GOVERNMENT ARTS COLLEGE (A), KUMBAKONAM

DEPARTMENT OF COMPUTER APPLICATIONS

BCA SYLLABUS

Effect From 2023 - 2024 Onwards

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KUMBAKONAM
Course Structure Under CBCS for Science (2023 - 2024 Onwards)

B.C.A. - COURSE STRUCTURE

SEM	PART	SUB CODE	COURSE TITLE	CREDITS	INST. HOURS /WEEK	MARKS INT.	MARKS EXT.	TOTAL
1	I	23U1TLC1	LC – PART I TAMIL PAPER I	3	6	25	75	100
	II	23U1ELC1	ELC – PART II ENGLISH PAPER I	3	6	25	75	100
	III	23U1CA1	CC – OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	5	5	25	75	100
		23U1CAP1	CP – LAB – I: C++ PROGRAMMING	3	3	40	60	100
		23U1CAST1	AC – APPLIED STATISTICS – I	4	4	25	75	100
		23U2CAST2	AC – APPLIED STATISTICS – II (CARRY OVER)		2			
	IV	23U1VE	VE – VALUE EDUCATION	2	2	25	75	100
		23U1CAFC	FC – FOUNDATION COURSE – STRUCTURED PROGRAMMING IN C	2	2	25	75	100
TOTAL				**22**	**30**	**TOT MARKS**		**700**
2	I	23U2TLC2	LC – PART I TAMIL PAPER II	3	6	25	75	100
	II	23U2ELC2	ELC – PART II ENGLISH PAPER II	3	6	25	75	100
	III	23U2CA2	CC – DATA STRUCTURES AND ALGORITHMS	5	5	25	75	100
		23U2CAP2	CP – LAB – II: DATA STRUCTURES AND ALGORITHMS LAB USING C++	3	3	40	60	100
		23U2CAST2	AC – APPLIED STATISTICS – II	4	4	25	75	100
		23U2CASTP1	AP – APPLIED STATISTICS – PRACTICAL	2	2	40	60	100
	IV	23U2ES	ES – ENVIRONMENTAL STUDIES	2	2	25	75	100
		23U2CANMSEC1	SEC – SKILL ENHANCEMENT COURSE I – OVERVIEW OF ENGLISH LANGUAGE COMMUNICATION ASSESSMENT & CERTIFICATION FROM CAMBRIDGE	2	2	25	75	100
		23U2CAEC1	SEC – SKILL ENHANCEMENT COURSE I – FUNDAMENTALS OF INFORMATION TECHNOLOGY (Re-Appearance Students Only)					
TOTAL				**24**	**30**	**TOT MARKS**		**800**

3	I	23U3TLC3	LC – PART I TAMIL PAPER III	3	6	25	75	100
	II	23U3ELC3	ELC – PART II ENGLISH PAPER III	3	6	25	75	100
	III	23U3CA3	CC – PROGRAMMING IN JAVA	5	5	25	75	100
		23U3CAP3	CP – LAB – III: PROGRAMMING IN JAVA	3	3	40	60	100
		23U3CACO1	AC – PRINCIPLE OF ACCOUNTANCY	4	4	25	75	100
		23U4CACO2	PRINCIPLE OF MANAGEMENT (CARRY OVER)		2			
	IV	23U3CASEC2	SEC – SKILL ENHANCEMENT COURSE II – PHP PROGRAMMING	2	2	25	75	100
		23U3CANMSEC2	NAAN MUDHALVAN					
		23U3CASEC3	SEC – SKILL ENHANCEMENT COURSE III – OFFICE AUTOMATION (Re-Appearance Students Only)	2	2	25	75	100
			TOTAL	**22**	**30**	**TOT MARKS**		**700**
4	I	23U4TLC4	LC – PART I TAMIL PAPER IV	3	6	25	75	100
	II	23U4ELC4	ELC – PART II ENGLISH PAPER IV	3	6	25	75	100
	III	23U4CA4	CC – MICROPROCESSOR AND MICROCONTROLLER	5	5	25	75	100
		23U4CAP4	CP – LAB – IV: MICROPROCESSOR AND MICROCONTROLLER LAB	3	3	40	60	100
		23U4CACO2	AC – PRINCIPLE OF MANAGEMENT	4	4	25	75	100
		23U4CACO3	AC – ORGANISATIONAL BEHAVIOUR	2	2	25	75	100
	IV	23U4CASEC4	SEC – SKILL ENHANCEMENT COURSE IV – SOFT SKILLS DEVELOPMENT	2	2	25	75	100
		23U4CANMSEC3	NAAN MUDHALVAN					
		23U4CASEC5	SEC – SKILL ENHANCEMENT COURSE V – UNDERSTANDING INTERNET (Re-Appearance Students Only)	2	2	25	75	100
			TOTAL	**24**	**30**	**TOT MARKS**		**800**

