes	20%
III	U23GS45	Digital Logic Fundamentals	Yes	10%
III	U23GS47	Resource Management Techniques	Yes	10%
III	U23GS37	Statistical Methods and its Application-I	Yes	15%

B.Sc. Computer Science Curriculum Design

First Year

Semester-I

Sub.Code	Part	List of Courses	Credit	Hours per week (L/T/P)
U231A1/U231H1	Part-I	Language	3	6
U232A1	Part-II	English	3	6
U23CS1	Part-III	Python Programming	5	5
U23CS2P		Python Programming Lab	3	3
U23GS35		Discrete Mathematics –I	4	4
U23GS50P		Programming in C Lab	-	2
U23SES1P		Office Automation Lab	2	2
U23FS1	Part-IV	Problem Solving Techniques	2	2
			22	**30**

Semester-II

Sub.Code	Part	List of Courses	Credit	Hours per week(L/T)
U231A2/U231H2	Part-I	Language	3	6
U232A2	Part-II	English	3	6
U23CS3	Part-III	Data Structure and Algorithms	5	5
U23CS4P		Data Structure and Algorithms Lab	3	3
U23GS50P		Programming in C Lab	2	2
U23GS45		Digital Logic Fundamentals	4	4
U23SES2P	Part-IV	Multimedia Lab	2	2
U23SES3		Multimedia Systems	2	2
			24	**30**

Second Year

Semester-III

Sub.code	Part	List of Courses	Credit	Hours week(L/T)
U231A3/U231H3	Part-I	Language	3	6
U232A3	Part-II	English	3	6
U23CS5	Part-III	Microprocessor and Microcontroller	4	5
U23CS6P		Microprocessor and Microcontroller Lab	3	3
U23GS37		Statistical Methods and its Application-I	4	4
U23GS51P		PHP Programming Lab	-	2
U23SES4	Part-IV	Fundamentals of Information Technology	1	1
U23SES5P		Visual Basic Lab	2	2
U23EVS1		Environmental Studies	-	1
			20	**30**

Semester-IV

Sub Code	Part	List of Courses	Credit	Hours p week (L/T/P
U231A4/U231H4	Part-I	Language	3	6
U232A4	Part-II	English	3	6
U23CS7	Part-III	Java Programming	4	4
U23CS8P		Java Programming Lab	3	3
U23GS51P		PHP Programming Lab	2	2
U23GS47		Resource Management Techniques	4	4
U23SES6P	Part-IV	Web Designing Lab	2	2
U23SES57		Biometrics	2	2
U23EVS1		Environmental Studies	2	1
			25	**30**

Third Year
Semester-V

Sub code	Part	List of Courses	Credit	Hours per week (L/T/P)
U23CS9	Part-III	Software Engineering	5	5
U23CS10		Database Management System	5	5
U23CS11 P		Database Management System Lab	3	6
U23SPW		Project with Viva voce	4	4
U23DS19		Data Mining and Warehousing	3	4
U23DS20		Operating System	3	4
U23VE1	Part-IV	Value Education	2	2
U23SIS1		Internship / Industrial Training	2	-
			27	**30**

Semester-VI

Sub code	Part	List of Courses	Credit	Hours per week (L/T/P)
U23CS13	Part-III	Computer Networks	5	6
U23CS14		.NET Programming	5	6
U23CS15 P		.NET Programming Lab	3	6
U23DS21		Computer Graphics	3	5
U23DS22		Artificial Intelligence	3	5
U23PCS1 P	Part-IV	Image Processing using MATLAB	2	2
U23EAS		Extension Activity	1	
			21	**30**

Total Credits : 140

CORE COURSES

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		Total
								CIA	External	
U23CS1	Python programming	Core	5	-	-	-	5	25	75	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	ReemaThareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2	Dr. R. NageswaraRao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.

	Reference Books	
1.	VamsiKurama, "Python Programming: A Modern Approach", Pearson Education.
2.	Mark Lutz, "Learning Python", Orielly.
3.	Adam Stewarts, "Python Programming", Online.
4.	Fabio Nelli, "Python Data Analytics", APress.
5.	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.

	Web Resources
1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

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

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

Course Code: U23CS1	Title of the Course: Python programming							
pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/ Blended Learning	Fieldwork/internship
	75	50	5	5	5	10	-	-
UNIT	Topic						Lect. hrs	Mode of Teaching
UNIT I	Basics of Python Programming						15	Lecture
UNIT II	Control Statements						15	Lecture and Peer Group learning
UNIT III	Functions						15	Lecture /Seminar
UNIT IV	Lists						15	Lecture/Demo
UNIT V	Python File Handling						15	Lecture/practical Experience

Relevant to Global need	✅	Employability oriented	✅	Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23CS2P	**Python Programming Lab**	**Core**	-	-	3	-	3	25	75	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.		**75**

Course Outcomes	
On completion of this course, students will	
CO1	Demonstrate the understanding of syntax and semantics of PYTHON language
CO2	Identify the problem and solve using PYTHON programming techniques.
CO3	Identify suitable programming constructs for problem solving.
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.
CO5	Develop a PYTHON program for a given problem and test for its correctness.

Mapping with Programme Outcomes:

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

Course Code: U23CS2P	Title of the Course: Python programming Lab

Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	75	-	60	5	10	-		

UNIT	Topic	Lect./Prac hrs	Mode of Teaching
UNIT I	Basics of Python Programming	15	practical Experience/Demo
UNIT II	Control Statements	15	practical Experience/Peer group
UNIT III	Functions	15	practical Experience
UNIT IV	Lists	15	practical Experience
UNIT V	Python File Handling	15	practical Experience

Relevant to Global need	✅	Employability oriented		Address Professional Ethics		
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization		
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	✅	
Relevant to Local need				Address Human Values		

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	CIA	External	Total
U23CS3	DATA STRUCTURES	Core	5	-	-	-	5	5	25	75	100

	AND ALGORITHMS											

	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 Addition - 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	15
III	Tree ADT- Basic Terminology- Binary Trees – Binary Tree Representations – Binary Tree Traversal – Threaded Binary Trees – Application of Trees – Heap – Binary Heap	15
IV	Graph ADT - Terminology and Representations – Traversals DFS and BFS - Connected Components – Shortest Path – Topological Sort	15
V	Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Quick sort-Radix sort- Hashing functions -Overflow Handling	15
	Total	**75**

	Course Outcomes	**Programmeme Outcome**
CO	On completion of this course, students will	
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
CO3	Describe the hash function and concepts of collision and its resolution methods	PO2,PO4
CO4	Solve problem involving graphs, trees and heaps	PO4,PO6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO5,PO6

	Text Book
1	Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Booksource,
2	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.

	Reference Books	
1.	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.	
2.	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003	
3.	ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition	
	Web Resources	
1.	https://www.programiz.com/dsa	
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/	

Mapping with Programme Outcomes:

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

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

Course Code: U23CS3	Title of the Course: DATA STRUCTURES AND ALGORITHMS							
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/ Blended Learning**	**Fieldwork/internship**
	75	50	-	5	5	10	5	
UNIT	**Topic**						**Lect. hrs**	**Mode of Teaching**
UNIT I	Dynamic memory management and data types						15	Lecture

UNIT II	Basic data structures	15	Lecture and Peer Group learning
UNIT III	Trees	15	Lecture /Seminar
UNIT IV	Graphs	15	Lecture/Demo
UNIT V	Sorting and Searching	15	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Cre	Ins	Marks

							d i t s	t . H o u r s	C I A	E xt er n al	Tot al
U23CS4P	**DATA STRUCTURES AND ALGORITHMS LAB** [Note: Practicals may be offered through C / C++ / Python]	Core	-	-	3	-	3	3	25	75	100

<table>
<tr><td colspan="3" align="center">Learning Objectives</td></tr>
<tr><td>LO1</td><td colspan="2">To understand the concepts of ADTs</td></tr>
<tr><td>LO2</td><td colspan="2">To learn linear data structures-lists, stacks, queues</td></tr>
<tr><td>LO3</td><td colspan="2">To learn Tree structures and application of trees</td></tr>
<tr><td>LO4</td><td colspan="2">To learn graph structures and and application of graphs</td></tr>
<tr><td>LO5</td><td colspan="2">To understand various sorting and searching</td></tr>
<tr><td>Sl. No</td><td align="center">Contents</td><td>No. of Hours</td></tr>
<tr><td>1.</td><td>Write a program to implement the List ADT using arrays and linked lists.</td><td rowspan="6" align="center">75</td></tr>
<tr><td>2.</td><td>Write a programs to implement the following using a singly linked list.
● Stack ADT
● Queue ADT</td></tr>
<tr><td>3.</td><td>Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).</td></tr>
<tr><td>4.</td><td>Write a program to implement Circular Queue .</td></tr>
<tr><td>5.</td><td>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.</td></tr>
<tr><td>6.</td><td>Write programs for the implementation of BFS and DFS for a given graph.</td></tr>
</table>

7.	Write a program for finding the Shortest path in a graph.	
8.	Write a program for finding the and Topological order in a directed graph.	
9.	Write a program for implementing Min Heap and Max Heap.	
10.	Write a program for hashing string data.	
11.	Write programs for implementing the following searching methods: ● Linear search ● Binary search.	
12.	Write programs for implementing the following sorting methods: ● Bubble sort ● Selection sort ● Insertion sort ● Quick sort ● Radix sort.	
	Total	**75**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1, PO4,PO6
3	Describe the hash function and concepts of collision and its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1,PO5,PO6
Text Book		
1	Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Booksource,	
2	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.	
Reference Books		
1	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition	
2	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003	

3	ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition
Web Resources	
1.	https://www.programiz.com/dsa
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/

Mapping with Programme Outcomes:

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

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

Course Code: U23CS4P		**Title of the Course**: DATA STRUCTURES AND ALGORITHMS LAB								
pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**		
	75		70	5	-	-	5			
UNIT		**Topic**					**Lect./pract hrs**	**Mode of Teaching**		
UNIT I	Dynamic memory management and data types						15	Practical Experience		
UNIT II	Basic data structures						15	Practical and Peer Group learning		
UNIT III	Trees						15	Practical		
UNIT IV	Graphs						15	Practical		
UNIT V	Sorting and Searching						15	Practical/ICT		
Relevant to Global need	✅	**Employability oriented**		**Address Professional Ethics**						
Relevant to National need		**Entrepreneurship oriented**		**Address Gender Sensitization**						

Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS5	**Microprocessor and Microcontroller**	Core	5	-	-	-	4	5	25	75	100

Learning Objectives	
LO1	To introduce the internal organization of Intel 8085 Microprocessor.
LO2	To know about various instruction sets and classifictions
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.

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		ProgrammemeOutcome
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,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. [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

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

Course Code: U23CS5	Title of the Course: Microprocessor and Microcontroller							
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**

UNIT	75	50	-		5	5	10		5	
UNIT			Topic						Lect. hrs	Mode of Teaching
UNIT I	Organization of Intel 8085 Microprocessor								15	Lecture
UNIT II	Instruction sets and classifications								15	Lecture and Peer Group learning
UNIT III	Assembly language programs								15	Lecture /Seminar
UNIT IV	Interrupt controller and DMA interface.								15	Lecture/Demo
UNIT V	Real-life applications using microcontroller.								15	Lecture/ICT

Relevant to Global need	✅	Employability oriented	✅	Address Professional Ethics
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability
Relevant to Local need				Address Human Values

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	CIA	External	Total
U23CS6P	**Microprocessor and microcontroller Lab**	Core	-	-	3	-	3	3	25	75	100
		Learning Objectives									
LO1	To introduce the internal organization of Intel 8085 Microprocessor.										
LO2	To know about various instruction sets and classifictions										
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										No. of Hours
	List of Exercises:										

	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.	60
	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	
Total		**60**

Course Outcomes		Programmeme Outcome
CO	On completion of this course, students will	
CO1	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor	PO1

	programming and provide a good understanding of the architecture of 8085o introduce the internal organization of Intel 8085 Microprocessor..	
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. [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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

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

Course Code: U23CS6P	Title of the Course: Microprocessor and Microcontroller Lab						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/ Blended Learning	Fieldwork/internship
	60	-	40	5	5	5	5	
UNIT	Topic					Lect./ prac hrs	Mode of Teaching
UNIT I	Organization of Intel 8085 Microprocessor					10	Practical
UNIT II	Instruction sets and classifications					10	Practical
UNIT III	Assembly language programs					10	Practical/Seminar
UNIT IV	Interrupt controller and DMA interface.					15	Lecture/Demo
UNIT V	Real-life applications using microcontroller.					15	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext	Total
U23CS7	**Java Programming**	Core	4	-	-	-	4	4	25	75	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 buzzwords – JVM architecture - Datatypes - 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-in exceptions - Creating own Exception classes.	15
III	**Multithreaded Programming**: Thread Class - Runnable interface –Synchronization–Using synchronized methods– Using synchronized statement- Inter thread Communication –Deadlock.	15

	I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.		
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, 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*, 7th Edition, Pearson Education India, 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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

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

Course Code: U23CS7	Title of the Course: Java Programming							
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship

	75	50	-	5	5	10	5	
UNIT				**Topic**			**Lect.hrs**	**Mode of Teaching**
UNIT I	Introduction						15	Lecture
UNIT II	Inheritance, Package, Interface, Exception handling						15	Lecture and Peer Group learning
UNIT III	Multithreaded Programming, IO streams						15	Lecture /Seminar
UNIT IV	AWT Control, Event handling						15	Lecture/Demo
UNIT V	Swings.						15	Lecture/ICT

Relevant to Global need	✅	**Employability oriented**		**Address Professional Ethics**	
Relevant to National need		**Entrepreneurship oriented**		**Address Gender Sensitization**	
Relevant to Regional need		**Skill Development oriented**	✅	**Address Environment and Sustainability**	
Relevant to Local need				**Address Human Values**	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
										Marks	
U23CS8P	**Java Programming Lab**	Core	-	-	3	-	3	3	25	75	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.

EXERCISE	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.
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.

The value **60** appears in a separate right-hand column spanning the rows.

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		**60**

	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, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2.	Gary Cornell, *Core Java 2 Volume I – Fundamentals,* Addison Wesley, 1999.

	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

Mapping with Programme Outcomes:

S-Strong   M-Medium   L-Low

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

Course Code: U23CS8P	Title of the Course: Java programming Lab							
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	60	-	45	5	5	-	5	
UNIT	Topic						Lect./Prac hrs	Mode of Teaching
UNIT I	Basics of object-oriented programming						15	practical Experience/Demo
UNIT II	Core java						15	practical Experience/Peer group
UNIT III	Event Handling.						10	practical Experience
UNIT IV	String Concepts						10	practical Experience

UNIT V	GUI and AWT controls	10	practical Experience

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS9	**Software Engineering**	Core	5	-	-	-	4	5	25	75	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	Course Objectives
I	**Introduction**: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable	15	

	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.	
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
IV	**Coding and Testing:** Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; 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	15

	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.	
	Total	**75**

Course Outcomes		

Course Outcomes	On completion of this course, students will;	
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, Fifth Edition, Prentice-Hall of India, 2018

References Books	
1.	Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997
2.	Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
3.	James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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 contribute d to each PO/PSO	15	13	14	10	10	11

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

Course Code: U23CS9	Title of the Course: Software Engineering						
Pedago gy	**T o t a l h r s**	**L e c t u r e**	**Practi cal Experi ence**	**Peer Gro up Lear ning**	**D e m o**	**Semina r/GD**	**ICT/B lended Learni ng**	**Fieldwork/inte rnship**
	75	55	-	5	5	5	5	
UNIT	**Topic**					**Lect.hrs**	**Mode of Teaching**
UNIT I	Introduction, Software Life Cycle Models					15	Lecture
UNIT II	Requirements Analysis and Specification, Software Design					15	Lecture and Peer Group learning
UNIT III	Function-Oriented Software Design, User-Interface design					15	Lecture /Seminar
UNIT IV	Coding and Testing, Software Reliability and Quality Management					15	Lecture/Demo
UNIT V	Computer Aided Software Engineering , Software Maintenance					15	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS10	**Database Management System**	Core	5	-	-	-	4	5	25	75	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 –		15

	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.	
	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", Ninth Edition
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016

Reference Books

1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

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

Course Code: U23CS10	Title of the Course: Database Management System						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	75	50	-	5	5	10	5	
UNIT	**Topic**					**Lect.hrs**	**Mode of Teaching**
UNIT I	Database Concepts					15	Lecture
UNIT II	Design Concepts					15	Lecture and Peer Group learning
UNIT III	Normalization of Database Tables, Introduction to SQL					15	Lecture /Seminar
UNIT IV	Advanced SQL, Sub Queries and Correlated Queries					15	Lecture/Demo
UNIT V	PL/SQL, Control Structures and Embedded SQL, PL/SQL Cursors and Exceptions:					15	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS11P	**Database Management System lab**	Core	-	-	5	-	4	5	25	75	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**	**Course Objective**
II	*I. SQL* 1. DDLCOMMANDS 2. DMLCOMMANDS 3. TCLCOMMANDS *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 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, PO4

Text Book	
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016

Reference Books	
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

Course Code: U23CS11P	Title of the Course: Database Management System lab						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar /GD	ICT/Blended Learning	Fieldwork/internship
	75	-	60	5	5	-	5	
UNIT	Topic					Lect. hrs	Mode of Teaching
UNIT I	Designing Of Data Base Systems, Foundation On The Relational Model Of Data And Normal Forms					15	practical Experience/Demo
UNIT II	Design Simple Database Models					15	practical Experience/Peer group
UNIT III	Queries Using SQL, PL/SQL					15	practical Experience
UNIT IV	Relational Model Of Data And Normal Forms.					15	practical Experience
UNIT V	Design Simple Database Models.					15	practical Experience/ICT

SEMESTER - VI

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Cred	Inst	Marks

								its	.Hours	CIA	External	Total
U23CS13	**Computer Networks**	Core	6	-	-	-	5	6	25	75	100

	Course Objective
LO1	To learn the basic concepts of Data communication and Computer network
LO2	To learn about wireless Transmission
LO3	To learn about networking and data link layer.
LO4	To study about Network communication.
LO5	To learn the concept of Transport layer

UNIT	Contents	No. of Hours
I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	18
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	18
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	18
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	18
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transporet Protocols (ITP) - Network Security: Cryptography	18
	Total	**90**

	Course Outcomes	**Programme Outcome**
CO	On completion of this course, students will	
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1

CO2	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3	To understand the concept of MAC	PO4, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO4

	Text Book
1	A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.