5	III	23U5CA5	CC – PYTHON PROGRAMMING	5	5	25	75	100
		23U5CA6	CC – OPERATING SYSTEM	4	5	25	75	100
		23U5CA7	CC – RDBMS WITH PL/SQL	4	4	25	75	100
		23U5CAP5	CP – LAB – V: PYTHON	3	6	40	60	100
		23U5CAMBE1	MBE – CLOUD COMPUTING	3	4	25	75	100
		23U5CAMBE2	MBE – DATA MINING AND WAREHOUSING	3	4	25	75	100
	IV	23U5CANMSEC4	NAAN MUDHALVAN	2	2	25	75	100
		23U4CASEC6	SEC – SKILL ENHANCEMENT COURSE VI – INTRODUCTION TO HTML (Re-Appearance Students Only)					
		23U5CAFV	FV – INTERNSHIP/INDUSTRIAL VISIT/FIELD VISIT	2				
TOTAL				**26**	**30**	**TOT MARKS**		**700**
6	III	23U6CA8	CC – ASP.NET PROGRAMMING	5	6	25	75	100
		23U6CA9	CC – COMPUTER NETWORKS	4	5	25	75	100
		23U6CAP6	CP – LAB – VI: ASP.NET PROGRAMMING	3	5	40	60	100
		23U6CAMBE3	MBE – SOFTWARE ENGINEERING	3	5	25	75	100
	IV	23U6CAMBE4	MBE – INTRODUCTION TO DATA SCIENCE	3	5	25	75	100
		23U6CANMSEC5	NAAN MUDHALVAN	2	2	25	75	100
		23U4CASEC7	SEC – SKILL ENHANCEMENT COURSE VII – WEB DESIGNING (Re-Appearance Students Only)					
			EA – EXTENSION ACTIVITY	1				
	V	23U6GS	GS – GENDER STUDIES	1	2	25	75	100
TOTAL				**22**	**30**	**TOT MARKS**		**700**
NET TOTAL CREDITS				**140+1**	**180**	**NET TOT MARKS**		**4400**

B.C.A. - COURSE STRUCTURE - SUMMARY

PART	COURSE	NO. OF PAPERS	CREDITS
1	TAMIL	4	12
2	ENGLISH	4	12
3	CORE COURSE	9	42
	CORE COURSE - PRACTICAL	6	18
	ALLIED COURSE	4	16
	ALLIED PRACTICAL	2	4
	MAJOR BASED ELECTIVE	4	12
4	FOUNDATION COURSE FC	1	2
	VALUE EDUCATION	1	2
	ENVIRONMENTAL STUDIES	1	2
	SKILL ENHANCED COURSE-SEC/NAAN MUDHALVAN	7	14
	INTERSHIP/INDUSTRIAL VISIT/FIELD VISIT		2
	EXTENSION ACTIVITY		1
5	GENDER STUDIES	1	1
NET TOTAL		**44**	**140+1**

ANNEXURE - II

UG - B.Sc. Statistics

Allied courses from the Department of Computer Applications (III & IV Semesters)

SEM	PART	SUB CODE	COURSE TITLE	CREDITS	INST. HOURS / WEEK	MARKS		TOTAL
						INT.	EXT.	
III	III	AC-I	PROGRAMMING IN C	4	5	25	75	100
		AP-I	PROGRAMMING IN C AND C++ - PRACTICAL (CARRY OVER)		2			
IV	III	AC-II	PROGRAMMING IN C++	3	3	25	75	100
		AP-I	PROGRAMMING IN C AND C++ - PRACTICAL	3	4	40	60	100

FIRST YEAR
SEMESTER I

Title of the Course / Paper	Subject Code: 23U1CA1 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-I	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	Core	5	-	-	-	5	5	25	75	100

Course Objective	
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
LO5	Demonstrate the use of various OOPs concepts with the help of programs

UNIT	Details	No. of Hours
I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages–Object Oriented Languages – I/O in C++ -C++ Declarations. Control Structures:- Decision Making and Statements: If..else, jump, goto, break, continue, Switch case statements - Loops in C++: for, while, do - functions in C++ - inline functions – Function Overloading.	15
II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects – friend functions – Overloading member functions – Bit fields and classes –Constructor and destructor with static members.	15
III	Operator Overloading: Overloading unary, binary operators –Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	15
IV	Pointers – Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions.	15

V	Files –Filestream classes – filemodes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation –Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.	15
	Total	**75**

Course Outcomes		**Programme Outcome**
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test Cases	PO7,PO8
Text Book		
1	E.Balagurusamy,‒Object-OrientedProgrammingwithC++‖,TMH2013,7thEdition.	
Reference Books		
1.	Ashok N Kamthane,‒Object-Oriented Programming with ANSI and Turbo C++‖, PearsonEducation2003.	
2.	Maria Litvin & Gray Litvin, ‒C++ for you‖, Vikaspublication2002.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	-	-	1
CO2	2	2	2	1	-	-
CO3	3	1	1	-	1	-
CO4	1	2	1	2	2	1
CO5	3	2	1	2	3	2
Weightage of course contributed to each PSO	12	9	6	5	6	4

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

Title of the Course / Paper	Subject Code: 23U1CAP1 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CP-I	LAB – I: C++ PROGRAMMING	CP	-	-	3	-	3	3	40	60	100

Course Objective	
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
LO5	Demonstrate the use of various OOPs concepts with the help of programs

S. No	Details
1	Write a C++ program to demonstrate function overloading, Default arguments and Inline function.
2	Write a C++ program to demonstrate Class and Objects
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions
4	Write a C++ program to demonstrate the Friend Functions.
5	Write a C++ program to demonstrate the concept of Passing Objects to Functions
6	Write a C++ program to demonstrate Constructor and Destructor
7	Write a C++ program to demonstrate Unary Operator Overloading
8	Write a C++ program to demonstrate Binary Operator Overloading
9	Write a C++ program to demonstrate: • Single Inheritance • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance
10	Write a C++ program to demonstrate Virtual Functions.
11	Write a C++ program to manipulate a Text File.
12	Write a C++ program to perform Sequential I/O Operations on a file.
13	Write a C++ program to find the Biggest Number using Command Line Arguments
14	Write a C++ program to demonstrate Class Template
15	Write a C++ program to demonstrate Function Template.
16	Write a C++ program to demonstrate Exception Handling.

Course Outcomes		Programme Outcome
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E.Balagurusamy,–Object-OrientedProgrammingwithC++‖,TMH2013,7thEdition.	
Reference Books		
1.	Ashok N Kamthane,–Object-Oriented Programming with ANSI and Turbo C++‖, PearsonEducation2003.	
2.	Maria Litvin & GrayLitvin,–C++foryou‖,Vikaspublication2002.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weightage of course contributed to each PSO	11	15	15	15	5	10

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

Subject Code	Subject Code: 23U1CAFC & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
FC-I	**FOUNDATION COURSE – STRUCTURED PROGRAMMING IN C**	FC	2	-	-	-	2	2	25	75	100

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

UNIT	Details	No.of Hours
I	**Over view of C**: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables - Assignment statement, declaring a variable as constant, as Volatile. Operators and Expression.	6
II	**Decision Making and Branching**: Decision making with If, simple IF, IF..ELSE, nested IF ELSE, ELSEIF ladder, switch, GOTO statement. **Decision Making and Looping**: While, Do-While, For, Jumps in loops.	6
III	**Arrays**: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.	6
IV	**Functions**: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes - character arrays and string functions	6
V	**Pointers:** definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.	6
Total		**30**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will be	
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,PO7
3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO7
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	PO7,PO8
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.	Yashavant Kanetkar, LetUs 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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	2	-
CO2	2	2	2	2	-	2
CO3	3	2	2	1	1	-
CO4	3	2	2	1	-	1
CO5	1	2	2	2	2	3
Weightage of course contributed to each PSO	7	10	10	18	15	6

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

FIRST YEAR
SEMESTER II

Title of the Course / Paper	Subject Code: 23U2CA2 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-II	DATA STRUCTURES AND ALGORITHMS	Core	5	-	-	-	5	5	25	75	100
Course Objective											
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	Details	No. of Hours
I	Abstract Data Types (ADTs)- List ADT- array-based implementation- linked list implementation singly linked lists- circular linked lists- doubly-linked lists- applications of lists- Polynomial Manipulation- All operations-Insertion-Deletion-Merge-Traversal	15
II	Stack ADT- Operations- Applications- Evaluating arithmetic expressions –Conversion of infix to postfix expression- QueueADT- Operations- Circular Queue- Priority Queue-deQueue applications of queues.	15
III	Tree ADT - tree traversals- Binary Tree ADT- expression trees-applications of trees- binary search tree ADT- Threaded Binary Trees- AVL Trees- B-Tree- B+Tree –Heap- Applications of heap.	15
IV	Definition- Representation of Graph-Types of graph- Breadth first traversal – Depth first traversal- Topological sort- Bi-connectivity – Cutvertex- Euler circuits- Applications of graphs.	15
V	Searching- Linear search-Binary search- Sorting- Bubble sort- Selection sort- Insertion sort- Shell sort- Radix sort- Hashing- Hash functions-Separate chaining- Open Addressing- Rehashing Extendible Hashing	15
	Total	**75**

Course Outcomes		Programmeme Outcome
CO	On completion of this course, students will be	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O'notation	PO1,PO6
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
3	Describe the hash function and concepts of collision and its resolution methods	PO2,PO4
4	Solve problem involving graphs, trees and heaps	PO6,PO8
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO7
Text Book		
1	Mark Allen Weiss,―Data Structures and Algorithm Analysis in C++‖, Pearson Education 2014,4th Edition.	
2	Reema Thareja,―Data Structures Using C‖, Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1.	Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein,―Introduction to Algorithms‖, McGraw Hill 2009,3rd Edition.	
2.	Aho, Hopcroft and Ullman,―Data Structures and Algorithms‖, Pearson Education 2003	
Web Resources		
1.	NPTEL & MOOC courses titled Data Structures	
2.	https://nptel.ac.in/courses/106106127/	