	Reference Books
1.	B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017
2.	F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008
3.	D. Bertsekas and R. Gallagher, "Data Networks", 2nd Edition, PHI, 2008.
4.	Lamarca, "Communication Networks", Tata McGraw- Hill, 2002

	Web Resources
1.	https://en.wikipedia.org/wiki/Computer_network
2.	https://citationsy.com/styles/computer-networks

Mapping with Programme Outcomes:

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

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

Course Code: U23CS13	Title of the Course: Computer Networks

Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	90	70	-	5	5	5	5	

UNIT	Topic	Lect.hrs	Mode of Teaching
UNIT I	Basics of Computer Network architecture, OSI and TCP/IP reference models	20	Lecture
UNIT II	Telephone systems using wireless network	20	Lecture and Peer Group learning
UNIT III	Datalink layer protocols ,MAC	20	Lecture /Seminar
UNIT IV	Routing and Congestion control algorithms	15	Lecture/Demo
UNIT V	Network security and define various protocols such as FTP, HTTP, Telnet, DNS	15	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	CIA	External	Total
U23CS14	**.Net Programming**	Core	6	-	-	-	5	6	25	75	100

Course Objective	
C1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
C2	To develop ASP.NET Web application using standardcontrols.
C3	To implement file handling operations.

C4	To handles SQL Server Database using ADO.NET.	
C5	Understand the Grid view control and XML classes.	

UNIT	Contents	No. of Hours
I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- C# Fundamentals: Primitive types and Variables – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – Stringoperations.	18
II	Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms – Web form standard controls: Properties and its events – HTML controls -List Controls: Properties and its events.	18
III	Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deletingfiles – File uploading.	18
IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controlsand its Properties – DataBinding	18
V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files - Website Security - Authentication - Authorization – Creating aWeb application.	18
	Total	90

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
2	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5

3	To Work On Various Controls Files	PO1, PO3, PO6
4	To create a web application using MicrosoftADO.NET.	PO2, PO6
5	To develop web applications using XML	PO1, PO3, PO6

Text Book	
1	SvetlinNakov,VeselinKolev& Co, Fundamentals of Computer Programming with C#,Faber publication,2019.
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

Reference Books	
1.	Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013.
3.	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc.2016.
4.	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.
5.	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010,APRESS,2010.

Web Resources	
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/
2.	https://www.javatpoint.com/net-framework

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	2	3
CO2	3	2	2	3	3	3
CO3	3	3	3	2	3	3
CO4	2	2	1	3	3	2
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	12	14	14	14

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

Course Code: U23CS14	Title of the Course: .Net Programming							
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	90	**70**	**-**	**5**	**-**	**10**	**5**	
UNIT	**Topic**						**Lect.hrs**	**Mode of Teaching**
UNIT I	Objectives of the .NET framework and ASP.NET with C# language.						20	Lecture
UNIT II	ASP.NET Web application using standard controls						15	Lecture and Peer Group learning
UNIT III	File handling operations						15	Lecture /Seminar
UNIT IV	SQL Server Database using ADO.NET.						20	Lecture/Demo
UNIT V	Grid view control and XML classes						20	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS15P	.Net Programming LAB	Core	-	-	6	-	3	6	25	75	100

<div align="center">Course Objective</div>

LO1	To develop ASP.NET Web application using standard controls.
LO2	To create rich database applications usingADO.NET.
LO3	To implement file handling operations.
LO4	To implement XML classes.
LO5	To utilize ASP.NET security features for authenticating the website

Sl. No	Programs	No. of Hours
1.	Create an exposure of Web applications and tools	
2.	Implement the Html Controls	
3.	Implement the Server Controls	
4.	Web application using Web controls.	
5.	Web application using List controls.	

6.	Web Page design using Rich control. Validate user input using Validation controls. Working with Fileconcepts.	
7.	Web application using Data Controls.	90
8.	Data binding with Web controls	
9.	Data binding with Data Controls.	
10.	Database application to perform insert, update and delete operations.	
11.	Database application using Data Controls to perform insert, delete, edit, paging and sorting operation.	
12.	Implement the Xml classes.	
13.	Implement Authentication – Authorization.	
14.	Ticket reservation using ASP.NET controls.	
15.	Online examination using ASP.NET controls	
Total		**90**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO 1	To create web applications and implement various controls	PO1, PO2, PO4
CO2	Create web pages in Rich control.	PO3, PO5
CO3	Develop knowledge about file handling operations	PO1, PO4, PO5
CO4	An ability to design XML classes	PO2, PO4, PO6
CO5	To develop a software to solve real-world problems using ASP.NET	PO1,PO3, PO5, PO6

Text Book	
1	SvetlinNakov, VeselinKolev& Co, Fundamentals of Computer Programming with C#, Faber publication,2019.
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

Reference Books	
1.	Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres,2013.
3.	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc.2016.
4.	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.
5.	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS,2010.

Web Resources	
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/
2.	https://www.javatpoint.com/net-framework

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

Course Code: U23CS15P	Title of the Course: .Net Programming Lab						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/ Blended Learning	Fieldwork/internship
	90	-	75	5	5	-	5	
UNIT	Topic					Lect. hrs	Mode of Teaching
UNIT I	ASP.NET Web application using standard controls.					20	practical Experience/Demo
UNIT II	Rich database applications using ADO.NET					15	practical Experience/Peer group
UNIT III	File handling operations					15	practical Experience

UNIT IV	XML classes.	15	practical Experience
UNIT V	ASP.NET security features for authenticating the website	25	practical Experience/ICT

Generic Elective Courses

Relevant to Global need	✅	**Employability oriented**				**Address Professional Ethics**				
Relevant to National need		**Entrepreneurship oriented**				**Address Gender Sensitization**				
Relevant to Regional need		**Skill Development oriented**	✅			**Address Environment and Sustainability**				
Relevant to Local need						**Address Human Values**				

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS35	Discrete Mathematics – I	**Elect**	4	-	-		4	25	75	100

	Learning Objectives
LO1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.
LO2	To Explain the Relations concepts and their properties
LO3	To know the Applications of recurrence relations
LO4	To understand the Graphs and Graphs models
LO5	To explain the Matrices concepts
UNIT	**Contents** **No. Of. Hours**

I	**_SET THEORY_** Introduction- set and Its Element – Set Description (Roster, Set Builder and cardinal number method) Types of Sets- Set Operations and Laws of set Theory. Partition of sets. Minsets-Countable and un Countable set. Algebra of sets andDuality		**12**
II	**_MATHEMATICAL LOGIC_** Basic Logic and Proof, logical operations – Logic Propositional equivalence, Predicates and Quantities, Tautology-Contradiction-Methods of proofs(Direct and Indirect)- Function- Definition-Notation- Types of Function- Composition of Functions-		**12**
III	**_NUMBER THEORY_** The Integers and Division, Integers and Algorithms,(Multiplication, Addition and Division-Sequences and Summations, Recursive algorithms, Program correctness		**12**
IV	**_COMBINATORICS_:** The basics of counting, the pigeonhole principle, Permutations and Combinations, Binomial coefficients, Generalized permutations and combinations		**12**
V	**_RELATIONS_** Relations – Relations and their properties, Representing Relations, Closures of relations, Equivalence relations, Partial orderings-Recurrence Relations Binary Relations.		**12**

Total hours	60
Course Outcomes	**Programme Outcomes**

CO	On completion of this course, students will	
CO1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	To understand different mathematical logics and functions	PO1, PO2, PO3, PO4, PO5, PO6

CO3	To Understanding the different form of number theory	PO1, PO2, PO3, PO4, PO5, PO6
CO4	To gain knowledge on set theory	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Able to understand Relations and its applications	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Discrete Mathematics and its applications, Seventh Edition, Kenneth.H.Rosen, McGrawHill Publishing Company, 2012.	
2.	Discrete Mathematics, M Venkatraman, N Sridharan and N Chandrasekaran, The National Publishing Company, 2009	
3.	J.K Sharma "DISCRETE MATHEMATICS" 3 rd Edition Macmillan Reprint2011	
Reference Books		
1.	Modern Algebra - S.Arumugam and A. Thangapandi Isaac, Scitechpublications 2005.	
2.	Invitation to Graph Theory-S.Arumugam and S.Ramachandran, Scitech Publications,2005, Chennai.	
3.	Discrete Mathematical Structures with applications to Computer Science - Tremblay and Manohar, McGraw Hill,1997.	
Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

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

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

Course Code: U23GS35	Title of the Course: Discrete Mathematics – I						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/ Blended Learning	Fieldwork/internship
	60	50		5		-	5	

UNIT	Topic	Lect. hrs	Mode of Teaching
UNIT I	Mathematical concepts like set theory, logics, number theory, combinatory and relations.	12	Lecture
UNIT II	Mathematical logics and functions	12	Lecture/peer group
UNIT III	Different form of number theory	12	Lecture
UNIT IV	Set theory	12	Lecture/ICT
UNIT V	Relations and its applications	12	Lecture

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	T o t a l
U23GS50P	**PROGRAMMING IN C LAB**	Core	-	-	2	-	-	2	-	-	-
Course Objective											

			Cour se Objec tives
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.		
LO2	To understand the concept using if statements and loops		
LO3	This unit covers the concept of Arrays and Functions		
LO4	This unit covers the concept of Structurs and unions and Preprocessors		
LO5	To understand the concept of implementing pointers and files		
UNIT	**List of Excercises**	**No. of Hours**	**Cour se Objec tives**
I	**Unit I : Variables, Data types, Constants and Operators** 1.Evaluation of expression ex: $((x+y)\,^2 * (x+z))/w$ 2.Temperature conversion problem (Fahrenheit to Celsius) 3.Program to convert days to months and days (Ex: 364 days = 12 months and 4 days) 4.Solution of quadratic equation 5.Salesman salary (Given: Basic Salary, Bonus for every item sold, commission on the total monthly sales)	12	
II	**Unit II: Decision making Statements** 6.Maximum of three numbers 7.Calculate Square root of five numbers (using gototatement) 8.Pay-Bill Calculation for different levels of employee (Switch statement) 9. Fibonacci series 10.Floyds Triangle 11.Pascal's Triangle	12	
III	**Unit III: Arrays, Functions and Strings** 12.Prime numbers in an array 13.Sorting data (Ascending and Descending) 14.Matrix Addition and Subtraction 15.Matrix Multiplication 16.Function with no arguments and no return values 17.Function that convert lower case letters to upper case	12	

	18. Factorial using recursion.		
	19.Perform String Operations using Switch Case.		
IV	**Unit IV : Structures and Macros**		
	20.Structure that describes a Hotel (name, address, grade, avg room rent, number of rooms) Perform some operations (list of hotels of a given grade etc.)	12	
	21. Using Pointers in Structures.		
	22.Cricket team details using Union.		
	23.Write a macro that calculates the max and min of two numbers		
	24.Nested macro to calculate Cube of a number.		
V	**Unit V : Pointers and Files**		
	25.Evaluation of Pointer expressions	12	
	26.Function to exchange two pointer values		
	27.Creation, insertion and deletion in a linked list		
	28.Program to read a file and print the data.		
	29.Program to receive a file name and a line of text as command line arguments and write the text to the file		
	30. Program to copy the content of one file to another file.		
	Total	**60**	

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6
3	Apply the programming principles learnt in real-time problems	PO3,PO4

4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
5	Code, debug and test the programs with appropriate test cases	PO4,PO6

Text Book	
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books	
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021

Web Resources	
1.	https://codeforwin.org/
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	http://en.cppreference.com/w/c
4.	http://learn-c.org/
5.	https://www.cprogramming.com/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	2	3	3	3	3	3
CO 3	3	3	2	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

Weight age of course contributed to each PSO	14	15	14	15	15	14

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

Course Code: U23GS50P	Title of the Course: **PROGRAMMING IN C LAB**						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/ Blended Learning**	**Fieldwork/internship**
	60	-	45	5	5	-	5	
UNIT	**Topic**						**Lect. hrs**	**Mode of Teaching**
UNIT I	Program structure of C						12	practical /Demo
UNIT II	Decision making Statements						12	practical /Peer group
UNIT III	Arrays, Functions and Strings						12	practical Experience
UNIT IV	Structures and Macros						12	practical Experience
UNIT V	Pointers and Files						12	practical /ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS45	Digital Logic Fundamentals	**Elect**	4	-	-		4	25	75	100
Learning Objectives										
LO1	ItaimstotrainthestudenttothebasicconceptsofDigitalLogicFundamentals									

LO2	To impart the in-depth knowledge of logic gates, Boolean algebra, combinational circuits and sequential circuits.	
LO3	To explain the concept of Combinational Logic and counters	
LO4	To introduce the concepts of Flip-Flops, Registers	
LO5	To explain the Asynchronous and Synchronous Counters	
UNIT	**Contents**	**No. Of. Hours**
I	NumberSystemsandCodes:NumberSystem–BaseConversion – BinaryCodes – Code Conversion. Digital Logic: Logic Gates – Truth Tables – UniversalGates.	**12**
II	Boolean Algebra: Laws and Theorems – SOP, POS Methods – Simplification ofBooleanFunctions–UsingTheorems,K-Map,Prime–Implicant Method–Binary Arithmetic: Binary Addition – Subtraction – Various Representations ofBinaryNumbers–ArithmeticBuildingBlocks–Adder–Subtractor.	**12**
III	Combinational Logic: Multiplexers – Demultiplexers – Decoders – Encoders –CodeConverters–ParityGeneratorsandCheckers.	**12**
IV	SequentialLogic:RS,JK,D,andTFlip-Flops–Master-Slave Flip-Flops.Registers:ShiftRegisters–TypesofShiftRegisters.	**12**
V	Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-DownCounters– Ring Counters. Memory: Basic Terms and Ideas –Types of ROMs –TypesofRAMs.	**12**
Total hours		**60**

	Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Identify the logic gates and their functionality.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Perform number conversions from one system to another system	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the functions of combinational circuits	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Perform number conversions	PO1, PO2, PO3, PO4, PO5, PO6

CO5	Perform Counter design and learn its operations	PO1, PO2, PO3, PO4, PO5, PO6

	Textbooks
1	Donald P.Leach and A.P.Malvino, *Digital Principles and Applications*–TMH Education Pvt limited –Eighth Edition.
2	V.RajaramanandT.Radhakrishnan,*Digital Computer Design*, Prentice HallofIndia,2001
3	M.MorisMano,*DigitalLogicandComputerDesign*,PHI,2001
4	T.C.Bartee,*DigitalComputerFundamentals*,6thEdition,TataMcGrawHill,1991

	Web Resources
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

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

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

Course Code: U23GS45	Title of the Course: Digital Logic Fundamentals						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/ Blended Learning	Fieldwork/internship
	60	50		5		-	5	
UNIT	Topic					Lect. hrs	Mode of Teaching
UNIT I	Number Systems and Codes, Digital Logic					12	Lecture
UNIT II	Boolean Algebra					12	Lecture/peer group
UNIT III	Combinational Logic:					12	Lecture
UNIT IV	Sequential Logic					12	Lecture/ICT
UNIT V	Counters					12	Lecture

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Cre	Marks

							d i t s	C I A	Ex ter na l	Tot al
U23GS3 7	Statistical Methods and its Application-I	**Elect**	4	-	-		4	25	75	100

	Learning Objectives
LO1	To make understand the fundamentals of Statistics.
LO2	Define the principal concepts about probability.
LO3	To explain the Coefficient of Variation
LO4	To understand the concept of Conditional Probability
LO5	Explain the concept of a random variable and the probability distributions.