Mapping with Programme Outcomes:

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

Strong-3   Medium-2   Low-1

Title of the Course / Paper	Subject Code: 23U2CAP2 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CP-II	**LAB – II: DATA STRUCTURES AND ALGORITHMS USING C++**	CP	-	-	3	-	3	3	40	60	100
Course Objective											
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										
S.No	**Details**										
1.	Write a program to implement the List ADT using arrays and linked lists.										
2.	Write a program to implement the following using a singly linked list. ● Stack ADT ● Queue ADT										
3.	Write a program that reads an infix expression, converts thee xpression to post fix form and then evaluates the postfix expression (use stack ADT).										
4.	Write a program to implement priority queue ADT.										
5.	Write a program to perform the following operations: ● Insert an element into a binary search tree. ● Delete an element from a binary search tree. ● Search for a key element in a binary search tree.										
6.	Write a program to perform the following operations ● Insertion into an AVL-tree ● Deletion from an AVL-tree										
7.	Write a programs for the implementation of BFS and DFS for a given graph.										
8	Write a programs for implementing the following searching methods: ● Linear Search ● Binary search.										
9.	Write a programs for implementing the following sorting methods: ● Bubble sort ● Selection sort ● Insertion sort ● Radix sort.										

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will be	
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,PO8
3	Describe the hash function and concepts of collision and its resolution methods	PO1,PO3,PO6
4	Solve problems involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1,PO5,PO6
Text books		
1	Mark Allen Weiss,―Data Structures and Algorithm Analysis in C++‖, Pearson Education 2014, 4th Edition.	
2	Reema Thareja,―Data StructuresUsing C‖,Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1	ThomasH.Cormen,Chales E.Leiserson, Ronald L.Rivest, Clifford Stein,―Introduction to Algorithms‖, McGraw Hill 2009,3rd Edition	
2.	Aho, Hopcroft and Ullman,―Data Structures and Algorithms‖, Pearson Education 2003	
Web Resources		
1.	NPTEL & MOOC courses titled Data Structures	
2.	https://nptel.ac.in/courses/106106127/	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**1**	**-**
CO2	**1**	**2**	**1**	**-**	**-**	**2**
CO3	**3**	**1**	**2**	**1**	**-**	**-**
CO4	**2**	**2**	**1**	**2**	**3**	**1**
CO5	**3**	**2**	**1**	**-**	**-**	**-**
Weightage of course contributed to each PSO	12	10	8	5	4	4

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

Subject Code	Subject Code: 23U3CA3 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-III	**PROGRAMMING IN JAVA**	Core	5	-	-	-	5	5	25	75	100

	Course 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	Details	No. of Hours
I	**Introduction:** Review of Object Oriented concepts – History of Java –- JVM architecture – Data types – Variables – Scope and Lifetime of Variables – Arrays – Operators – Control Statements – Type Conversion and Casting – Classes, Objects and Methods - 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 keyword – Method Overloading – Method Overriding - Abstract classes - Usage of final keyword. **Packages**: Definition – Access Protection - Importing Packages. **Interfaces**: Definition – Implementation – Extending Interfaces.	15
III	**Exception Handling**: try – catch - throw – throws –finally – Built-in exceptions – Creating own Exception classes. **Multithreaded Programming**: Thread Class – Runnable interface – Synchronization –Using synchronized methods – Using synchronized statement.	15
IV	**APPLET:** Applet Programming – Local and Remote Applets – Building Applet Code – Applet Life Cycle – Designing a Web Page – Adding Applet of HTML File – Running the Applet Managing Input/Output Files in Java. **I/O Streams:** Concepts of streams – Stream classes –Byte and Character stream –Reading console Input and Writing Console output – File Handling.	15

V	**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	15	
	Total	**75**	

Course Outcomes

CO	On completion of this course, students will;	Programme Outcomes
1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1,PO2,PO6
2	Implement inheritance, packages, interfaces and Exception handling of Core Java.	PO2,PO3,PO8
3	Implement multi-threading and I/O Streams of Core Java	PO1,PO3,PO7
4	Implement AWT and Event handling.	PO2,PO6
5	Use Swing to create GUI.	PO1,PO3,PO8

Text Books:	
1.	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7thEdition, 2010
2.	GaryCornell, *Core Java2 VolumeI – Fundamentals,* AddisonWesley, 1999

References:	
1.	Head First Java, O'Rielly Publications, Y.DanielLiang, *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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**-**	**2**	**2**	**2**
CO2	**3**	**1**	**2**	**1**	**2**	**2**
CO3	**1**	**-**	**2**	**2**	**2**	**2**
CO4	**2**	**2**	**2**	**2**	**2**	**2**
CO5	**1**	**2**	**-**	**2**	**2**	**2**
Weightage of course Contributed to each PSO	10	7	6	9	10	10

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

Subject Code	Subject Code: 23U3CAP3 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CP-III	LAB – III: PROGRAMMING IN JAVA	CP	-	-	3	-	3	3	40	60	100

	Course Objective
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 into create GUI using AWT controls.