UNIT	Contents	No. Of. Hours
I	Introduction: Quantitative Techniques and Statistics – Concept of Quantitative techniques – Statistics-Introduction- Data Measurements and Classification- Collection of data – Methods of Collection of Primary Data – Drafting a Questionnaire or a Schedule- Specimen Questionnaire- Secondary Data – Reliability of Secondary Data – classification of Data – Methods of Classification-- Diagrammatic and Graphical Presentation- Types of Diagrams-Graphs – Histograms- Frequency Polygon-Ogives or Cumulative Frequency Curve.	**12**
II	Measures of Central Tendency- Various Measures Central Tendency – Arithmetic mean- Calculation of simple Arithmetic mean- Shortcut methods for calculating Arithmetic mean – Arithmetic mean in case of discrete frequency distribution – Calculation of Arithmetic mean – continuous grouped data – Introduction - Significance of measuring variation- properties of a good measure of variation- methods of studying variations- Absolute and Relative measures of variation – Range- Merits and Demerits of Range – Use of Range – Inter Quartile Range- Quartile Deviation or Semi-Interquartile Range- Merits and limitations of quartile deviation- Inter Percentile Range Derivation and its Coefficient – The Average Deviation / Mean Deviation-Calculation of Mean Deviation from Discrete Frequency distribution – Calculation of mean Deviation – continuous series – Merits and Demerits of mean Deviation- Standard Deviation- Variance in case of graphed Data – Another formaula to find variance- shorcut methods – Step Deviation method – Change of scale- Coefficient of Variation and Consistency.	**12**
III	Skewness, Moments and Kurtosis- Introduction-Difference between variation and Skewness – measures of skewness – Karl Pearsons-	**12**

		Karl Pearsons Coefficient of Skewness- other measures based on positional measures - Moments of Skewness – Karl Pearsons Betas and Gammas coefficients based on central Moments – Kurtosis – Concept of Kurtosis -Types of Curves	
IV		Correlation – Definition of Correlation – Significance of the study of correlation – Correlation and Causation- Scatter Diagram- Merits and Limitations of the method – Karl Pearsons Coefficient of Correlations – Covariance-Karl Pearson Coefficient of Correlations – Shortcut methods – coefficient of Correlation and Probable error	12
V		Regression Analysis – Introduction- Regression Equation – Difference between Correlation and Regression Analysis- Uses of Regression Analysis – Linear and Non-Linear Regression- Regression Equation X on Y – Regression Equation Y on X - regression Lines - Probability Theory – Introduction to Probability – Concept of Probability – Basic Mathematical Concepts used – Permutations & Combinations – Experiments – Bayes Theorem – Sampling and Sampling Distributions – Methods and Data Collection – Sampling and Non-Sampling Errors – Sampling Errors-Non-Sampling Errors – Principles of Sampling – Law of Statistical Regularity – Principles of Inertia of Large Numbers- Merits of Sampling Methods – Limitations of Sampling- Methods of Sampling – Simple Random Sampling – Stratified Random Sampling – Systematic Sampling – Steps to select a systematic sampling – Multi-stage sampling	12
	Total hours		**60**
	Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will		
CO1	Summarize the concepts of statistical methods		PO1, PO2, PO3, PO4, PO5, PO6
CO2	Analyse the different Statistical measures of data		PO1, PO2, PO3, PO4, PO5, PO6
CO3	Derive the marginal and conditional distributions of random variables, translate realworld problems into probability models		PO1, PO2, PO3, PO4, PO5, PO6
CO4	To understanding the concepts of Probability of an event		PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables		PO1, PO2, PO3, PO4, PO5, PO6

	Textbooks
1	Text Book : Quantative Techniques and Statistics : K.L. Sehgal Unit I : Chapters : 1.1,1.2,2.5-2.10,2.12,2.12.1,3.3,3.4,3.5.1,3.5.2,3.7 Unit II : Chapters : 4.3,4.4,4.4.1,4.4.2,4.4.3,5.1 To 5.13 Unit III : Chapters : 6.1To 6.6 Unit IV : Chapters :7.1 To 7.5 , 7.9 Unit V : Chapters :11.1 To 11.4 , 11.14, 14.1 To 14.6, 14.15 Text Book: statistical Methods – Dr.S.P.Gupta Unit V : Chapters : 11.2 To 11.5

	Reference Books
1.	Statistics, Dr. S.Arumugam and A.ThangapandiIssac, New Gamma Publication house, 2002.
2.	KishorS. Trivedi - Probability and statistics with reliability queuing and Computer Science Applications - Prentice Hall of India (P) Ltd., New Delhi -1997
3.	Discrete Mathematics - Seymour Lipschutz, Marc Lars Lipson Schaum's Outlines- by, 3rd Edition., Tata McGraw Hill, Education Pvt. Ltd., New Delhi. 5th Reprint, 2012
	Web Resources
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

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

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

Course Code: U23GS35	Title of the Course: Statistical Methods and its Application-I

Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	60	50		5		-	5	

UNIT	Topic	Lect. hrs	Mode of Teaching
UNIT I	Introduction	12	Lecture
UNIT II	Measures of Central Tendency	12	Lecture/peer group
UNIT III	Skewness, Moments and Kurtosis	12	Lecture
UNIT IV	Correlation	12	Lecture/ICT
UNIT V	Regression Analysis	12	Lecture

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS51P	**PHP Programming Lab**	**Core**	-	-	2	-	-	-	-	-

	Learning Objectives
LO1	**To learn about Database Applications and the Web**
LO2	To learn about PHP scripting Language
LO3	To learn about PHP OOPs concept
LO4	To learn about Querying Database
LO5	To learn about PHP reporting

LAB EXERCISES	**Required Hours**

1. Write a PHP Coding for:
    i.   Create a Times Table
    ii.   Use Include File Concept
 	
2. Write a PHP Coding to handle:
    i.   Global Variable
    ii.   Static Variable
 	
3. Write a PHP Coding for:
    i.   Pass by Reference
    ii.   Handling Default Parameter
 	
4. Write a PHP Coding to handle Array Functions:
    i.   Counting number of elements
    ii.   Finding Min, and Max
    iii.   Explode and Implode
    iv.   Sorting
    v.   Cm to inch calculation for all array element
 	
5. Write a PHP Coding to handle String Functions:
    i.   Padding
    ii.   Change Case
    iii.   Trimming
    iv.   Finding the Positions of Characters
    v.   Handling Substring
    vi.   Handling String Replace
 	
6. Write a PHP Coding for handling Constructor.
 	
7. Write a PHP Coding for handling Destructor
 	
8. Write a PHP Coding for handling Private Member Function.
 	
9. Write a PHP Coding for handling Static Member Variables.
 	
10. Write a PHP Coding for handling Inheritance.
 	
11. Write a PHP Coding for Exception handling.
 	
12. Write a PHP Coding to connect PHP with MYSQL using PEAR.
 	
13. Write a PHP Coding for database connectivity (PHP & MYSQL).
 	
14. Write a PHP Coding for database connectivity (PHP & MYSQL) with error handling.
 	
15. Write a PHP Coding for database connectivity (PHP & MYSQL) and format the output.
	75

16. Write a PHP Coding for database connectivity (PHP & MYSQL) using template concept.	
17. Write a PHP Coding to pass parameter to PHP using HTML forms, Hyperlinks, and Browser.	

Course Outcomes	
On completion of this course, students will	
CO1	Learn the PHP Three tier Architecture, PHP Scripting language , Condition and Branches , Loops basics of computer, Construct the structure of the required things in computer, learn how to use it.
CO2	Develop PHP scripting Language
CO3	Concept of Oops, SQL ,MySQL Queries
CO4	Work with Querying Database, Processing User Input, PEAR Overview, Core Components, Packages, Writing to Web databases
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	14	15	15	15

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

Course Code: : U23GS51P	Title of the Course : PHP PROGRAMMING LAB

Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/ Blended Learning	Fieldwork/internship
	75	-	60	5	5	-	5	

UNIT	Topic	Lect. hrs	Mode of Teaching
UNIT I	Database Applications and the Web	15	practical /Demo
UNIT II	PHP Scripting Language	15	practical /Peer group
UNIT III	Concept of Oops, SQL ,MySQL Queries	15	practical Experience
UNIT IV	Work with Querying Database	15	practical Experience
UNIT V	PHP reporting	15	practical /ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total

U23GS47	Resource Management Techniques	Elect	4	-	-	4	25	75	100

	Learning Objectives
LO1	To introduce the concepts of OR
LO2	To explain the Linear Programming Problem
LO3	To illustrate the Simplex Method
LO4	To know the Duality Theorems
LO5	To understanding the Methods for finding IBFS for the Transportation Problems

UNIT	Contents	No. Of. Hours
I	Development of OR: Definition of OR – Modeling - Characteristics and Phases - Tools, Techniques & Methods - scope of OR.	12
II	Linear Programming Problem: Formulation - Slack & surplus variables - Graphical solution of LPP.	12
III	Simplex Method: Computational Procedure - Big-M method - Concept of duality in LPP - Definition of primal dual problems - General rules for converting any primal into its dual.	12
IV	Duality Theorems: (without proof) Primal dual correspondence - Duality and Simplex method - Mathematical formulation of assignment problem - Method for solving assignment problem.	12
V	Mathematical formulation of Transportation Problem: Methods for finding IBFS for the Transportation Problems.	12
Total hours		60

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	To understanding the concepts of Development of OR	PO1, PO2, PO3, PO4, PO5, PO6
CO2	develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems	PO1, PO2, PO3, PO4, PO5, PO6

CO3	Solve the problems of Simplex Method	PO1, PO2, PO3, PO4, PO5, PO6
CO4	To study the Duality Theorems	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Finding initial basic feasible and optimal solution of the Transportation problems	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks	
1	Operations Research, S.D.Sharma, KedarNath Ram Nath& Co Publishers, 12th Edition Reprint 2000 Digital Unit I : UNIT I- Chapter-1(1.1, 1.2, 1.4,1.5,1.8,1.9,1.10,1.11)-1.3,1.4,1.6,1.13,to 1.15 Unit II : UNIT II -Chapter-1 (1.1 to 1.5)-2.3 to 2.35 Unit III : Unit II- Chapter 3 (3.3,3.5.4)-2.61 to 2.79 Unit II – Chapter 5 (5.1 to 5.3)2.142 to 2.145 Unit IV : Unit II - Chapter-5 (5.6,5.7)- 2.157,2.160,2.161 Unit II –Chapter 9(9.2,9.4)-2.244,2.246,2.250,2.251 Unit V : Unit II -Chapter-10 (10.1 to 10.2)- 2.276,2.283,2.284,2.288

Reference Books	
1.	Operation Research, Nita H.Shah, Ravi M.Gor and Hardiksoni,PrenticeHall of India Pvt. Ltd., New Delhi 2008.
2.	Operation Research, R.Sivarethinamohan, Tata McGraw Hill, 2005.
3.	Operations Research – An Introduction by HamdyA.Taha. Ninth Edition, Dorling Kindersley Pvt. Ltd., Noida, India, 2012

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3

CO4	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**3**
Weightage of course contributed to each PSO	**15**	**14**	**14**	**15**	**15**	**15**

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

Course Code: U23GS47	Title of the Course: Resource Management Techniques						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/ Blended Learning**	**Fieldwork/internship**
	60	50		5		-	5	
UNIT	**Topic**					**Lect. hrs**	**Mode of Teaching**
UNIT I	Concepts of Development of OR					12	Lecture
UNIT II	Linear Programming Problem					12	Lecture/peer group
UNIT III	Simplex Method					12	Lecture
UNIT IV	Duality Theorems					12	Lecture/ICT
UNIT V	Transportation problems					12	Lecture

Discipline Specific Elective Courses

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS19	**Data mining and warehousing**	Core	5	-	-	-	4	5	25	75	100

Learning Objectives	
LO1	To provide the knowledge on Data Mining and Warehousing concepts and techniques
LO2	To study the basic concepts of Data Mining, Architecture and Comparison.
LO3	To study a set of Mining Association Rules, Data Warehouses.
LO4	To study about Classification and Prediction, Classifier Accuracy
LO5	To study the basic concepts of cluster analysis, Cluster Methods

UNIT	Contents	No. of Hours	Course Objectives
I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction	15	
II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining	15	

	Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.	
III	Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.	15
IV	Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy	15
V	Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Petitioning Methods – Hierarchical Methods-Density Based Methods – GRID Based Method – Model based Clustering Method	15
	Total	**75**

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	To understand the basic concepts and the functionality of the various data mining and data warehousing component	PO1, PO3, PO6, PO8
CO2	To know the concepts of Data mining system architectures	PO1,PO2,PO3,PO6
CO3	To analyze the principles of association rules	PO3, PO5
CO4	To get analytical idea on Classification and prediction methods	PO1, PO2, PO3, PO5
CO5	To Gain knowledge on Cluster analysis and its methods.	PO2, PO4, PO6

Text Books (Latest Editions)	
1.	Han and M. Kamber, "Data Mining Concepts and Techniques", 2001, Harcourt India Pvt. Ltd, New Delhi.

References Books (Latest editions)	
1.	K.P. Soman, ShyamDiwakar, V. Ajay "Insight into Data Mining Theory and Practice ",Prentice Hall of India Pvt. Ltd, New Delhi
2.	Parteek Bhatia, 'Data Mining and Data Warehousing: Principles and Practical Techniques', Cambridge University Press, 2019
Web Resources	
1.	https://www.topcoder.com/thrive/articles/data-warehousing-and-data-mining#:~:text=Data%20warehousing%20is%20a%20method,compiled%20in%20the%20data%20warehouse.
2.	https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing
3.	https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	2
CO3	3	2	3	3	3	2
CO4	3	2	3	2	3	3
CO5	2	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	14	14	14	13

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

Course Code: U23DS19	Title of the Course: Data mining and warehousing							
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship

UNIT		75	55	-	5	-	10	5		
UNIT		**Topic**							**Lect.hrs**	**Mode of Teaching**
UNIT I		Basic concepts various data mining and data warehousing component							15	Lecture
UNIT II		Data mining system architectures							15	Lecture and Peer Group learning
UNIT III		Principles of association rules							15	Lecture /Seminar
UNIT IV		Classification and prediction methods							15	Lecture/Demo
UNIT V		Cluster analysis and its methods.							15	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS20	**Operating Systems**	Elective	4	-	-	-	3	4	25	75	100
Learning Objectives											
LO1	Understanding the design of the Operating System										
LO2	Imparting knowledge on CPU scheduling, Process and Memory Management.										
LO3	To code specialized programs for managing overall resources and operations of the computer.										
LO4	Explain the Job and processor scheduling										
LO5	To understand the Virtual Memory organization										
UNIT	**Contents**										**No. of Hours**

I	**Introduction**: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. **Process concepts:** definition of process, process states-Life cycle of a process, process management- process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.	12
II	**Asynchronous concurrent processes:** mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm,software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. **Concurrent programming:** monitors, message passing	12
III	**Deadlock and indefinite postponement:** Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery	12
IV	**Job and processor scheduling:** scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling	12
V	**Real Memory organization and Management**:: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition	12

	multiprogramming, variable partition multiprogramming, Memory swapping		
	Virtual Memory organization: virtual memory basic concepts, multilevel storage organization,		
	block mapping, paging basic concepts, segmentation, paging/segmentation systems.		
	Virtual Memory Management: Demand Paging, Page replacement strategies		
	Total		**60**

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
CO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
CO2	know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.	PO4, PO5
CO4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
CO5	understand memory organization and management	PO2, PO4

	Text Book
1	H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011

	Reference Books
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2.	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Nineth Edition, John Wiley &Sons(ASIA) Pte Ltd.,2012

	Web Resources
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

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

Course Code: U23DS20	**Title of the Course**: Operating Systems						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	60	45	-	5	-	5	5	
UNIT	**Topic**					**Lect.hrs**	**Mode of Teaching**
UNIT I	Fundamentals of OS					12	Lecture
UNIT II	Threads and semaphores					12	Lecture and Peer Group learning
UNIT III	Deadlock and its impact over OS					12	Lecture /Seminar
UNIT IV	Scheduling Algorithms and its types.					12	Lecture/Demo
UNIT V	Memory organization and management					12	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS21	**COMPUTER GRAPHICS**	Core	5	-	-	-	3	5	25	75	100
Course Objective											
C1	To learn various concepts of Computer Graphics										

C2	To learn various Line,Circle and Ellipse Drawing Algorithm	
C3	To learn Attributes of Output primitives.	
C4	To learn about Two dimensional transformation.	
C5	To learn various type of Two dimensional Viewing.	

UNIT	Contents	No. of Hours
I	A Survey of Computer Graphics: Computer-Aided Design – Presentation Graphics Computer Art – Entertainment – Education and Training – Visualization – Image Processing – Graphical User Interfaces. Overview of Graphic Systems: Video Display Devices – Raster Scan Systems - Random Scan Systems – Input Devices – Hard Copy Devices	18
II	Output Primitives: Points and Lines – Line Drawing Algorithms – Circle Generation Algorithms – Ellipse Generating Algorithms - Other Curves-Filled Area primitives	18
III	Attributes of Output Primitives: Line Attributes – Curve Attributes – Color and Gray Scale Levels – Area Fill Attributes – Character Attributes – Bundled Attributes – Inquiry Functions – Anti aliasing.	18
IV	Two-Dimensional Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations – Transformation between Coordinate Systems.	18
V	Two-Dimensional Viewing : The Viewing Pipeline – Viewing Coordinate Reference Frame – Window – to – Viewport Coordinate Transformation – Two-Dimensional Viewing Functions – Clipping Operations – Point Clipping – Cohen Sutherland Line Clipping – Sutherland Hodgeman Polygon Clipping - Curve Clipping – Text Clipping – Exterior Clipping.	18
	Total	90

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
2	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5
3	To Work On Various Controls Files	PO1, PO3, PO6
4	To create a web application using MicrosoftADO.NET.	PO2, PO6
5	To develop web applications using XML	PO1, PO3, PO6

	Text Book
1	COMPUTER GRAPHICS – Donald Hearn, M. Pauline Baker, PHI, 2nd Edition, 1994

	Reference Books
1.	Computer Graphics, Multimedia & Animation – Malay K.Pakhira, PHI, New Delhi, 2008.
2.	Fundamentals of Computer Graphics and Multimedia – D.P.Mukherjee, PHI, New Delhi, 1999

	Web Resources
1.	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	2	3
CO2	3	2	2	3	3	3
CO3	3	3	3	2	3	3
CO4	2	2	1	3	3	2
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	12	14	14	14

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

Course Code: U23DS21	Title of the Course: COMPUTER GRAPHICS							
Pedago gy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	90	70	-	5	-	10	5	
UNIT	Topic					Lect.hrs	Mode of Teaching	
UNIT I	Survey of Computer Graphics					18	Lecture	
UNIT II	Output Primitives					18	Lecture and Peer Group learning	
UNIT III	Attributes of Output Primitives					18	Lecture /Seminar	
UNIT IV	Two-Dimensional Geometric Transformations					18	Lecture/Demo	
UNIT V	Two-Dimensional Viewing					18	Lecture/ICT	

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS22	**Artificial Intelligence**	Elective	5	-	-	-	3	5	25	75	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

CO	Course Outcomes	Programme Outcome
	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" , 3rd Edition, Prentice Hall.
	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

	Reference Books
1.	Trivedi, M.C., "A Classical Approach to Artifical 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

Course Code: U23DS22	Title of the Course: Artificial Intelligence						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	60	45	-	5	-	5	5	
UNIT	Topic						Lect.hrs	Mode of Teaching

UNIT I	Concepts of AI Techniques.	12	Lecture
UNIT II	Search Algorithm in AI.	12	Lecture and Peer Group learning
UNIT III	Probabilistic reasoning and models in AI.	12	Lecture /Seminar
UNIT IV	Markov Decision Process.	12	Lecture/Demo
UNIT V	Various type of Reinforcement learning Techniques.	12	Lecture/ICT

Skill Enhancement Courses

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23SES1P	**OFFICE AUTOMATION**	Skill Enha. Course (SEC)	-	-	2	-	2	2	25	75	100

<table>
<tr><td colspan="3" align="center">Learning Objectives</td></tr>
</table>

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	**Introductory concepts:** Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS– UNIX–Windows. Introduction to Programming Languages.	6
II	**Word Processing:** Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing–Preview, options, merge.	6
III	**Spreadsheets:**Excel–opening,enteringtextanddata,formatting,navigating;Formulas–entering,handlingand copying; Charts–creating, formatting and printing,analysistables,preparationoffinancialstatements,introductiontodataanalytics.	6
IV	**Database Concepts:** The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query	6

	language(MS–Access).	
V	**Power point:** Introduction to Power point - Features – Understanding slide typecasting &viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition–Animation effects, audio inclusion, timers.	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,PO7
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8

	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 Outcomes:

MAPPING TABLE

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	14	15	15	15

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

Course Code: U23SES1P	Title of the Course: OFFICE AUTOMATION						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	30	15	-	5	-	5	5	
UNIT	Topic					Lect.hrs	Mode of Teaching
UNIT I	Basics of computers and its components					6	Lecture
UNIT II	Creating Documents, spreadsheet and presentation.					6	Lecture and Peer Group learning
UNIT III	Database and implement the Query in Database.					6	Lecture /Seminar
UNIT IV	Different automation tools.					6	Lecture/Demo
UNIT V	Utilize the automation tools for documentation, calculation and presentation purpose.					6	Lecture/ICT

Relevant to Global need	✅	Employability oriented	✅	Address Professional Ethics	

Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

	Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	T
										Marks		
	U23SES2P	**MULTIMEDIA LAB**	Sec	-	-	2	-	2	2	25	75	100

Course Objective	
LO1	To understand the basic functionalities of pagemaker
LO2	To Learningand working with coral DRAW
LO3	To Learningand understanding the concept of the flash
LO4	Learning and understanding the concept of the Photoshop
LO5	To design an image

UNIT	List of Excercises	No. of Hours	Course Objectives
I	Editing Text ,Formatting Text ,Tracking – Kerning ,Leading ,Importing Style		
II	Drawing Basic Geometric Figures , Saving a file – Closing a file Opening and Exiting CorelDRAW9/10 ,Views – The View Manager Drawing and Selecting: Getting familiar with the toolbar		

		Getting started with the project Working with text: The text tool – Getting started with the Book Cover	
	III	Basic tools used in Flash.Develop a Flash application using motion tween. Develop a Flash application using shape tween. Develop a Flash application for ball bouncing using motion guide path.	
	IV	Getting started with Photoshop 6/7,Opening existing file, Guidelines for working with tool bar Creating a new file. Working with images and colors: Bitmap and vector images	
	V	Opening recently used files,Image size ,Editing Photographs for own Album Editing Images ,Color Modes	
		Total	**60**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO	On completion of this course, students will	
CO1	understand the concepts, importance, application and the process of developing multimedia	PO1
CO2	To have basic knowledge and understanding about image related processings	PO1, PO2
CO3	To understand the framework of frames and bit images to animations	PO4, PO6
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4, PO5, PO6
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3, PO6

Textbooks	
1	TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-Hill,2001.