S. No.	**Details**
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers upto 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 Character Array 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 sub string from given string
7	Write a program to perform string operations using StringBuffer 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 1 to 10 using Thread1 and to print 90 to 100 using Thread2.
10	Write a program to demonstrate the use of following exceptions. a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception

11	Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes
12	Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.
13	Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).
14	Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
15	Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with‒stop or‒ready or‒go‖ should appear above the buttons in a selected color. Initially there is no message shown.

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,PO8

Text Book	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7thEdition, 2010.
2.	Gary Cornell, *Core Java2 Volume I – Fundamentals,* Addison Wesley, 1999.

Reference Books	
1.	Head First Java, O'Rielly Publications, Y. DanielLiang, *Introduction to Java Programming*, 7thEdition, Pearson Education India, 2010.

Web Resources	
1.	https://www.w3schools.com/java/
2.	http://java.sun.com
3.	http://www.afu.com/javafaq.html

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	3	2	3
CO2	3	2	1	3	1	3
CO3	3	2	1	3	2	3
CO4	3	2	1	3	2	3
CO5	3	2	1	3	2	3
Weightage of course contributed to each PSO	15	10	5	15	9	15

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

Subject Code	Subject Code: 23U3CASEC2 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
SEC-II	**PHP PROGRAMMING**	SEC	2				2	2	25	75	100

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

UNIT	Details	No. of Hours
I	Introduction to PHP – Basic Knowledge of websites - Introduction of Dynamic Web site – What is a PHP file?- Advantages and Disadvantages of PHP - Features of PHP – Types of Error – Tags in PHP.	6
II	PHP Programming Basics – Syntax of PHP – Output Functions in PHP – Variable – Scope of Variable – Constants – Data Types – Comment Line – Operators Type – Decision Making Statements: If( ), If..else ( ), else if ladder and Switch( ).	6
III	Loop Statements: for Loop, while Loop, do..while Loop, foreach Loop – break and continue statement – Arrays: Creating an Array – indexed, associative and multidimensional – Processing Arrays with Loops – Array Functions.	6
IV	PHP Functions – Creating a Function – Returning Values from Function – Parameter passing to Functions – Recursive Functions – Strings – Concatenation of Two Strings – String Functions in PHP: strlen( ), str_word_count( ), strrev( ), strtolower( ), strtoupper( ), strcmp( ) and strpos( ).	6
V	File Handling: File Attributes, Opening and Closing Files – Reading a File – Writing a file. Cookies: Creating a Cookies, Retrieve a Cookies, Modify a Cookie value, Deleting Cookies – PHP Session: Creating a Session, Modify a Session value, Destroy Session.	6
Total		**30**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
1	Write PHP scripts to handle HTML forms	PO1, PO4, PO6, PO8.
2	Write regular expressions including modifiers, operators, and meta characters.	PO2, PO5, PO7.
3	Create PHP Program using the concept of array.	PO3, PO6, PO8.
4	Create PHP programs that use various PHP Library functions	PO2, PO3, PO5, PO8.
5	Manipulate files and directories.	PO3, PO5, PO6.

Text Book	
1	**Head First PHP & My SQL : ABrain-FriendlyGuide-2009 -Lynn mighley and Michael Morrison.**
2	**The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL – Alan Forbes**
Reference Books	
1.	PHP: The Complete Reference – Steven Holzner.
2.	DT EditorialServices(Author),‒*HTML5BlackBook(CoversCSS3,JavaScript,XML, XHTML,AJAX,PHP, jQuery)*‖,Paperback2016,2ndEdition.
Web Resources	
1.	Refer MOOC Courses like NPTEL and SWAYAM
2.	https://www.w3schools.com/php/default.asp

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**1**	**1**	**-**	**1**
CO2	**2**	**-**	**1**	**1**	**2**	**1**
CO3	**3**	**3**	**1**	**1**	**-**	**1**
CO4	**1**	**3**	**2**	**1**	**-**	**1**
CO5	**3**	**2**	**1**	**1**	**-**	**1**
Weightage of course contributed to each PSO	12	11	6	5	2	5

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

Subject Code	Subject Code: 23U4CA4 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-IV	**MICROPROCESSOR AND MICROCONTROLLER**	Core	5	-	-	-	5	5	25	75	100

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

UNIT	Details	No. of Hours
I	**Number Systems and Codes:** Binary, Octal and Hexadecimal Number Systems – Conversion between Number Systems – Complements – Binary Arithmetic – Binary Code – **Logic Gates:** AND, OR, NOT, NAND, NOR, XOR, XNOR gates – Truth tables – Universal NAND and NOR gates.	15
II	Microprocessor Architecture and its operations – Microprocessor initiated operations and 8085 Bus organization – Internal Data operations and 8085 registers - Peripheral or External initiated operations.	15
III	8085 Microprocessor – Pin out and Signals – Functional block diagram 8085 Instruction Set and Classifications.	15
IV	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 – Multi byte Addition and Subtraction - Multiplication and Division.	15
V	Introduction to Microcontroller - Microcontroller Vs Microprocessor - 8051 Microcontroller architecture - 8051 pin description. 8259 Programmable Interrupt Controller - Direct Memory Access (DMA) and 8257 DMA controller.	15
	Total	**75**

Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
1	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the architecture of 8085 introduce the internal organization of Intel 8085 microprocessor.	PO1
2	Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic	PO1,PO2
3	Applying different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multi byte arithmetic operations.	PO4,PO6
4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.	PO4,PO5,PO6
5	An exposure to create real time applications using microcontroller.	PO3,PO8

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-TataMcGraw-Hill-1993.
2.	Raj Kamal-―Microcontrollers: Architecture, Programming, Interfacing and System Design‖, Pearson Education, 2005.
3.	KrishnaKant,―Microprocessors and Microcontrollers–Architectures, Programming and System Design 8085,8086,8051,8096‖,PHI,2008

Web Resources	
1.	Web resources from NDL Library, E-content from open source libraries
2.	https://www.bing.com/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO 4	PSO 5	PSO6
CO1	3	1	1	3	3	-
CO2	2	3	1	1	1	1
CO3	3	2	1	3	3	-
CO4	3	3	1	2	3	-
CO5	1	1	1	3	2	1
Weightage of course contributed to each PSO	12	10	5	12	12	2

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

Subject Code	Subject Code: 23U4CAP4 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
CP-IV	**LAB – IV: MICROPROCESSOR AND MICROCONTROLLER**	CP	-	-	3	-	3	3	40	60	100

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

S. No.	**Details**

1	Addition and Subtraction
	   1. 8-bit addition
	   2. 16-bit addition
	   3. 8-bit subtraction
	   4. BCD subtraction

2	Multiplication and Division
	   1. 8-bit multiplication
	   2. BCD multiplication
	   3. 8-bit division

3	Sorting and Searching
	   1. Searching for an element in an array.
	   2. Sorting in Ascending and Descending order.
	   3. Finding the largest and smallest elements in an array.
	   4. Reversing array elements.
	   5. Block move.

4	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

5	Simple programs on 8051Microcontroller
	   1. Addition
	   2. Subtraction
	   3. Multiplication
	   4. Division
	   5. Interfacing Experiments using 8051
	      I. Realisation of Boolean Expression through ports.
	      II. Time delay generation using subroutines.
	      III. Display LEDs through ports

	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
1	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the architecture of 8085 introduce the internal organization of Intel 8085 Microprocessor..	PO1
2	Understanding the 8085 instruction set and their classifications, enables the students to write the program easily their own using different logic	PO1,PO2
3	Applying different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multi byte arithmetic operations.	PO4,PO6
4	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.	PO4,PO5,PO6
5	An exposure to create real time applications using microcontroller.	PO3,PO8

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-TataMcGraw-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.	Web resources from NDL Library, E-content from open source libraries
2.	https://www.bing.com/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	1	3	3	-
CO2	2	3	1	1	1	1
CO3	3	2	1	3	3	-
CO4	3	3	1	2	3	-
CO5	1	1	1	3	2	1
Weightage of course contributed to each PSO	12	10	5	12	12	2

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

Subject Code	Subject Code: 23U5CA5 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-V	**PYTHON PROGRAMMING**	Core	5	-	-	-	5	5	25	75	100

	Course 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 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 – xpressions - 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 – Module 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	
1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1,PO2,PO3, PO4,PO5,PO6
2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1,PO2,PO3, PO4,PO5,PO6
3	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
4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1,PO2,PO3, PO4,PO5,PO6
5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1,PO2,PO3, PO4,PO5,PO6
Text Books		
1	ReemaThareja,―Python Programming using problem solving approach‖, First Edition, 2017, Oxford University Press.	
2	Dr.R.Nageswara Rao,―Core Python Programming‖, First Edition,2017, Dreamtech Publishers.	
Reference Books		
1	Vamsi Kurama,―Python Programming: A Modern Approach‖, Pearson Education.	
2	MarkLutz,‖ Learning Python‖, Orielly.	
3	Adam Stewarts,―Python Programming‖, Online.	
4	Fabio Nelli,―Python Data Analytics‖, A Press.	
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 Program Outcomes:

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

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

Subject Code	Subject Code: 23U5CA6 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-VI	OPERATING SYSTEM	Core	5	-	-	-	4	5	25	75	100

	Course Objective
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	To study about the concept of Job and process or scheduling
LO5	To learn about the concept of memory organization and multiprogramming

UNIT	Details	No. of Hours
I	**Introduction**: operating system, history (1990sto2000andbeyond), 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.	15
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. Semaphores - Mutual exclusion with Semaphores, thread synchronization with semaphores, implementing semaphores.	15
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.	15
IV	**Job and processor scheduling:** scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval time for interrupting clock, priorities, scheduling algorithms-FIFO scheduling, RR scheduling, quantum size, SJF scheduling.	15
V	**Real Memory organization and Management**: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, Memory swapping. **Virtual Memory organization and Management:** virtual memory basic concepts, block mapping, paging basic concepts, segmentation, paging/ segmentation systems, Demand Paging.	15