Reference Book	
1.	RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications",Pe

	arsonEducation,2012.

<table>
<tr><td colspan="2" align="center">Web Resources</td></tr>
<tr><td>1.</td><td>https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/</td></tr>
</table>

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	3	3	3	2
CO2	2	3	2	3	2	1
CO3	1	2	3	3	3	2
CO4	3	2	2	2	1	2
CO5	2	3	1	3	3	3
Weightage of course contributed to each PSO	10	12	11	14	12	10

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

<table>
<tr>
<td>Course Code:
U23SES2P</td>
<td colspan="8">Title of the Course: MULTIMEDIA LAB</td>
</tr>
<tr>
<td>Pedagogy</td>
<td>Total hrs</td>
<td>Lecture</td>
<td>Practical Experience</td>
<td>Peer Group Learning</td>
<td>Demo</td>
<td>Seminar/GD</td>
<td>ICT/Blended Learning</td>
<td>Fieldwork/internship</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>15</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>UNIT</td>
<td colspan="6" align="center">Topic</td>
<td>Lect.hrs</td>
<td>Mode of Teaching</td>
</tr>
<tr>
<td>UNIT I</td>
<td colspan="6">Concepts, importance, application and the process of developing multimedia</td>
<td>6</td>
<td>Lecture</td>
</tr>
<tr>
<td>UNIT II</td>
<td colspan="6">Basic knowledge and understanding about image related processing.</td>
<td>6</td>
<td>Lecture and Peer Group learning</td>
</tr>
<tr>
<td>UNIT III</td>
<td colspan="6">The framework of frames and bit images to animations</td>
<td>6</td>
<td>Lecture /Seminar</td>
</tr>
<tr>
<td>UNIT IV</td>
<td colspan="6">Multimedia projects and stages of requirement in phases of project.</td>
<td>6</td>
<td>Lecture/Demo</td>
</tr>
<tr>
<td>UNIT V</td>
<td colspan="6">Multimedia planning, designing, and producing</td>
<td>6</td>
<td>Lecture/ICT</td>
</tr>
</table>

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23SES3	Multimedia Systems	**Skill Enhancement Course**	-	-	2		2	25	75	100

Learning Objectives	
LO1	Understand the definition of Multimedia
LO2	To study about the Image File Formats, SoundsAudio File Formats
LO3	Understand the concepts of Animation and Digital Video Containers
LO4	To study about the Stage of Multimedia Project
LO5	Understand the concept of Ownership of Content Created for Project Acquiring Talent

UNIT	Contents	No. Of. Hours
I	Multimedia Definition-Use Of Multimedia-Delivering Multimedia- Text: About Fonts and Faces - Using Text in Multimedia.	**6**
II	Computers and Text Font Editing and Design Tools-Hypermedia and Hypertext.	6

	Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images - Color - Image File Formats.	
III	Sound: The Power of Sound -DigitalAudio-MidiAudio-Midivs.DigitalAudio-MultimediaSystemSounds Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project	**6**
IV	Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work.	6
V	Video: Using Video - Working with Video and Displays-Digital Video Containers-Obtaining Video Clips -Shooting and Editing Video	6

Total hours	**30**

	Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will	
CO1	understand the concepts, importance, application and the process of developing multimedia	PO1
CO2	to have basic knowledge and understanding about image related processings	PO1, PO2
CO3	To understand the framework of frames and bit images to animations	PO4, PO6
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4, PO5, PO6
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3, PO6

Textbooks	
1	TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-Hill,2001.

Reference Book

1.	RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications", PearsonEducation,2012.

Web Resources
1.	https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Mapping with Programme Outcomes:

CO/ PSO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**
CO1	**2**	**2**	**3**	**3**	**3**	**2**
CO2	**2**	**3**	**2**	**3**	**2**	**1**

CO3	1	2	3	3	3	2
CO4	3	2	2	2	1	2
CO5	2	3	1	3	3	3
Weightage of course contributed to each PSO	10	12	11	14	12	10

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

Course Code: U23SES3	Title of the Course: Multimedia Systems						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	30	15	-	5	-	5	5	
UNIT	**Topic**					**Lect.hrs**	**Mode of Teaching**
UNIT I	Concepts, importance, application and the process of developing multimedia					6	Lecture
UNIT II	Basic knowledge and understanding about image related processing.					6	Lecture and Peer Group learning
UNIT III	The framework of frames and bit images to animations					6	Lecture /Seminar
UNIT IV	Multimedia projects and stages of requirement in phases of project.					6	Lecture/Demo
UNIT V	Multimedia planning, designing, and producing					6	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented	✅	Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23SES6P	WEB DESIGNING LAB	SEC	-	-	2		2	25	75	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

UNIT	Contents	No. Of. Hours
I	Script using HTML tags, page structure, adding comments working with texts, paragraphs and line break. Emphasizing test, heading and horizontal rules list-font size, face and color,alignment links-tables-frames.	12
II	Forms& Images Using Html: Graphics image maps, GIF animation, adding multimedia Data collection with html forms textbox password, list box, combo box, text area Tools for building web page front page.	12

III	XML & DHTML: Cascading style sheet (CSS	**12**	
IV	Dynamic HTML: Document object model (DCOM) Accessing HTML & CSS through DCOM Dynamic content styles & positioning Event bubbling-data binding. JavaScript: Client-side scripting	**12**	
V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	**12**	
Total hours		**60**	

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
4	Ability to develop a java script	PO1, PO2, PO3, PO7
5	An ability to develop web application using Ajax.	P02, PO6, PO7
Text Book		
1	Pankaj Sharma, "Web Technology", SkKataria& 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:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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**

Course Code: U23SES6P	**Title of the Course**: WEB DESIGNING LAB						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	30	15	-	5	-	5	5	
UNIT	**Topic**					**Lect.hrs**	**Mode of Teaching**
UNIT I	Basics of HTML and its components					6	Lecture
UNIT II	Graphics in HTML					6	Lecture and Peer Group learning
UNIT III	Concepts of XML and DHTML					6	Lecture /Seminar
UNIT IV	The concept of JavaScript					6	Lecture/Demo
UNIT V	web application using Ajax					6	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	✅
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23SES57	**Biometrics**	Specific Elective	2	-	-	-	2	2	25	75	100

	Learning Objectives
LO1	Identify the various biometric technologies.
LO2	Design of biometric recognition.
LO3	Develop simple applications for privacy
LO4	Understand the need of biometric in the society
LO5	Understand the scope of biometric techniques

UNIT	contents	No. of Hours
I	**Introduction**: What is Biometrics, History, Types of biometric Traits, General architecture of biometric systems, Basic working of biometric matching,	6

	Biometric system error and performance measures, Design of biometric system, Applications of biometrics, Biometrics versus traditional authentication methods. **Face Biometrics:** Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, .7 Face Recognition Methods, Advantages and Disadvantages.	
II	**Retina and Iris Biometrics:** Introduction, Performance of Biometrics, Design of Retina Biometrics, Design of Iris Recognition System, Iris Segmentation Method , Determination of Iris Region, Determination of Iris Region, Applications of Iris Biometrics, Advantages and Disadvantages **Vein and Fingerprint Biometrics:** Introduction, Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages.	6
III	**Privacy Enhancement Using Biometrics:** Introduction, Privacy Concerns Associated with Biometric Deployments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics. **Multimodal Biometrics:** Introduction to Multimodal Biometrics , Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics, Characteristics and Advantages of Multimodal Biometrics.	6
IV	**Watermarking Techniques:** Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Attacks on Spatial Domain Watermarking.	6
V	**Scope and Future:** Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics, Biometrics and Information Technology Infrastructure, Role of Biometrics in Enterprise Security,	6

	Role of Biometrics in Border Security, Smart Card Technology and Biometrics, Radio Frequency Identification (RFID) Biometrics, DNA Biometrics, Comparative Study of Various Biometric Techniques. **Biometric Standards:** Introduction, Standard Development Organizations, Application Programming Interface (API), Information Security and Biometric Standards, Biometric Template Interoperability.	
	Total	**30**

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	To understand the basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and Applications.	PO1, PO3, PO6, PO8
CO2	To know the concepts Retina and Iris Biometrics and Vein and Fingerprint Biometrics.	PO1,PO2,PO3,PO6
CO3	To analyse the Privacy Enhancement and Multimodal Biometrics.	PO3, PO5
CO4	To get analyticalidea on Watrmarking Techniques	PO1, PO2, PO3, PO7
CO5	To Gain knowledge on Future scope of Biometrics,and Study of various Biometric Techniques.	PO2, PO6, PO7

Recommended Text	
1.	Biometrics: Concepts and Applications by G.R Sinha and SandeepB.Patil , Wiley, 2013

References Books	
1.	Guide to Biometrics by Ruud M. Bolle , SharathPankanti, Nalinik.Ratha, Andrew W.Senior, Jonathan H. Connell , Springer 2009
2.	Introduction to Biometrics by Anil k. Jain, Arun A. Ross, KarthikNandakumar
3.	Hand book of Biometrics by Anil K. Jain, Patrick Flynn, ArunA.Ross.

Web Resources	
1.	https://www.tutorialspoint.com/biometrics/index.htm
2.	https://www.javatpoint.com/biometrics-tutorial
3.	https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	2	2	2
CO2	2	3	2	3	3	1
CO3	2	2	2	3	3	2
CO4	3	2	1	3	3	2
CO5	3	3	2	3	3	3
Weightage of course contributed to each PSO	13	11	9	14	14	10

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

Course Code: U23SES57	Title of the Course: Biometrics						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	30	15	-	5	-	5	5	
UNIT	Topic					Lect.hrs	Mode of Teaching
UNIT I	Basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and Applications.					6	Lecture
UNIT II	Concepts Retina and Iris Biometrics and Vein and Fingerprint Biometrics.					6	Lecture and Peer Group learning
UNIT III	Privacy Enhancement and Multimodal Biometrics.					6	Lecture /Seminar
UNIT IV	Analytical idea on Water marking Techniques					6	Lecture/Demo
UNIT V	Future scope of Biometrics and Study of various Biometric Techniques.					6	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Inst. hours	Credits	Marks		
									CIA	External	Total
U23SES4	**Fundamentals of Information Technology**	Skill Enha. Course (SEC)	1	-	-	-	1	1	25	75	100

	Learning Objectives	
LO1		Understand basic concepts and terminology of information technology.
LO2		Have a basic understanding of personal computers and their operation
LO3		Be able to identify data storage and its usage
LO4		Get great knowledge of software and its functionalities
LO5		Understand about operating system and their uses

UNIT		Contents	No. Of. Hours
I		**Introduction to Computers:** Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer	6

II		**Basic Computer Organization:** Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	**6**
III		**Storage Fundamentals:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives	**6**
IV		**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w	**6**
V		**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters.Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	**6**
		TOTAL HOURS	**30**

	Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6

		Textbooks
1		Anoop Mathew, S. KavithaMurugeshan (2009), " Fundamental of Information Technology", Majestic Books.
2		Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.

3		S. K Bansal, "Fundamental of Information Technology".

		Reference Books
1.		BhardwajSushilPuneet Kumar, "Fundamental of Information Technology"
2.		GG WILKINSON, "Fundamentals of Information Technology", Wiley-Blackwell
3.		A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing

		Web Resources
1.		https://testbook.com/learn/computer-fundamentals
2.		https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html
3.		https://www.javatpoint.com/computer-fundamentals-tutorial
4.		https://www.tutorialspoint.com/computer_fundamentals/index.htm
5.		https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Mapping with Programme Outcomes:

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

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

Course Code: U23SES4	**Title of the Course**: **Fundamentals of Information Technology**						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	30	15	-	5	-	5	5	

UNIT	Topic	Lect.hrs	Mode of Teaching
UNIT I	Basic concepts and terminology of information technology.	6	Lecture
UNIT II	Personal computers and their operation	6	Lecture and Peer Group learning
UNIT III	Data storage and its usage	6	Lecture /Seminar
UNIT IV	Software and its functionalities	6	Lecture/Demo
UNIT V	Operating system and their uses	6	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23SES5P	VISUAL BASIC LAB	Skill Enha. Course (SEC)	-	-	2		2	25	75	100

Learning Objectives	
LO1	Develop VB application to handle menu options
LO2	VB application to handle mouse event
LO3	VB application to connect with database
LO4	VB application with DLL
LO5	Create a real time application with VB.

UNIT	Contents	No. Of. Hours
	1.Develop VB Application for Creation of Scientific Calculator.	
	2. Develop VB Application to handle the MDI with Menu options	
	3. Develop VB Application to handle frame control.	
	4. Develop VB Application to handle Mouse event and list box.	
	5. Develop VB Application to Create the Menu options and Tool bar (images).	
	6. Develop VB Application using the Modules and class concept.	
	7. Develop VB Application to loading the picture through ActiveX Document[Use Driver, Dir and File List Box Components]	
	8. Develop VB Application to create DLL.	30
	9. Develop VB Application to handle DLL using API Viewer	
	10. Develop VB Application for the following: i. to access the native database and perform the following operations for a Student Database (ie) Insert a Record, Modify the Records, View the records and delete the records by DML operations.	
	11. Develop VB Application for the following: i. Develop VB Application to access the (Oracle or Access) database and perform the following using DDL operations (ie) Creation, Modification, Display and View the Table.	
	12. Develop VB code for any application (Railway, Airline, Library etc..)	
	TOTAL HOURS	**30**

	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
CO1	Knows the basic concept in VB Concept of resources in VB	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows Design concept. Concept of GUI based events Understand the concept of DDL operations.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the Connection to the DATABASE. Concept of list	PO1, PO2, PO3, PO4, PO5, PO6

CO4	Creating Menu Editor	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Concept of adding images Understand the table creation.	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks		
1	Microsoft Visual Basic 2010 Step by StepBy Michael Halvorson · 2010
2	Visual Basic 2015 in 24 Hours, Sams Teach YourselfBy James Foxall · 2015

Mapping with Programme Outcomes:

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

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

Course Code: U23SES5P	Title of the Course: Visual BASIC LAB						
Pedagogy	Total hrs	Lecture	Practical Experience	Peer Group Learning	Demo	Seminar/GD	ICT/Blended Learning	Fieldwork/internship
	30	15	-	5	-	5	5	

UNIT	Topic	Lect.hrs	Mode of Teaching
UNIT I	VB application to handle menu options	6	Lecture
UNIT II	VB application to handle mouse event	6	Lecture and Peer Group learning
UNIT III	VB application to connect with database	6	Lecture /Seminar
UNIT IV	VB application with DLL	6	Lecture/Demo
UNIT V	Create a real time application with VB.	6	Lecture/ICT

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented	✅	Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23SES6P	WEB DESIGNING LAB	SEC	-	-	2		2	25	75	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

UNIT	Contents	No. Of. Hours
I	Script using HTML tags, page structure, adding comments working with texts, paragraphs and line break. Emphasizing test, heading and horizontal rules list-font size, face and color,alignment links-tables-frames.	12
II	Forms& Images Using Html: Graphics image maps, GIF animation, adding multimedia Data collection with html forms textbox password, list box, combo box, text area Tools for building web page front page.	12
III	XML & DHTML: Cascading style sheet (CSS)	12
IV	Dynamic HTML: Document object model (DCOM) Accessing HTML & CSS through DCOM Dynamic content styles & positioning Event bubbling-data binding. JavaScript: Client-side scripting	12
V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	12
Total hours		**60**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
4	Ability to develop a java script	PO1, PO2, PO3, PO7
5	An ability to develop web application using Ajax.	P02, PO6, PO7
Text Book		
1	Pankaj Sharma, "Web Technology", SkKataria& 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:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

Course Code: U23SES6P	Title of the Course: WEB DESIGNING LAB								
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**	
	60	45	-	5	-	5	5		
UNIT	**Topic**						**Lect.hrs**	**Mode of Teaching**	
UNIT I	Understand the basics of HTML and its components						12	Lecture	
UNIT II	To study about the Graphics in HTML						12	Lecture and Peer Group learning	
UNIT III	Understand and apply the concepts of XML and DHTML						12	Lecture /Seminar	
UNIT IV	Understand the concept of JavaScript						12	Lecture/Demo	
UNIT V	To identify and understand the goals and objectives of the Ajax						12	Lecture/ICT	

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	✅
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total

U23SES57	Biometrics	Specific Elective	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	Identify the various biometric technologies.
LO2	Design of biometric recognition.
LO3	Develop simple applications for privacy
LO4	Understand the need of biometric in the society
LO5	Understand the scope of biometric techniques

UNIT	contents	No. of Hours
I	**Introduction**: What is Biometrics, History, Types of biometric Traits, General architecture of biometric systems, Basic working of biometric matching, Biometric system error and performance measures, Design of biometric system, Applications of biometrics, Biometrics versus traditional authentication methods. **Face Biometrics:** Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, .7 Face Recognition Methods, Advantages and Disadvantages.	6
II	**Retina and Iris Biometrics:** Introduction, Performance of Biometrics, Design of Retina Biometrics, Design of Iris Recognition System, Iris Segmentation Method , Determination of Iris Region, Determination of Iris Region, Applications of Iris Biometrics, Advantages and Disadvantages **Vein and Fingerprint Biometrics:** Introduction, Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages.	6
III	**Privacy Enhancement Using Biometrics:** Introduction, Privacy Concerns Associated with Biometric Deployments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics. **Multimodal Biometrics:** Introduction to Multimodal Biometrics , Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics	6

	and Advantages of Multimodal Biometrics, Characteristics and Advantages of Multimodal Biometrics.	
IV	**Watermarking Techniques:** Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Attacks on Spatial Domain Watermarking.	6
V	**Scope and Future:** Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics, Biometrics and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometrics, Radio Frequency Identification (RFID) Biometrics, DNA Biometrics, Comparative Study of Various Biometric Techniques. **Biometric Standards:** Introduction, Standard Development Organizations, Application Programming Interface (API), Information Security and Biometric Standards, Biometric Template Interoperability.	6
	Total	**30**

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	To understand the basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and Applications.	PO1, PO3, PO6, PO8
CO2	To know the concepts Retina and Iris Biometrics and Vein and Fingerprint Biometrics.	PO1,PO2,PO3,PO6
CO3	To analyse the Privacy Enhancement and Multimodal Biometrics.	PO3, PO5
CO4	To get analyticalidea on Watrmarking Techniques	PO1, PO2, PO3, PO7
CO5	To Gain knowledge on Future scope of Biometrics,and Study of various Biometric Techniques.	PO2, PO6, PO7
Recommended Text		
1.	Biometrics: Concepts and Applications by G.R Sinha and SandeepB.Patil , Wiley, 2013	

References Books	
1.	Guide to Biometrics by Ruud M. Bolle , SharathPankanti, Nalinik.Ratha, Andrew W.Senior, Jonathan H. Connell , Springer 2009
2.	Introduction to Biometrics by Anil k. Jain, Arun A. Ross, KarthikNandakumar
3.	Hand book of Biometrics by Anil K. Jain, Patrick Flynn, ArunA.Ross.
Web Resources	
1.	https://www.tutorialspoint.com/biometrics/index.htm
2.	https://www.javatpoint.com/biometrics-tutorial
3.	https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**
CO1	3	1	2	2	2	2
CO2	2	3	2	3	3	1
CO3	2	2	2	3	3	2
CO4	3	2	1	3	3	2
CO5	3	3	2	3	3	3
Weightage of course contributed to each PSO	13	11	9	14	14	10

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

Entrepreneurial Skill Development Courses

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23CS1	Python programming	Core	5	-	-	-	5	25	75	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	15

	String Methods and Functions - String Comparison.**Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.	
IV	**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	15
V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.	15
	TOTAL HOURS	75

	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6

	Textbooks
1	ReemaThareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2	Dr. R. NageswaraRao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.

	Reference Books
1.	VamsiKurama, "Python Programming: A Modern Approach", Pearson Education.
2.	Mark Lutz, "Learning Python", Orielly.

3.	Adam Stewarts, "Python Programming", Online.
4.	Fabio Nelli, "Python Data Analytics", APress.
5.	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.
	Web Resources
1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS35	Discrete Mathematics – I	**Elect**	4	-	-		4	25	75	100

	Learning Objectives	

LO1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.
LO2	To Explain the Relations concepts and their properties
LO3	To know the Applications of recurrence relations
LO4	To understand the Graphs and Graphs models
LO5	To explain the Matrices concepts

UNIT	Contents	No. Of. Hours
I	***SET THEORY*** Introduction- set and Its Element – Set Description (Roster, Set Builder and cardinal number method) Types of Sets- Set Operations and Laws of set Theory. Partition of sets. Minsets-Countable and un Countable set. Algebra of sets andDuality	**12**

II	**MATHEMATICAL LOGIC** Basic Logic and Proof, logical operations – Logic Propositional equivalence, Predicates and Quantities, Tautology-Contradiction-Methods of proofs(Direct and Indirect)- Function- Definition-Notation- Types of Function-Composition of Functions-	12
III	**NUMBER THEORY** The Integers and Division, Integers and Algorithms,(Multiplication, Addition and Division-Sequences and Summations, Recursive algorithms, Program correctness	12
IV	**COMBINATORICS:** The basics of counting, the pigeonhole principle, Permutations and Combinations, Binomial coefficients, Generalized permutations and combinations	12
V	**RELATIONS** Relations – Relations and their properties, Representing Relations, Closures of relations, Equivalence relations, Partial orderings-Recurrence Relations Binary Relations.	12

Total hours		**60**
Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	To understand different mathematical logics and functions	PO1, PO2, PO3, PO4, PO5, PO6
CO3	To Understanding the different form of number theory	PO1, PO2, PO3, PO4, PO5, PO6
CO4	To gain knowledge on set theory	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Able to understand Relations and its applications	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		

1	Discrete Mathematics and its applications, Seventh Edition, Kenneth.H.Rosen, McGrawHill Publishing Company, 2012.
2.	Discrete Mathematics, M Venkatraman, N Sridharan and N Chandrasekaran, The National Publishing Company, 2009
3.	J.K Sharma "DISCRETE MATHEMATICS" 3 rd Edition Macmillan Reprint2011
Reference Books	
1.	Modern Algebra - S.Arumugam and A. Thangapandi Isaac, Scitechpublications 2005.
2.	Invitation to Graph Theory-S.Arumugam and S.Ramachandran, Scitech Publications,2005, Chennai.
3.	Discrete Mathematical Structures with applications to Computer Science - Tremblay and Manohar, McGraw Hill,1997.
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
U23GS50P	**PROGRAMMING IN C LAB**	Core	-	-	2	-	-	2	-	-	-

Course Objective	
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.
LO2	To understand the concept using if statements and loops
LO3	This unit covers the concept of Arrays and Functions
LO4	This unit covers the concept of Structurs and unions and Preprocessors
LO5	To understand the concept of implementing pointers and files

UNIT	List of Excercises	No. of Hours	Course Objectives

I	**Unit I : Variables, Data types, Constants and Operators** 1.Evaluation of expression ex: $((x+y)^2 * (x+z))/w$ 2.Temperature conversion problem (Fahrenheit to Celsius) 3.Program to convert days to months and days (Ex: 364 days = 12 months and 4 days) 4.Solution of quadratic equation 5.Salesman salary (Given: Basic Salary, Bonus for every item sold, commission on the total monthly sales)	12
II	**Unit II: Decision making Statements** 6.Maximum of three numbers 7.Calculate Square root of five numbers (using gototatement) 8.Pay-Bill Calculation for different levels of employee (Switch statement) 9. Fibonacci series 10.Floyds Triangle 11.Pascal's Triangle	12
III	**Unit III: Arrays, Functions and Strings** 12.Prime numbers in an array 13.Sorting data (Ascending and Descending) 14.Matrix Addition and Subtraction 15.Matrix Multiplication 16.Function with no arguments and no return values 17.Function that convert lower case letters to upper case 18. Factorial using recursion. 19.Perform String Operations using Switch Case.	12
IV	**Unit IV : Structures and Macros** 20.Structure that describes a Hotel (name, address, grade, avg room rent, number of rooms) Perform some operations (list of hotels of a given grade etc.)	12

	21. Using Pointers in Structures. 22.Cricket team details using Union. 23.Write a macro that calculates the max and min of two numbers 24.Nested macro to calculate Cube of a number.	
V	**Unit V : Pointers and Files** 25.Evaluation of Pointer expressions 26.Function to exchange two pointer values 27.Creation, insertion and deletion in a linked list 28.Program to read a file and print the data. 29.Program to receive a file name and a line of text as command line arguments and write the text to the file 30. Program to copy the content of one file to another file.	12
	Total	**60**

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6
3	Apply the programming principles learnt in real-time problems	PO3,PO4
4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
5	Code, debug and test the programs with appropriate test cases	PO4,PO6
	Text Book	
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.	

Reference Books	
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021
Web Resources	
1.	https://codeforwin.org/
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	http://en.cppreference.com/w/c
4.	http://learn-c.org/
5.	https://www.cprogramming.com/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	2	3	3	3	3	3
CO 3	3	3	2	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
Weight age of course contributed to each PSO	14	15	14	15	15	14

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23SES1P	**OFFICE AUTOMATION**	Skill Enha. Course (SEC)	-	-	2	-	2	2	25	75	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	**Introductory concepts:** Memory unit– CPU-Input Devices: Key board, Mouse and Scanner.Outputdevices:Monitor,Printer.IntroductiontoOperatings	6

	ystems&itsfeatures:DOS– UNIX–Windows. IntroductiontoProgrammingLanguages.		
II	**Word Processing:** Open, Save and close word document; Editing text – tools, formatting, bullets;SpellChecker - Document formatting – Paragraph alignment, indentation, headers and footers,numbering;printing–Preview,options,merge.		6
III	**Spreadsheets:**Excel–opening,enteringtextanddata,formatting,navigating;Formulas–entering,handlingand copying;Charts–creating,formatting and printing,analysistables,preparationoffinancialstatements,introductiontodataanalytics.		6
IV	**Database Concepts:** The concept of data base management system; Data field, records, and files,Sorting and indexing data; Searching records. Designing queries, and reports; Linking of datafiles; Understanding Programming environment in DBMS; Developing menu drive applicationsinquerylanguage(MS–Access).		6
V	**Power point:** Introduction to Power point - Features – Understanding slide typecasting &viewingslides – creating slide shows. Applying special object – including objects & pictures – Slidetransition–Animationeffects,audioinclusion,timers.		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,PO7
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8
	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 Outcomes:

MAPPING TABLE						
CO/ PSO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	14	15	15	15

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23FS1	**Problem Solving Techniques**	FC	2	-	-	-	2	2	25	75	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.	PO1, PO2, PO3, PO4, PO5, PO6

	Creating and reading Files	

	Textbooks	
1	**Stewart Venit,** "Introduction to Programming: Concepts and Design", Fourth Edition, 2010, Dream Tech Publishers.	

	Web Resources	
1.	https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm	
2.	http://www.nptel.iitm.ac.in/video.php?subjectId=106102067	
3.	http://utubersity.com/?page_id=876	

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS3	DATA STRUCTURES AND ALGORITHMS	Core	5	-	-	-	5	5	25	75	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 Addition - 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	15
III	Tree ADT- Basic Terminology- Binary Trees – Binary Tree Representations – Binary Tree Traversal – Threaded Binary Trees – Application of Trees – Heap – Binary Heap	15
IV	Graph ADT - Terminology and Representations – Traversals DFS and BFS - Connected Components – Shortest Path – Topological Sort	15
V	Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Quick sort-Radix sort- Hashing functions -Overflow Handling	15
	Total	**75**

	Course Outcomes	Programmeme Outcome
CO	On completion of this course, students will	
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
CO3	Describe the hash function and concepts of collision and its resolution methods	PO2,PO4
CO4	Solve problem involving graphs, trees and heaps	PO4,PO6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO5,PO6

	Text Book
1	Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Booksource,
2	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.

	Reference Books
1.	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2.	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003
3.	ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition

Web Resources	
1.	https://www.programiz.com/dsa
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS4P	DATA STRUCTURES AND	Core	-	-	3	-	3	3	25	75	100

	ALGORITHMS LAB [Note: Practicals may be offered through C / C++ / Python]										
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 and application of graphs										
LO5	To understand various sorting and searching										

Sl. No	Contents	No. of Hours
1.	Write a program to implement the List ADT using arrays and linked lists.	
2.	Write a programs to implement the following using a singly linked list. ● Stack ADT ● Queue ADT	
3.	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	
4.	Write a program to implement Circular Queue .	
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 for the implementation of BFS and DFS for a given graph.	**75**
7.	Write a program for finding the Shortest path in a graph.	
8.	Write a program for finding the and Topological order in a directed graph.	
9.	Write a program for implementing Min Heap and Max Heap.	
10.	Write a program for hashing string data.	

11.	Write programs for implementing the following searching methods: ● Linear search ● Binary search.		
12.	Write programs for implementing the following sorting methods: ● Bubble sort ● Selection sort ● Insertion sort ● Quick sort ● Radix sort.		
	Total		**75**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1, PO4,PO6
3	Describe the hash function and concepts of collision and its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1,PO5,PO6
Text Book		
1	Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Booksource,	
2	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.	
Reference Books		
1	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition	
2	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003	
3	ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition	
Web Resources		
1.	https://www.programiz.com/dsa	
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/	

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total

U23GS45	Digital Logic Fundamentals	**Elect**	4	-	-		4	25	75	100

	Learning Objectives
LO1	Itaimstotrainthestudenttothebasicconceptsof DigitalLogicFundamentals
LO2	To impart the in-depth knowledge of logic gates, Booleanalgebra,combinationalcircuitsandsequentialcircuits.
LO3	To explain the concept of Combinational Logic and counters
LO4	To introduce the concepts of Flip-Flops, Registers
LO5	To explain the Asynchronous and Synchronous Counters

UNIT	**Contents**	**No. Of. Hours**
I	NumberSystemsandCodes:NumberSystem–BaseConversion – BinaryCodes – Code Conversion. Digital Logic: Logic Gates – Truth Tables – UniversalGates.	**12**
II	Boolean Algebra: Laws and Theorems – SOP, POS Methods – Simplification ofBooleanFunctions–UsingTheorems,K-Map,Prime–Implicant Method–Binary Arithmetic: Binary Addition – Subtraction – Various Representations ofBinaryNumbers–ArithmeticBuildingBlocks–Adder–Subtractor.	**12**
III	Combinational Logic: Multiplexers – Demultiplexers – Decoders – Encoders –CodeConverters–ParityGeneratorsandCheckers.	**12**
IV	SequentialLogic:RS,JK,D,andTFlip-Flops–Master-Slave Flip-Flops.Registers:ShiftRegisters–TypesofShiftRegisters.	**12**
V	Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-DownCounters– Ring Counters. Memory: Basic Terms and Ideas –Types of ROMs –TypesofRAMs.	**12**
Total hours		**60**

	Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Identify the logic gates and their functionality.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Perform number conversions from one system to another system	PO1, PO2, PO3, PO4, PO5, PO6

CO3	Understand the functions of combinational circuits	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Perform number conversions	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Perform Counter design and learn its operations	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks		
1	Donald P.Leach and A.P.Malvino, *Digital Principles and Applications*–TMH Education Pvt limited –Eighth Edition.	
2	V.RajaramanandT.Radhakrishnan,*Digital Computer Design*, Prentice HallofIndia,2001	
3	M.MorisMano,*DigitalLogicandComputerDesign*,PHI,2001	
4	T.C.Bartee,*DigitalComputerFundamentals*,6[th]Edition,TataMcGrawHill,1991	

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

	Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hou	Marks		
										CIA	External	Total

U23SES2P	**MULTIMEDIA LAB**	Sec	-	-	2	-	2	2	25	75	100

	Course Objective
LO1	To understand the basic functionalities of pagemaker
LO2	To Learningand working with coral DRAW
LO3	To Learningand understanding the concept of the flash
LO4	Learning and understanding the concept of the Photoshop
LO5	To design an image

UNIT	**List of Excercises**	**No. of Hours**	**Course Objectives**
I	Editing Text ,Formatting Text ,Tracking – Kerning ,Leading ,Importing Style		
II	Drawing Basic Geometric Figures , Saving a file – Closing a file Opening and Exiting CorelDRAW9/10 ,Views – The View Manager Drawing and Selecting: Getting familiar with the toolbar Getting started with the project Working with text: The text tool – Getting started with the Book Cover		
III	Basic tools used in Flash.Develop a Flash application using motion tween. Develop a Flash application using shape tween. Develop a Flash application for ball bouncing using motion guide path.		
IV	Getting started with Photoshop 6/7,Opening existing file, Guidelines for working with tool bar Creating a new file. Working with images and colors: Bitmap and vector images		
V	Opening recently used files,Image size ,Editing Photographs for own Album Editing Images ,Color Modes		
	Total	**60**	

	Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will		
CO	On completion of this course, students will		

CO1	understand the concepts, importance, application and the process of developing multimedia	PO1
CO2	to have basic knowledge and understanding about image related processings	PO1, PO2
CO3	To understand the framework of frames and bit images to animations	PO4, PO6
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4, PO5, PO6
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3, PO6

Textbooks	
1	TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-Hill,2001.

Reference Book	
1.	RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications",PearsonEducation,2012.

Web Resources	
1.	https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	3	3	3	2
CO2	2	3	2	3	2	1
CO3	1	2	3	3	3	2
CO4	3	2	2	2	1	2
CO5	2	3	1	3	3	3
Weightage of course contributed to each PSO	10	12	11	14	12	10

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

Relevant to Global need	✅	Employability oriented			Address Professiona
Relevant to National need		Entrepreneurship oriented			Address Gender Ser
Relevant to Regional need		Skill Development oriented	✅		Address Environme Sustainability
Relevant to Local need					Address Human Val

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23SES3	Multimedia Systems	**Skill Enhancement Course**	-	-	2		2	25	75	100

	Learning Objectives
LO1	Understand the definition of Multimedia
LO2	To study about the Image File Formats, SoundsAudio File Formats
LO3	Understand the concepts of Animation and Digital Video Containers
LO4	To study about the Stage of Multimedia Project
LO5	Understand the concept of Ownership of Content Created for Project Acquiring Talent

UNIT	Contents	No. Of. Hours
I	Multimedia Definition-Use Of Multimedia-Delivering Multimedia- Text: About Fonts and Faces - Using Text in Multimedia.	**6**
II	Computers and Text Font Editing and Design Tools-Hypermedia and Hypertext. Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images - Color - Image File Formats.	6
III	Sound: The Power of Sound -DigitalAudio-MidiAudio-Midivs.DigitalAudio-MultimediaSystemSounds Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project	**6**
IV	Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work.	6
V	Video: Using Video - Working with Video and Displays-Digital Video Containers-Obtaining Video Clips -Shooting and Editing Video	6

Total hours	30
Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will

CO1	understand the concepts, importance, application and the process of developing multimedia	PO1
CO2	to have basic knowledge and understanding about image related processings	PO1, PO2
CO3	To understand the framework of frames and bit images to animations	PO4, PO6
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4, PO5, PO6
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3, PO6

Textbooks	
1	TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-Hill,2001.