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Define the fundamentals of OS and identify the concepts relevant to process, process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
3	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, PO6
4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
5	Understand memory organization and management	PO3, PO8
Text Book		
1	H.M.Deitel,OperatingSystems,ThirdEdition,PearsonEducationAsia,2011	
Reference Books		
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-HallofIndia,2012.	
2.	A.Silberschatz, and P.B. Galvin., Operating Systems Concepts, Nineth Edition, JohnWiley &Sons(ASIA)PteLtd.,2012	
Web Resources		
1.	https://pdfcoffee.com/operating-systems-deitel-3rd-edition1pdf-pdf-free.html	
2.	https://faculty.ksu.edu.sa/sites/default/files/os-concepts-08-edition.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weightage of course contributed to each PSO	12	8	4	11	5	6

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

Subject Code	Subject Code: 23U5CA7 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-VII	**RDBMS WITH PL/SQL**	Core	4	-	-	-	4	4	25	75	100

Course Objective	
LO1	Describe basic concepts of database system
LO2	Design a Data model and Schemas in RDBMS
LO3	Competent in use of SQL
LO4	Analyze functional dependencies for designing robust Database
LO5	Describe basic concepts of database system

UNIT	Details	No. of Hours
I	Overview of DBMS: Data and Information – Database – Database Management System: Structure of DBMS – Objectives of DBMS – File Based System – Drawbacks of File Based System – Advantages of DBMS – Data Independence – Data Models.	15
II	Components and Interfaces of DBMS: Hardware, Software, Data, Procedure, People Interacting with Database, Data Dictionary – Functional Components of Database System Structure. Entity Relationship Model: The Building Blocks of an Entity – Relationship Diagram – Classification of Entity Sets – Attribute Classification – Relationship Degree – Relationship Classification – Advantages of ER Modeling.	15
III	Relational Model: CODD'S Rules – Relational Data Model – Concept of Key – Relational Integrity – Relational Algebra Operations – Cartesian Product Operation – Join Operations. Database Design: Objectives of Database Design – Normalization – Steps in Normalization – Unnormal Form to First Normal Form – First Normal Form to Second Normal Form – Second Normal Form to Third Normal Form – Boyce–Codd Normal Form (BCNF).	15
IV	Structured Query Language: Introduction – Features of SQL – Commands in SQL – Datatypes in SQL – Data Definition Language (DDL) – Selection Operation – Projection Operation – Aggregate Functions – Data Manipulation Language – Table Modification Commands – Table Truncation – Imposition of Constraints: NOT NULL, UNIQUE, Primary Key, CHECK, Referential Integrity – Set Operations.	15

	PL/SQL: Introduction – Structure of PL/SQL – PL/SQL Language Elements – Data Types – Operators Precedence – Control Structure – Steps to Create a PL/SQL Program – Iterative Control – Cursors: Implicit Cursors, Explicit Cursor – Steps to Create a Cursor – Procedure – Function.	
V		15
Total		**75**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand basic concepts of database system	PO1
2	Design a Data model and Schemas in RDBMS	PO1,PO2
3	Understand Competent in use of SQL	PO4,PO6
4	Analyze functional dependencies for designing Robust Database	PO4,PO5,PO6
5	Understand basic concepts of database system	PO3,PO8

Text Book

1	S.Sumathi, S.Esakkirajan, ‒Fundamentals of Relational Database Management System, Springer International Edition2007.

Reference Books

1.	Abraham Silberchatz, Henry F.Korth, S.Sudarshan,‒ Database System Concepts‖, McGraw Hill 2019, 7th Edition.
2.	Alexis Leon & Mathews Leon, ‒Fundamentals of DBMS‖, Vijay Nicole Publications 2014, 2nd Edition.

Web Resources

1.	NPTEL & MOOC courses titled Relational Database Management Systems
2.	https://nptel.ac.in/courses/106106093/
3.	https://nptel.ac.in/courses/106106095/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	3	-	-
CO2	-	-	1	-	2	2
CO3	3	2	1	3	-	-
CO4	3	-	1	-	2	2
CO5	3	2	1	3	2	2
Weightage of course Contributed to each PSO	12	6	5	9	6	6

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

Subject Code	Subject Code: 23U5CAP5 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
										Marks	
CP-V	LAB – V: PYTHON	CP	-	-	3	-	3	6	40	60	100

	Course Objective
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.