Reference Book	
1.	RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications",PearsonEducation,2012.

Web Resources	
1.	https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	3	3	3	2
CO2	2	3	2	3	2	1
CO3	1	2	3	3	3	2
CO4	3	2	2	2	1	2
CO5	2	3	1	3	3	3
Weightage of course contributed to each PSO	10	12	11	14	12	10

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
U23CS5	**Microprocessor and Microcontroller**	Core	5	-	-	-	4	5	25	75	100

	Learning Objectives
LO1	To introduce the internal organization of Intel 8085 Microprocessor.
LO2	To know about various instruction sets and classifictions
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.

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		**ProgrammemeOutcome**
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,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. [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

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

Relevant to Global need	✅	Employability oriented	✅	Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented		Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS6P	**Microprocessor and microcontroller Lab**	Core	-	-	3	-	3	3	25	75	100

	Learning Objectives
LO1	To introduce the internal organization of Intel 8085 Microprocessor.
LO2	To know about various instruction sets and classifictions
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	No. of Hours
	List of Exercises:	
	Addition and Subtraction 5. 8 - bit addition 6. 16 - bit addition 7. 8 - bit subtraction	

	8. BCD subtraction
	
	II. Multiplication and Division
	
	    4. 8 - bit multiplication
	
	    5. BCD multiplication
	
	    6. 8 - bit division
	
	III. Sorting and Searching
	
	    6. Searching for an element in an array.
	
	    7. Sorting in Ascending and Descending order.
	
	    8. Finding the largest and smallest elements in an array.
	
	    9. Reversing array elements.
	
	    10. Block move.
	
	IV. Code Conversion
	
	    4. BCD to Hex and Hex to BCD
	
	    5. Binary to ASCII and ASCII to binary
	
	    6. ASCII to BCD and BCD to ASCII
	
	V. Simple programs on 8051 Microcontroller
	
	    6. Addition
	
	    7. Subtraction
	
	    8. Multiplication
	
	    9. Division
	
	    10. Interfacing Experiments using 8051
	
	        1. Realisation of Boolean Expression through ports.
	
	        2. Time delay generation using subroutines.
	
	        3. Display LEDs through ports
		60

Total		**60**
Course Outcomes		**Programmeme 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. [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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS37	Statistical Methods and its Application-I	Elect	4	-	-		4	25	75	100

Learning Objectives	
LO1	To make understand the fundamentals of Statistics.
LO2	Define the principal concepts about probability.
LO3	To explain the Coefficient of Variation
LO4	To understand the concept of Conditional Probability
LO5	Explain the concept of a random variable and the probability distributions.

UNIT	Contents	No. Of. Hours
I	Introduction: Quantitative Techniques and Statistics – Concept of	12

		Quantitative techniques – Statistics-Introduction- Data Measurements and Classification- Collection of data – Methods of Collection of Primary Data – Drafting a Questionnaire or a Schedule- Specimen Questionnaire- Secondary Data – Reliability of Secondary Data – classification of Data – Methods of Classification-- Diagrammatic and Graphical Presentation- Types of Diagrams-Graphs – Histograms- Frequency Polygon-Ogives or Cumulative Frequency Curve.	
II		Measures of Central Tendency- Various Measures Central Tendency – Arithmetic mean- Calculation of simple Arithmetic mean-Shortcut methods for calculating Arithmetic mean – Arithmetic mean in case of discrete frequency distribution – Calculation of Arithmetic mean – continuous grouped data – Introduction - Significance of measuring variation- properties of a good measure of variation- methods of studying variations- Absolute and Relative measures of variation – Range- Merits and Demerits of Range – Use of Range – Inter Quartile Range- Quartile Deviation or Semi-Interquartile Range- Merits and limitations of quartile deviation- Inter Percentile Range Derivation and its Coefficient – The Average Deviation / Mean Deviation-Calculation of Mean Deviation from Discrete Frequency distribution – Calculation of mean Deviation – continuous series – Merits and Demerits of mean Deviation- Standard Deviation- Variance in case of graphed Data – Another formaula to find variance- shorcut methods – Step Deviation method – Change of scale- Coefficient of Variation and Consistency.	12
III		Skewness, Moments and Kurtosis- Introduction-Difference between variation and Skewness – measures of skewness – Karl Pearsons- Karl Pearsons Coefficient of Skewness- other measures based on positional measures - Moments of Skewness – Karl Pearsons Betas and Gammas coefficients based on central Moments – Kurtosis – Concept of Kurtosis -Types of Curves	12
IV		Correlation – Definition of Correlation – Significance of the study	12

		of correlation – Correlation and Causation- Scatter Diagram- Merits and Limitations of the method – Karl Pearsons Coefficient of Correlations – Covariance-Karl Pearson Coefficient of Correlations – Shortcut methods – coefficient of Correlation and Probable error	
V		Regression Analysis – Introduction- Regression Equation – Difference between Correlation and Regression Analysis- Uses of Regression Analysis – Linear and Non-Linear Regression- Regression Equation X on Y – Regression Equation Y on X - regression Lines - Probability Theory – Introduction to Probability – Concept of Probability – Basic Mathematical Concepts used – Permutations & Combinations – Experiments – Bayes Theorem – Sampling and Sampling Distributions – Methods and Data Collection – Sampling and Non-Sampling Errors – Sampling Errors-Non-Sampling Errors – Principles of Sampling – Law of Statistical Regularity – Principles of Inertia of Large Numbers- Merits of Sampling Methods – Limitations of Sampling- Methods of Sampling – Simple Random Sampling – Stratified Random Sampling – Systematic Sampling – Steps to select a systematic sampling – Multi-stage sampling	12

Total hours		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Summarize the concepts of statistical methods	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Analyse the different Statistical measures of data	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Derive the marginal and conditional distributions of random variables, translate realworld problems into probability models	PO1, PO2, PO3, PO4, PO5, PO6
CO4	To understanding the concepts of Probability of an event	PO1, PO2, PO3, PO4, PO5, PO6

	Understand basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables	PO1, PO2, PO3, PO4, PO5, PO6
CO5		

Textbooks		
1	Text Book : Quantative Techniques and Statistics : K.L. Sehgal
	Unit I : Chapters : 1.1,1.2,2.5-2.10,2.12,2.12.1,3.3,3.4,3.5.1,3.5.2,3.7
	Unit II : Chapters : 4.3,4.4,4.4.1,4.4.2,4.4.3,5.1 To 5.13
	Unit III : Chapters : 6.1To 6.6
	Unit IV : Chapters :7.1 To 7.5 , 7.9
	Unit V : Chapters :11.1 To 11.4 , 11.14, 14.1 To 14.6, 14.15
	Text Book: statistical Methods – Dr.S.P.Gupta
	Unit V : Chapters : 11.2 To 11.5

Reference Books	
1.	Statistics, Dr. S.Arumugam and A.ThangapandiIssac, New Gamma Publication house, 2002.
2.	KishorS. Trivedi - Probability and statistics with reliability queuing and Computer Science Applications - Prentice Hall of India (P) Ltd., New Delhi -1997
3.	Discrete Mathematics - Seymour Lipschutz, Marc Lars Lipson Schaum's Outlines- by, 3rd Edition., Tata McGraw Hill, Education Pvt. Ltd., New Delhi. 5th Reprint, 2012

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6

CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	15	13	15	13	14

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS51P	**PHP Programming Lab**	**Core**	-	-	2	-	-	-	-	-
Learning Objectives										

LO1	**To learn about Database Applications and the Web**
LO2	To learn about PHP scripting Language

LO3	To learn about PHP OOPs concept
LO4	To learn about Querying Database
LO5	To learn about PHP reporting

LAB EXERCISES	**Required Hours**

18. Write a PHP Coding for:
   iii.   Create a Times Table
   iv.   Use Include File Concept
 	
19. Write a PHP Coding to handle:
   iii.   Global Variable
   iv.   Static Variable
 	
20. Write a PHP Coding for:
   iii.   Pass by Reference
   iv.   Handling Default Parameter
 	
21. Write a PHP Coding to handle Array Functions:
   vi.   Counting number of elements
   vii.   Finding Min, and Max
   viii.   Explode and Implode
   ix.   Sorting
   x.   Cm to inch calculation for all array element
 	
22. Write a PHP Coding to handle String Functions:
   vii.   Padding
   viii.   Change Case
   ix.   Trimming
   x.   Finding the Positions of Characters
   xi.   Handling Substring
   xii.   Handling String Replace
 	
23. Write a PHP Coding for handling Constructor.
 	
24. Write a PHP Coding for handling Destructor
 	
25. Write a PHP Coding for handling Private Member Function.
 	
26. Write a PHP Coding for handling Static Member Variables.
 	
27. Write a PHP Coding for handling Inheritance.
 	
28. Write a PHP Coding for Exception handling.
 	
29. Write a PHP Coding to connect PHP with MYSQL using PEAR.
	75

30. Write a PHP Coding for database connectivity (PHP & MYSQL).

31. Write a PHP Coding for database connectivity (PHP & MYSQL) with error handling.

32. Write a PHP Coding for database connectivity (PHP & MYSQL) and format the output.

33. Write a PHP Coding for database connectivity (PHP & MYSQL) using template concept.

34. Write a PHP Coding to pass parameter to PHP using HTML forms, Hyperlinks, and Browser.

Course Outcomes	
On completion of this course, students will	
CO1	Learn the PHP Three tier Architecture, PHP Scripting language , Condition and Branches , Loops basics of computer, Construct the structure of the required things in computer, learn how to use it.
CO2	Develop PHP scripting Language
CO3	Concept of Oops, SQL ,MySQL Queries
CO4	Work with Querying Database, Processing User Input, PEAR Overview, Core Components, Packages, Writing to Web databases
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	14	15	15	15

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23GS47	Resource Management Techniques	**Elect**	4	-	-		4	25	75	100

	Learning Objectives		
LO1	To introduce the concepts of OR		
LO2	To explain the Linear Programming Problem		
LO3	To illustrate the Simplex Method		
LO4	To know the Duality Theorems		
LO5	To understanding the Methods for finding IBFS for the Transportation Problems		

UNIT	Contents	No. Of. Hours
I	Development of OR: Definition of OR – Modeling - Characteristics and Phases - Tools, Techniques & Methods - scope of OR.	12
II	Linear Programming Problem: Formulation - Slack & surplus variables - Graphical solution of LPP.	12
III	Simplex Method: Computational Procedure - Big-M method - Concept of duality in LPP - Definition of primal dual problems - General rules for converting any primal into its dual.	12
IV	Duality Theorems: (without proof) Primal dual correspondence - Duality and Simplex method - Mathematical formulation of assignment problem - Method for solving assignment problem.	12
V	Mathematical formulation of Transportation Problem: Methods for finding IBFS for the Transportation Problems.	12
Total hours		60

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	To understanding the concepts of Development of OR	PO1, PO2, PO3, PO4, PO5, PO6
CO2	develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Solve the problems of Simplex Method	PO1, PO2, PO3, PO4, PO5, PO6

| CO4 | To study the Duality Theorems | PO1, PO2, PO3, PO4, PO5, PO6 |
| CO5 | Finding initial basic feasible and optimal solution of the Transportation problems | PO1, PO2, PO3, PO4, PO5, PO6 |

Textbooks	
1	Operations Research, S.D.Sharma, KedarNath Ram Nath& Co Publishers, 12th Edition Reprint 2000 Digital Unit I : UNIT I- Chapter-1(1.1, 1.2, 1.4,1.5,1.8,1.9,1.10,1.11)-1.3,1.4,1.6,1.13,to 1.15 Unit II : UNIT II -Chapter-1 (1.1 to 1.5)-2.3 to 2.35 Unit III : Unit II- Chapter 3 (3.3,3.5.4)-2.61 to 2.79 Unit II – Chapter 5 (5.1 to 5.3)2.142 to 2.145 Unit IV : Unit II - Chapter-5 (5.6,5.7)- 2.157,2.160,2.161 Unit II –Chapter 9(9.2,9.4)-2.244,2.246,2.250,2.251 Unit V : Unit II -Chapter-10 (10.1 to 10.2)- 2.276,2.283,2.284,2.288

Reference Books	
1.	Operation Research, Nita H.Shah, Ravi M.Gor and Hardiksoni,PrenticeHall of India Pvt. Ltd., New Delhi 2008.
2.	Operation Research, R.Sivarethinamohan, Tata McGraw Hill, 2005.
3.	Operations Research – An Introduction by HamdyA.Taha. Ninth Edition, Dorling Kindersley Pvt. Ltd., Noida, India, 2012

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3

CO2	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**3**
Weightage of course contributed to each PSO	**15**	**14**	**14**	**15**	**15**	**15**

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

Relevant to Global need	✅	**Employability oriented**		**Address Professional Ethics**	
Relevant to National need		**Entrepreneurship oriented**	✅	**Address Gender Sensitization**	
Relevant to Regional need		**Skill Development oriented**		**Address Environment and Sustainability**	
Relevant to Local need				**Address Human Values**	

Subject Code	Subject Name	Category	L	T	P	S	Cred	Marks

								i t s	C I A	Ex ter na l	Total
U23SES6P	WEB DESIGNING LAB	SEC	-	-	2		2	25	75	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

UNIT	Contents	No. Of. Hours
I	Script using HTML tags, page structure, adding comments working with texts, paragraphs and line break. Emphasizing test, heading and horizontal rules list-font size, face and color,alignment links-tables-frames.	12
II	Forms& Images Using Html: Graphics image maps, GIF animation, adding multimedia Data collection with html forms textbox password, list box, combo box, text area Tools for building web page front page.	12
III	XML & DHTML: Cascading style sheet (CSS	12
IV	Dynamic HTML: Document object model (DCOM) Accessing HTML & CSS through DCOM Dynamic content styles & positioning Event bubbling-data binding. JavaScript: Client-side scripting	12
V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	12
	Total hours	60

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
4	Ability to develop a java script	PO1, PO2, PO3, PO7

5	An ability to develop web application using Ajax.	P02, PO6, PO7
Text Book		
1	Pankaj Sharma, "Web Technology", SkKataria& 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:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	

									Marks		
Subject Code	**Subject Name**	**Category**	**L**	**T**	**P**	**S**	**Credits**	**Inst. Hours**	**CIA**	**External**	**Total**
U23CS9	**Software Engineering**	Core	5	-	-	-	4	5	25	75	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	Course Objectives
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
IV	**Coding and Testing:** Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; 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		

Course Outcomes	On completion of this course, students will;	
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, Fifth Edition, Prentice-Hall of India, 2018

References Books	
1.	Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997
2.	Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
3.	James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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 contribute d to each PO/PSO	15	13	14	10	10	11

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS10	**Database Management System**	Core	5	-	-	-	4	5	25	75	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 -	15

	Business rules - Evolution of Data models - Degrees of Data Abstraction		
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 | 15 | |

	Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	
	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", Ninth Edition	
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016	
	Reference Books	
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition	
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition	
	Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries	

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	CIA	External	Total
									Marks		
U23CS11P	**Database Management System lab**	Core	-	-	5	-	4	5	25	75	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**	**Course Objective**

II	**V.SQL**			
	1. DDLCOMMANDS			
	2. DMLCOMMANDS			
	3. TCLCOMMANDS			
	VI. PL/SQL			
	12. FIBONACCI SERIES			
	13. FACTORIAL			
	14. STRING REVERSE			
	15. SUM OF SERIES		75	
	16. TRIGGER			
	VII. CURSOR			
	17. STUDENT MARK ANALYSIS USING CURSOR			
	VIII. APPLICATION			
	18. LIBRARY MANAGEMENTSYSTEM			
	19. STUDENT MARK ANALYSIS			
	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	PO4, PO6

	and retrieving of data using Data Manipulation Language (DML)	
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, PO4

	Text Book
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016

	Reference Books
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition

	Web Resources
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS19	**Data mining and warehousing**	Core	5	-	-	-	4	5	25	75	100

Learning Objectives	
LO1	To provide the knowledge on Data Mining and Warehousing concepts and techniques

UNIT	Contents	No. of Hours	Course Objectives
LO2	To study the basic concepts of Data Mining, Architecture and Comparison.		
LO3	To study a set of Mining Association Rules, Data Warehouses.		
LO4	To study about Classification and Prediction, Classifier Accuracy		
LO5	To study the basic concepts of cluster analysis, Cluster Methods		
I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction	15	
II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.	15	
III	Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.	15	
IV	Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy	15	
V	Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Petitioning Methods – Hierarchical Methods-Density Based Methods – GRID Based Method – Model based Clustering Method	15	
	Total	**75**	
	Course Outcomes		

Course Outcomes	On completion of this course, students will;	
CO1	To understand the basic concepts and the functionality of the various data mining and data warehousing component	PO1, PO3, PO6, PO8
CO2	To know the concepts of Data mining system architectures	PO1,PO2,PO3,PO6
CO3	To analyze the principles of association rules	PO3, PO5
CO4	To get analytical idea on Classification and prediction methods	PO1, PO2, PO3, PO5
CO5	To Gain knowledge on Cluster analysis and its methods.	PO2, PO4, PO6

Text Books (Latest Editions)	
1.	Han and M. Kamber, "Data Mining Concepts and Techniques", 2001, Harcourt India Pvt. Ltd, New Delhi.

References Books (Latest editions)	
1.	K.P. Soman, ShyamDiwakar, V. Ajay "Insight into Data Mining Theory and Practice ",Prentice Hall of India Pvt. Ltd, New Delhi
2.	Parteek Bhatia, 'Data Mining and Data Warehousing: Principles and Practical Techniques', Cambridge University Press, 2019

Web Resources	
1.	https://www.topcoder.com/thrive/articles/data-warehousing-and-data-mining#:~:text=Data%20warehousing%20is%20a%20method,compiled%20in%20the%20data%20warehouse.
2.	https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing
3.	https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	2
CO3	3	2	3	3	3	2

CO4	**3**	**2**	**3**	**2**	**3**	3
CO5	**2**	**3**	**3**	**3**	**3**	3
Weightageofcour secontributedtoe ach PSO	**14**	**13**	**14**	**14**	**14**	**13**

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

Relevant to Global need	✅	**Employability oriented**		**Address Professional Ethics**	
Relevant to National need		**Entrepreneurship oriented**		**Address Gender Sensitization**	
Relevant to Regional need		**Skill Development oriented**	✅	**Address Environment and Sustainability**	
Relevant to Local need				**Address Human Values**	

Subject Code	**Subject Name**	**Categ ory**	**L**	**T**	**P**	**S**	**C r e d i t s**	**I n s t . H o u**	**Marks**

								r s	C I A	E x t e r n a l	Tot al
U23DS20	**Operating Systems**	Elective	4	-	-	-	3	4	25	75	100

	Learning Objectives
LO1	Understanding the design of the Operating System
LO2	Imparting knowledge on CPU scheduling, Process and Memory Management.
LO3	To code specialized programs for managing overall resources and operations of the computer.
LO4	Explain theJob and processor scheduling
LO5	To understand the Virtual Memory organization

UNIT	Contents	No. of Hours
I	**Introduction**: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. **Process concepts:** definition of process, process states-Life cycle of a process, process management- process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.	12
II	**Asynchronous concurrent processes:** mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm,software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores.	12

		Concurrent programming: monitors, message passing	
III		**Deadlock and indefinite postponement:** Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery	12
IV		**Job and processor scheduling:** scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling	12
V		**Real Memory organization and Management**:: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping **Virtual Memory organization:** virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems. **Virtual Memory Management:** Demand Paging, Page replacement strategies	12
		Total	**60**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
CO2	know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2

CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.	PO4, PO5
CO4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
CO5	understand memory organization and management	PO2, PO4

Text Book	
1	H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011

Reference Books	
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2.	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Nineth Edition, John Wiley &Sons(ASIA) Pte Ltd.,2012

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	

Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
U23CS13	**Computer Networks**	Core	6	-	-	-	5	6	25	75	100

	Course Objective	
LO1	To learn the basic concepts of Data communication and Computer network	
LO2	To learn about wireless Transmission	
LO3	To learn about networking and data link layer.	
LO4	To study about Network communication.	
LO5	To learn the concept of Transport layer	

UNIT	Contents	No. of Hours
I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	18
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	18
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	18
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	18
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transporet Protocols (ITP) - Network Security: Cryptography	18
	Total	**90**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1
CO2	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3	To understand the concept of MAC	PO4, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO4
Text Book		
1	A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.	
Reference Books		
1.	B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017	
2.	F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008	
3.	D. Bertsekas and R. Gallagher, "Data Networks", 2nd Edition, PHI, 2008.	
4.	Lamarca, "Communication Networks", Tata McGraw- Hill, 2002	
Web Resources		
1.	https://en.wikipedia.org/wiki/Computer_network	
2.	https://citationsy.com/styles/computer-networks	

Mapping with Programme Outcomes:

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

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS14	**.Net Programming**	Core	6	-	-	-	5	6	25	75	100

Course Objective	
C1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
C2	To develop ASP.NET Web application using standardcontrols.
C3	To implement file handling operations.
C4	To handles SQL Server Database using ADO.NET.
C5	Understand the Grid view control and XML classes.

UNIT	Contents	No. of Hours
I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- C# Fundamentals: Primitive types and Variables – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – Stringoperations.	18
II	Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms – Web form standard controls: Properties and its events – HTML controls -List Controls: Properties and its events.	18

III	Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deletingfiles – File uploading.	18
IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controlsand its Properties – DataBinding	18
V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files - Website Security - Authentication - Authorization – Creating aWeb application.	18
	Total	**90**

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
2	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5
3	To Work On Various Controls Files	PO1, PO3, PO6
4	To create a web application using MicrosoftADO.NET.	PO2, PO6
5	To develop web applications using XML	PO1, PO3, PO6

	Text Book
1	SvetlinNakov,VeselinKolev& Co, Fundamentals of Computer Programming with C#,Faber publication,2019.
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

	Reference Books
1.	Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013.

3.	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc.2016.
4.	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.
5.	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010,APRESS,2010.
Web Resources	
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/
2.	https://www.javatpoint.com/net-framework

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	2	3
CO2	3	2	2	3	3	3
CO3	3	3	3	2	3	3
CO4	2	2	1	3	3	2
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	12	14	14	14

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CS15P	**.Net Programming LAB**	Core	-	-	6	-	3	6	25	75	100

	Course Objective
LO1	To develop ASP.NET Web application using standardcontrols.
LO2	To create rich database applications usingADO.NET.
LO3	To implement file handling operations.
LO4	To implement XML classes.
LO5	To utilize ASP.NET security features for authenticating the website

Sl. No	Programs	No. of Hours
16.	Create an exposure of Web applications and tools	
17.	Implement the Html Controls	
18.	Implement the Server Controls	
19.	Web application using Web controls.	
20.	Web application using List controls.	
21.	Web Page design using Rich control. Validate user input using Validation controls. Working with Fileconcepts.	

22.	Web application using Data Controls.	90
23.	Data binding with Web controls	
24.	Data binding with Data Controls.	
25.	Database application to perform insert, update and delete operations.	
26.	Database application using Data Controls to perform insert, delete, edit, paging and sorting operation.	
27.	Implement the Xml classes.	
28.	Implement Authentication – Authorization.	
29.	Ticket reservation using ASP.NET controls.	
30.	Online examination using ASP.NET controls	
Total		**90**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO 1	To create web applications and implement various controls	PO1, PO2, PO4
CO2	Create web pages in Rich control.	PO3, PO5
CO3	Develop knowledge about file handling operations	PO1, PO4, PO5
CO4	An ability to design XML classes	PO2, PO4, PO6
CO5	To develop a software to solve real-world problems using ASP.NET	PO1,PO3, PO5, PO6

Text Book	
1	SvetlinNakov, VeselinKolev& Co, Fundamentals of Computer Programming with C#, Faber publication,2019.
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

Reference Books	
1.	Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres,2013.
3.	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc.2016.
4.	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.

5.	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS,2010.
Web Resources	
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/
2.	https://www.javatpoint.com/net-framework

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS21	**COMPUTER GRAPHICS**	Core	5	-	-	-	3	5	25	75	100

	Course Objective	
C1	To learn various concepts of Computer Graphics
C2	To learn various Line,Circle and Ellipse Drawing Algorithm
C3	To learn Attributes of Output primitives.
C4	To learn about Two dimensional transformation.
C5	To learn various type of Two dimensional Viewing.

UNIT	Contents	No. of Hours
I	A Survey of Computer Graphics: Computer-Aided Design – Presentation Graphics Computer Art – Entertainment – Education and Training – Visualization – Image Processing – Graphical User Interfaces. Overview of Graphic Systems: Video Display Devices – Raster Scan Systems - Random Scan Systems – Input Devices – Hard Copy Devices	18
	Output Primitives: Points and Lines – Line Drawing Algorithms	

II	– Circle Generation Algorithms – Ellipse Generating Algorithms - Other Curves-Filled Area primitives	18
III	Attributes of Output Primitives: Line Attributes – Curve Attributes – Color and Gray Scale Levels – Area Fill Attributes – Character Attributes – Bundled Attributes – Inquiry Functions – Anti aliasing.	18
IV	Two-Dimensional Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations – Transformation between Coordinate Systems.	18
V	Two-Dimensional Viewing : The Viewing Pipeline – Viewing Coordinate Reference Frame – Window – to – Viewport Coordinate Transformation – Two-Dimensional Viewing Functions – Clipping Operations – Point Clipping – Cohen Sutherland Line Clipping – Sutherland Hodgeman Polygon Clipping - Curve Clipping – Text Clipping – Exterior Clipping.	18
	Total	**90**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
2	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5
3	To Work On Various Controls Files	PO1, PO3, PO6
4	To create a web application using MicrosoftADO.NET.	PO2, PO6
5	To develop web applications using XML	PO1, PO3, PO6

Text Book	
1	2. COMPUTER GRAPHICS – Donald Hearn, M. Pauline Baker, PHI, 2nd Edition, 1994

Reference Books	
1.	Computer Graphics, Multimedia & Animation – Malay K.Pakhira, PHI, New Delhi, 2008.
2.	Fundamentals of Computer Graphics and Multimedia – D.P.Mukherjee, PHI, New Delhi, 1999

Web Resources	
1.	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	2	3
CO2	3	2	2	3	3	3
CO3	3	3	3	2	3	3
CO4	2	2	1	3	3	2
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	12	14	14	14

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23DS22	**Artificial Intelligence**	Elective	5	-	-	-	3	5	25	75	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" , 3rd Edition, Prentice Hall.
	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

Reference Books	
1.	Trivedi, M.C., "A Classical Approach to Artifical 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=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghLMZVwlCm_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 ofcoursecontributedto eachPSO	15	12	10	11	12	13

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

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

	Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
									CIA	External	Total
	U23PCS1P	**Image Processing Using MATLAB**	**Core**	-	-	2	-	2	25	75	100

Learning Objectives

LO1	To learn fundamentals of digital image processing.
LO2	To learn about various 2D Image transformations
LO3	To learn about various image enhancement processing methods and filters
LO4	To learn about various classification of Image segmentation techniques

	LO5	To learn about various image compression techniques	
		LAB EXERCISES	**Required Hours**

1.Write a MATLAB program for Basic commands like date, pwd, who, dir
 	
2. Write a MATLAB program for find Largest number in three number using if statement
3. Write a MATLAB program for display prime numbers 1 to 100 using for loop and break.
 	
4. Write a MATLAB program for Sum of Digits using while loop
 	
5. Write a MATLAB program for Unit Converter using Switch
 	
6. Write a MATLAB program for check given string is palindrome or not
 	
7. Write a MATLAB program for display star pattern as like
 	
      *
 	
      **
 	
      ***
 	
      ****
 	
      *****
 	
8. Write a MATLAB program for compute the value of following function by using
 	
    1.Normal method
 	
    2.Avoiding inner loop
 	
    3.Avoiding both loop
 	
$$y(n) = 1^3*(1^3+2^3)*(1^3+2^3+3^3)*...*(1^3+2^3+ ...+n^3)$$
 	
9. Write a MATLAB program for a given matrix to perform the following operations.
 	
    A = 1 2   3
         4 5 6
         7 8 0
    (a)   Display the matrix
	75

	(b) Get the matrixsize
	(c) Get the matrixtranspose
	(d) Inverse matrix
	(e) Matrix determination(det)
	10. Write a MATLAB program for
	
	    B = [2 2 3; 4 0 6; 8 15]
	
	    C = [1 1 2; 6 3 5; 1 9 1]
	To Calculate:
	(a) D = B -C
	(b) E = B +C
	(c) F=E+2
	(d) G=B*C
	(e) H=B.*C
	
	11. Write a MATLAB program to
	
	     1.Read and display a image
	
	     2. Display multi Image in a Single Window
	     3. Display multi Image in a Separate Window
	
	12. Write a MATLAB program to
	
	     1. Resize a image
	
	     2. Rotate a image
	
	     3. Crop a image
	
	 13. Write a MATLAB program for flip an image
	
	14. Write a MATLAB program for convert image color RGB to Gray color
	
	15. Write a MATLAB program for contrast manipulation
	
	16. Write a MATLAB program for histogram for Black and White image
	
	17. Write a MATLAB program for histogram for RGB image
	
	18. Write a MATLAB program for Histogram Equalization
	19. Write a MATLAB program for Histogram of original and flipped image
	
	20. Write a MATLAB program for
	    ● Image Addition
	    ● Image Subtraction
	    ● Image Multiply	

21.Write a MATLAB program for Deblurring

22. Write a MATLAB program for Color – Dithering

23. Write a MATLAB program for Image Negation.

24. Write a MATLAB program to extract Red, Green, and Blue Component from an Image

25. Write aMatlab program for Edge Detection by using the following Operators.

    1.   Sobel
    2.   Prewitt
    3.   Roberts

26. Write a MATLAB program to draw a 2-D simple plot graph

27. Write a MATLAB program for 2-D plot graph with title, legend, label

28. Write a MATLAB program for 2-D multi plot with color

29. Write MATLAB program for 3-D plot

30. Write a MATLAB program for 3-D multi plot with color

Course Outcomes		
On completion of this course, students will		
CO	On completion of this course, students will	
1	Understand the fundamental concepts of digital image processing.	PO1
2	Understand various 2D Image transformations	PO1, PO2
3	Understand image enhancement processing techniques and filters	PO4, PO6
4	Understand the classification of Image segmentation techniques	PO4, PO5, PO6
5	Understand various image compression techniques	PO3, PO5
Text Book		
1	S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing ,Tata McGraw Hill, 2015	
2	Gonzalez Rafel C, Digital Image Processing, Pearson Education, 2009	
Reference Books		
1.	1. Jain Anil K , Fundamentals of digital image processing: , PHI,1988	

2.	Kenneth R Castleman , Digital image processing:, Pearson Education,2/e,2003
3.	Pratt William K , Digital Image Processing: , John Wiley,4/e,2007
Web Resources	
1.	https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf
2.	http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
3.	https://dl.acm.org/doi/10.5555/559707
4.	https://www.ijert.org/image-processing-using-web-2-0-2

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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**	**2**	**2**
Weightage ofcoursecontributedtoeachPSO	**15**	**14**	**11**	**15**	**10**	**10**

Foundation Courses

Relevant to Global need	✅	Employability oriented		Address Professional Ethics	
Relevant to National need		Entrepreneurship oriented		Address Gender Sensitization	
Relevant to Regional need		Skill Development oriented	✅	Address Environment and Sustainability	
Relevant to Local need				Address Human Values	

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23FS1	**Problem Solving Techniques**	FC	2	-	-	-	2	2	25	75	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,

Web Resources	
1.	https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm
2.	http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
3.	http://utubersity.com/?page_id=876

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	2	3	3	3	3
CO 4	3	3	2	3	3	3
CO 5	3	3	3	3	3	2

Weightage of course contributed to each PSO	15	14	14	15	15	14

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

Course Code: U23FS1	Title of the Course: Problem Solving Techniques						
Pedagogy	**Total hrs**	**Lecture**	**Practical Experience**	**Peer Group Learning**	**Demo**	**Seminar/GD**	**ICT/Blended Learning**	**Fieldwork/internship**
	30	15	-	5	-	5	5	
UNIT	**Topic**					**Lect.hrs**	**Mode of Teaching**
UNIT I	Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.					6	Lecture
UNIT II	Implement different programming constructs and decomposition of problems into functions.					6	Lecture and Peer Group learning
UNIT III	Use data flow diagram, Pseudo code to implement solutions.					6	Lecture /Seminar
UNIT IV	Define and use of arrays with simple applications					6	Lecture/Demo
UNIT V	Understand about operating system and their uses					6	Lecture/ICT

I.   QUESTION PAPER PATTERN FOR EXTERNAL EXAMINATION

1. Core, Major Elective and Allied Papers

Section - A	5 compulsory questions (1 question from each unit)	5 X 2 = 10 Marks
Section - B	5 questions to be answered under 'either – or' pattern (2 questions from each unit)	5 X 5 = 25 Marks
Section - C	5 questions to be answered under 'either – or' pattern (2 questions from each unit)	5 X 8 = 40 Marks
	Total	75 Marks

2. Skill Based Elective Papers

Section - A	5 questions to be answered under 'either – or' pattern (2 question from each unit)	5 X 15 =75 Marks
	Total	75 Marks

3. Non Major Elective Papers

Section - A	5 questions to be answered under 'either – or' pattern (2 questions from each unit)	5 X 5 = 25 Marks

Section - B	5 questions to be answered under 'either – or' pattern (2 questions from each unit)	5 X 10 = 50 Marks
	Total	75 Marks

. **Value Added Course**

Internal -   **20**

External -   **30**

Total -   **50**

I._____**EVALUATION PATTERN**

1. Theory Paper

Internal

Test	20
Quiz/Assignment	5
Total	25

Internal -   **25**

External -   **75**

Total -   **100**

2. Practical Paper

Internal

Record	5
Viva-Voce	5
Internal Practical Exam	15
Total	25

Internal   -   25

External   -   75

Total   - 100

3. Project

Internal Assessment	25
Viva-Voce	75
Total	100

II.   PASSING MINIMUM

External					Project - Passing Minimum		Internal
Theory - Passing Minimum		Practical - Passing Minimum					Passing Minimum
35% (**27** Marks)	Aggregate of **40** Marks in Total	35% (**21** Marks)	Aggregate of **40** Marks in Total	35% (**28** Marks)	Aggregate of **40** Marks in Total		**No**

Internship

Evaluation pattern for Internship shall be as follows:

Attendance (mandatory)   - 40 marks

Field work and performance   - 40 marks

Report writing   - 20 marks

APPENDIX

S.No.	Semester	Course Code	Course Name	Page No
1	I	U23CS1	**Python programming**	10
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.			
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.			
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.			
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.			
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.			

S.No.	Semester	Course Code	Course Name	Page No
2	I	U23CS2P	**Python Programming Lab**	13
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.			

S.No.	Semester	Course Code	Course Name	Page No

3	I	U23GS35	Discrete Mathematics – I	57
CO1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.			
CO2	To understand different mathematical logics and functions			
CO3	To Understanding the different form of number theory			
CO4	To gain knowledge on set theory			
CO5	Able to understand Relations and its applications			

S.No	Semester	Course Code	Course Name	Page No
4	I	U23GS50P	PROGRAMMING IN C LAB	60
CO1	Remember the program structure of C with its syntax and semantics			
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)			
CO3	Apply the programming principles learnt in real-time problems			
CO4	Analyze the various methods of solving a problem and choose the best method			
CO5	Code, debug and test the programs with appropriate test cases			

S.No.	Semester	Course Code	Course Name	Page No
5	I	U23SES1P	OFFICE AUTOMATION	92
CO1	Possess the knowledge on the basics of computers and its components			
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.			
CO3	Learn the concepts of Database and implement the Query in Database.			
CO4	Demonstrate the understanding of different automation tools.			
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.			

S.No.	Semester	Course Code	Course Name	Page No
6	I	U23FS1	Problem Solving Techniques	205
CO1	Study the basic knowledge of Computers. Analyze the programming languages.			
		Study the data types and arithmetic operations. Know about the algorithms.			

CO2	Develop program using flow chart and pseudocode.
CO3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops
CO4	Study about Numeric data and character-based data. Analyze about Arrays.
CO5	Explain about DFD. Illustrate program modules.Creating and reading Files

S.No.	Semester	Course Code	Course Name	Page No
7	II	U23CS3	DATA STRUCTURES AND ALGORITHMS	15
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation			
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues			
CO3	Describe the hash function and concepts of collision and its resolution methods			
CO4	Solve problem involving graphs, trees and heaps			
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data			

S.No.	Semester	Course Code	Course Name	Page No
8	II	U23CS4P	**DATA STRUCTURES AND ALGORITHMS LAB**	18
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation			
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues			
CO3	Describe the hash function and concepts of collision and its resolution methods			
CO4	Solve problem involving graphs, trees and heaps			
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data			

S.No.	Semester	Course Code	Course Name	Page No
9	II	U23GS45	Digital Logic Fundamentals	64
CO1	Identify the logic gates and their functionality.			
CO2	Perform number conversions from one system to another system			
CO3	Understand the functions of combinational circuits			

CO4	Perform number conversions
CO5	Perform Counter design and learn its operations

S.No.	Semester	Course Code	Course Name	Page No
10	II	U23SES2P	**MULTIMEDIA LAB**	95
CO1			understand the concepts, importance, application and the process of developing multimedia	
CO2			to have basic knowledge and understanding about image related processings	
CO3			To understand the framework of frames and bit images to animations	
CO4			Speaks about the multimedia projects and stages of requirement in phases of project.	
CO5			Understanding the concept of cost involved in multimedia planning, designing, and producing	

S.No.	Semester	Course Code	Course Name	Page No
11	II	U23SES3	Multimedia Systems	98
CO1			understand the concepts, importance, application and the process of developing multimedia	
CO2			to have basic knowledge and understanding about image related processings	
CO3			To understand the framework of frames and bit images to animations	
CO4			Speaks about the multimedia projects and stages of requirement in phases of project.	
CO5			Understanding the concept of cost involved in multimedia planning, designing, and producing	

S.No.	Semester	Course Code	Course Name	Page No
12	III	U23CS5	**Microprocessor and Microcontroller**	21
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..
CO2	Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic
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.
CO4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.
CO5	An exposure to create real time applications using microcontroller.

S.No.	Semester	Course Code	Course Name	Page No
13	III	U23CS6P	**Microprocessor and microcontroller Lab**	24
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..		
CO2		Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic		
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.		
CO4		Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.		
CO5		An exposure to create real time applications using microcontroller.		

S.No.	Semester	Course Code	Course Name	Page No
14	III	**U23GS37**	Statistical Methods and its Application-I	67

CO1	Summarize the concepts of statistical methods
CO2	Analyse the different Statistical measures of data
CO3	Derive the marginal and conditional distributions of random variables, translate realworld problems into probability models
CO4	To understanding the concepts of Probability of an event
CO5	Understand basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables

S.No.	Semester	Course Code	Course Name	Page No
15	III	U23GS51P	**PHP Programming Lab**	
LO1	To learn about Database Applications and the Web			
LO2	To learn about PHP scripting Language			
LO3	To learn about PHP OOPs concept			
LO4	To learn about Querying Database			
LO5	To learn about PHP reporting			

S.No.	Semester	Course Code	Course Name	Page No
16	III	U23SES4	**Fundamentals of Information Technology**	
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.			
CO2	Develop organizational structure using for the devices present currently under input or output unit.			
CO3	Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.			
CO4	Work with different software, Write program in the software and applications of software.			
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.			

S.No.	Semester	Course Code	Course Name	Page No
17	III	U23SES5P	**Vɪsᴜᴀʟ BASIC LAB**	
CO1			Knows the basic concept in VB Concept of resources in VB	
CO2			Knows Design concept. Concept of GUI based events Understand the concept of DDL operations.	
CO3			Understand the Connection to the DATABASE. Concept of list	
CO4			Creating Menu Editor	
CO5			Concept of adding images Understand the table creation.	

S.No.	Semester	Course Code	Course Name	Page No
18	III	U23CS7	**Java Programming**	
CO1			Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	
CO2			Implement inheritance, packages, interfaces and exception handling of Core Java.	
CO3			Implement multi-threading and I/O Streams of Core Java	
CO4			Implement AWT and Event handling.	
CO5			Use Swing to create GUI.	

S.No.	Semester	Course Code	Course Name	Page No
19	III	U23CS8P	**Java Programming Lab**	
CO1			Understand the basic Object-oriented concepts.Implement the basic constructs of Core Java.	
CO2			Implement inheritance, packages, interfaces and exception handling of Core Java.	
CO3			Implement multi-threading and I/O Streams of Core Java	
CO4			Implement AWT and Event handling.	
CO5			Use Swing to create GUI.	

S.No.	Semester	Course Code	Course Name	Page No

20	III	U23GS51P	**PHP Programming Lab**	71
CO1	Learn the PHP Three tier Architecture, PHP Scripting language , Condition and Branches , Loops basics of computer, Construct the structure of the required things in computer, learn how to use it.			
CO2	Develop PHP scripting Language			
CO3	Concept of Oops, SQL ,MySQL Queries			
CO4	Work with Querying Database, Processing User Input, PEAR Overview, Core Components, Packages, Writing to Web databases			
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.			

S.No.	Semester	Course Code	Course Name	Page No
21	III	U23GS47	Resource Management Techniques	74
CO1	To understanding the concepts of Development of OR			
CO2	develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems			
CO3	Solve the problems of Simplex Method			
CO4	To study the Duality Theorems			
CO5	Finding initial basic feasible and optimal solution of the Transportation problems			

S.No.	Semester	Course Code	Course Name	Page No
22	III	U23SES6P	WEB DESIGNING LAB	101
CO1	Develop working knowledge of HTML			
CO2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).			
CO3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).			
CO4	Ability to develop a java script			
CO5	An ability to develop web application using Ajax.			

S.No.	Semester	Course Code	Course Name	Page No
23	III	U23SES57	**Biometrics**	104
CO1	To understand the basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and Applications.			
CO2	To know the concepts Retina and Iris Biometrics and Vein and Fingerprint Biometrics.			
CO3	To analyse the Privacy Enhancement and Multimodal Biometrics.			
CO4	To get analyticalidea on Watrmarking Techniques			
CO5	To Gain knowledge on Future scope of Biometrics,and Study of various Biometric Techniques.			

S.No.	Semester	Course Code	Course Name	Page No
24	V	**U23CS9**	**Software Engineering**	36
CO1	Gain basic knowledge of analysis and design of systems			
CO2	Ability to apply software engineering principles and techniques			
CO3	Model a reliable and cost-effective software system			
CO4	Ability to design an effective model of the system			
CO5	Perform Testing at various levels and produce an efficient system.			

S.No.	Semester	Course Code	Course Name	Page No
25	V	U23CS10	**Database Management System**	40
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.			
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.			
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)			

CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions

S.No.	Semester	Course Code	Course Name	Page No
26	V	U23CS11P	**Database Management System lab**	44
CO1			Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	
CO2			Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	
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)	
CO4			Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	
CO5			Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	

S.No.	Semester	Course Code	Course Name	Page No
27	V	U23DS19	**Data mining and warehousing**	78
CO1			To understand the basic concepts and the functionality of the various data mining and data warehousing component	
CO2			To know the concepts of Data mining system architectures	
CO3			To analyze the principles of association rules	
CO4			To get analytical idea on Classification and prediction methods	
CO5			To Gain knowledge on Cluster analysis and its methods.	

S.No.	Semester	Course Code	Course Name	Page No
28	V	U23DS20	**Operating Systems**	81
CO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management			
CO2	know the critical analysis of process involving various algorithms, an exposure to threads and semaphores			
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.			
CO4	Have complete knowledge of Scheduling Algorithms and its types.			
CO5	understand memory organization and management			

S.No.	Semester	Course Code	Course Name	Page No
29	VI	U23CS13	**Computer Networks**	47
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models			
CO2	To gain knowledge on Telephone systems using wireless network			
CO3	To understand the concept of MAC			
CO4	To analyze the characteristics of Routing and Congestion control algorithms			
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS			

S.No.	Semester	Course Code	Course Name	Page No
30	VI	U23CS14	**.Net Programming**	49
CO1	Develop working knowledge of C# programming constructs and the .NET Framework			

CO2	To develop a software to solve real-world problems using ASP.NET
CO3	To Work On Various Controls Files
CO4	To create a web application using MicrosoftADO.NET.
CO5	To develop web applications using XML

S.No.	Semester	Course Code	Course Name	Page No
31	VI	U23CS15P	**.Net Programming LAB**	53
CO1	To create web applications and implement various controls			
CO2	Create web pages in Rich control.			
CO3	Develop knowledge about file handling operations			
CO4	An ability to design XML classes			
CO5	To develop a software to solve real-world problems using ASP.NET			
S.No.	Semester	Course Code	Course Name	Page No
32	VI	U23DS21	**COMPUTER GRAPHICS**	85
CO1	To learn various concepts of Computer Graphics			
CO2	To learn various Line,Circle and Ellipse Drawing Algorithm			
CO3	To learn Attributes of Output primitives.			
CO4	To learn about Two dimensional transformation.			
CO5	To learn various type of Two dimensional Viewing.			

S.No.	Semester	Course Code	Course Name	Page No
33	VI	U23DS22	**Artificial Intelligence**	88
CO1	Understand the various concepts of AI Techniques.			
CO2	Understand various Search Algorithm in AI.			

CO3	Understand probabilistic reasoning and models in AI.
CO4	Understand Markov Decision Process.
CO5	Understand various type of Reinforcement learning Techniques.

S.No.	Semester	Course Code	Course Name	Page No
34	VI	U23PCS1P	**Image Processing Using MATLAB**	198
CO1	Understand the fundamental concepts of digital image processing.			
CO2	Understand various 2D Image transformations			
CO3	Understand image enhancement processing techniques and filters			
CO4	Understand the classification of Image segmentation techniques			
CO5	Understand various image compression techniques			

Annexure I

Core Courses

Sno	Semester	Course Code	Course Name	Page No
1.	I	U23CS1	Python Programming	**10**
2	I	U23CS2P	Python Programming Lab	**13**
3	II	U23CS3	Data Structure and Algorithms	15
4	II	U23CS4P	Data Structure and Algorithms Lab	18
5	III	U23CS5	Microprocessor and Microcontroller	21
6	III	U23CS6P	Microprocessor and Microcontroller Lab	24

List of Generic Elective Courses

List of Domain Specific Electives

Sno	Semester	Course Code	Course Name	Page No
1.	V	U23DS19	Data Mining and Warehousing	**78**
2	V	U23DS20	Operating System	**81**
3	VI	U23DS21	Computer Graphics	85
4	VI	U23DS22	Artificial Intelligence	88

List of Skill based Electives

Sno	Semester	Course Code	Course Name	Page No
1.	I	U23SES1P	Office Automation Lab	**92**
2	II	U23SES2P	Multimedia Lab	**95**
3	III	U23SES4	Fundamentals of Information Technology	108
4	III	U23SES5P	Visual Basic Lab	111
5	IV	U23SES6P	Web Designing Lab	114
6	IV	U23SES57	Biometrics	117

List of Entrepreneurial Skill Development Courses

Sno	Semester	Course Code	Course Name	Page No
1.	I	U 23CS1	Python Programming	**10**
2	I	U23GS35	Discrete Mathematics –I	**57**
3	I	U23GS50P	Programming in C Lab	60
4	I	U23SES1P	Office Automation Lab	92
5	I	U23FS1	Problem Solving Techniques	205
6	II	U23CS3	Data Structure and Algorithms	15
7	II	U23CS4P	Data Structure and Algorithms Lab	18
8	II	U23GS45	Digital Logic Fundamentals	64
9	II	U23SES2P	Multimedia Lab	95
10	II	U23SES3	Multimedia Systems	98
11	III	U23CS5	Microprocessor and Microcontroller	21
12	III	U23CS6P	Microprocessor and Microcontroller Lab	24
13	III	U23GS37	Statistical Methods and its Application-I	67
14	III	U23GS51P	PHP Programming Lab	71
15	III	U23SES4	Fundamentals of Information Technology	108
16	III	U23SES5P	Visual Basic Lab	111
17	IV	U23CS7	Java Programming	28
18	IV	U23CS8P	Java Programming Lab	32

19	IV	U23GS51P	PHP Programming Lab	71
20	IV	U23GS47	Resource Management Techniques	74
21	IV	U23SES6P	Web Designing Lab	101
22	V	U23CS9	Software Engineering	36
23	V	U23CS10	Database Management System	40
24	V	U23CS11P	Database Management System Lab	44
25	V	U23DS19	Data Mining and Warehousing	78
26	V	U23DS20	Operating System	81
27	VI	U23CS13	Computer Networks	47
28	VI	U23CS14	.NET Programming	49
29	VI	U23CS15P	.NET Programming Lab	53
30	VI	U23DS21	Computer Graphics	85
31	VI	U23DS22	Artificial Intelligence	88
32	VI	U23PCS1P	Image Processing using MATLAB	198

List of Foundation Courses

Sno	Semester	Co urse Code	Course Name	Page No
1.	I	U23FS1	Problem Solving Techniques	205

List of Summer Internship

236

Sno	Semester	Course Code	Course Name	Page No
1.	V	U23SIS1	Internship / Industrial Training	

List of Project Viva-Voce

Sno	Semester	Course Code	Course Name	Page No
1.	V	U23SPW	Project with Viva-voce	

List of Extension Activity

Sno	Semester	Course Code	Course Name	Page No
1.	VI	U23EAS	Extension Activity	

Suggested topics in Core component

1. Programming in C
2. Programming in C Lab
3. Object oriented Programming using C++
4. Object oriented Programming using C++ Lab
5. Mobile Application Development
6. Mobile Application Development Lab
7. Data Analytics using R
8. Data Analytics using RLab
9. Machine Learning
10. Machine Learning Lab
11. Data Mining and Warehousing
12. Software Metrics
13. Network Security

Suggested topics in Elective Course

Generic Specific

1. Discrete Mathematics – I
2.   Discrete Mathematics-II
3. Statistical Methods and its Application-I
4. Statistical Methods and its Application-II
5. Optimization Techniques
6. Nano Technology
7. Introduction to Linear Algebra
8. Graph Theory and its Application
9. Financial Accounting
10. Cost and Management Accounting
11. Digital Logic Fundamentals
12. Numerical Methods
13. Resource Management Techniques
14. Multimedia Lab
15. Database Management System
16. RDBMS Lab
17. Programming in C Lab
18. PHP Programming Lab

Elective course – (EC1- EC8)-Discipline Specific

SNO	Subject Code	Name of the Course
1	U23DS01	Software Metrics
2	U23DS02	Natural Language Processing
3	U23DS03	Analytics for Service Industry
4	U23DS04	Cryptography
5	U23DS05	Big Data Analytics
6	U23DS06	IOT and its Applications
7	U23DS07	Software Project Management

8	U23DS08	Image Processing
9	U23DS09	Information Security
10	U23DS10	Human Computer Interaction
11	U23DS11	Fuzzy Logic
12	U23DS12	Mobile Adhoc Network
13	U23DS13	Computational Intelligence
14	U23DS14	Grid Computing
15	U23DS15	Cloud Computing
16	U23DS16	Artificial Neural Network
17	U23DS17	Agile Project Management
18	U23DS18	PHP Programming
19	U23DS19	Data mining and Warehousing
20	U23DS20	Operating System
21	U23DS21	Computer Graphics
22	U23DS22	Artificial Intelligence

Suggested topics in Skill Enhancement (SEC1-SEC8) Course

Skill Enhancement Course

1. Fundamentals of Information Technology
2. Introduction to HTML Lab
3. Web Designing
4. Software Testing
5. Problem Solving Techniques
6. Understanding Internet
7. Office Automation

8. Quantitative Aptitude
9. Open Source Technologies
10. Multimedia Systems
11. Advanced Excel
12. Biometrics
13. Cyber Forensics
14. Pattern Recognition
15. Enterprise Resource Planning

Sri Meenakshi Government Arts College for Women (Autonomous), Madurai-02.

Levels of Mapping

UNDERGRADUATE PROGRAMME

Bloom's classification system that is used to define and distinguish different levels of student's cognition has been incorporated into the evaluation process. It is based on the following:

K1 - Remembering /Recalling

Keywords: Define, Identify, Mention, List out, Find, Select, Quote, State, Choose, Trace, etc.

K2 - Understanding/ Comprehension

Keywords: Classify, Explain, Demonstrate, Translate, Infer, Show, Differentiate, Distinguish, Illustrate, Draw, Examine, etc.

K3- Application and Analysis

Keywords: Apply, Derive, Justify, Explain, Solve, Analyse, Describe, Sketch, Draw, Evaluate, Discuss, Explore, Compare and contrast, Appreciate, Elucidate, Review, etc.

Year	K1	K2	K3
I	40%	30%	30%
II	30%	40%	30%
III	30%	30%	40%

Question Pattern

Year	K1	K2	K3
I	Part-A (4 questions) or Part-A (3 questions)	Part-A (3 questions) or Part-A (1 question)	Part-A (3 questions) or Part-A (1 question)
	Part-B (3 questions) Part-C (3 questions)	Part-B (1 question) Part-C (1 question)	Part-B (1 question) Part-C (1 question)
II	Part-A (3 questions) or Part-A (1 question)	Part-A (4 questions) or Part-A (3 questions)	Part-A (3 questions) or Part-A (1 question)
	Part-B (2 questions) Part-C (2 questions)	Part-B (2 questions) Part-C (2 questions)	Part-B (1 question) Part-C (1 question)
III	Part-A (3 questions) or Part-A (1 question)	Part-A (3 questions) or Part-A (1 question)	Part-A (4 questions) or Part-A (3 questions)
	Part-B (1 question) Part-C (1 question)	Part-B (1 question) Part-C (1 question)	Part-B (3 questions) Part-C (3 questions)

19.07.2022

PRINCIPAL
Sri Meenakshi Govt. Arts College for Women
(Autonomous)
Madurai-2