S. No.	Details
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.

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Demonstrate the understanding of syntax and semantics	PO1
2	Identify the problem and solve using PYTHON programming techniques.	PO1,PO2
3	Identify suitable programming constructs for problem solving.	PO3,PO4
4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	PO4,PO5
5	Develop a PYTHON program for a given problem and test for its correctness.	PO5,PO6
Text Books		
1	ReemaThareja,―Python Programming using problem solving approach‖, First Edition, 2017, Oxford University Press.	
2	Dr.R.Nageswara Rao,―Core Python Programming‖, First Edition,2017, Dreamtech Publishers.	
Reference Books		
1.	Vamsi Kurama,―Python Programming:A Modern Approach‖, Pearson Education.	
2.	MarkLutz,‖ Learning Python‖, Orielly.	
3.	Adam Stewarts,―Python Programming‖, Online.	
4.	Fabio Nelli,―Python Data Analytics‖, A Press.	
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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	2	3	2
CO2	2	1	3	2	-	2
CO3	3	3	1	1	1	2
CO4	2	3	3	1	-	1
CO5	3	2	3	1	1	-
Weightage of course contributed to each PSO	12	11	12	7	5	7

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

Subject Code	Subject Code: 23U5CAMBE1 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
MBE-I	**CLOUD COMPUTING**	MBE	4	-	-	-	3	4	25	75	100

	Course Objective										

LO1	Learning fundamental concepts and Technologies of Cloud Computing.
LO2	Learning various cloud service types and their uses and pitfalls.
LO3	To learn about Cloud Architecture and Application design.
LO4	To know the various aspects of application design, bench marking and security on the Cloud.
LO5	To learn the various Case Studies in Cloud Computing.

UNIT	Details	No. of Hours
I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing –Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking.	12
II	**Cloud Services:** Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines. Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage. Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database-Windows Azure Table Service. Application Services: Application Runtimes and Frameworks – Queuing Services - Email Services - Notification Services - Media Services.	12
III	**Cloud Application Design:** Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications.	12
IV	**Cloud Application Bench marking and Tuning:** Introduction to Bench marking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics. **Cloud Security:** Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion.	12
V	**Case Studies:** Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems – Cloud Computing for Manufacturing Industry - Cloud Computing for Education.	12
Total		**60**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the fundamental concepts and Technologies in Cloud Computing.	PO1
2	Able to understand various cloud service types and their uses and pitfalls.	PO1, PO2
3	Able to understand Cloud Architecture and Application design.	PO4, PO6
4	Understand the various aspects of application design, bench marking and security in the Cloud.	PO4, PO5, PO6
5	Understand various Case Studies in Cloud Computing.	PO3, PO8
Text Book		
1	Arshdeep Bahga, Vijay Madisetti, *Cloud Computing–A Hands On Approach*, Universities Press (India)Pvt.Ltd.,2018	
Reference Books		
1.	Anthony T Velte, Toby J Velte, Robert Elsenpeter, *Cloud Computing: A Practical Approach*, Tata McGraw-Hill, 2013.	
2.	Barrie Sosinsky, *Cloud Computing Bible*, Wiley India Pvt. Ltd., 2013.	
3.	David Crookes, *Cloud Computing in Easy Steps*, Tata McGrawHill, 2015.	
4.	Dr. Kumar Saurabh, *Cloud Computing*, Wiley India, Second Edition 2012.	
Web Resources		
1.	https://en.wikipedia.org/wiki/Cloud_computing	
2.	https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7	
3.	https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	3	1
CO2	3	1	2	3	3	-
CO3	3	2	1	2	1	3
CO4	3	3	2	3	2	-
CO5	2	2	1	3	3	3
Weightage of course contributed to each PSO	13	10	8	14	12	7

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

Subject Code	Subject Code: 23U5CAMBE2 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
MBE-II	**DATA MINING AND WAREHOUSING**	MBE	4	-	-	-	3	4	25	75	100

<table>
<tr><td colspan="3" align="center">Course Objectives</td></tr>
<tr><td>LO1</td><td colspan="2">To provide the knowledge on Data Mining and Ware housing concepts and techniques</td></tr>
<tr><td>LO2</td><td colspan="2">To study the basic concepts of Data Mining, Architecture and Comparison.</td></tr>
<tr><td>LO3</td><td colspan="2">To study a set of Mining Association Rules, Data Warehouses.</td></tr>
<tr><td>LO4</td><td colspan="2">To study about Classification and Prediction, Classifier Accuracy</td></tr>
<tr><td>LO5</td><td colspan="2">To study the basic concepts of cluster analysis, Cluster Methods</td></tr>
</table>

UNIT	Details	No. of Hours
I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Ware housing – 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 Datain Cluster Analysis, Petitioning Methods–Hierarchical Methods-Density Based Methods–GRID Based Method–Model based Clustering Method	15
	Total	**75**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	To understand the basic concepts and the functionality of the various data mining and data warehousing component	PO1,PO3, PO6,PO8
2	To know the concepts of Data miningsystem architectures	PO1,PO2, PO3,PO6
3	To analyze the principles of association rules	PO3,PO5
4	To get analytical idea on Classification and prediction methods	PO1,PO2,PO3, PO7
5	To Gain knowledge on Cluster analysis and its methods.	PO2,PO6,PO7

Text Books	
1.	Hanand M.Kamber,‒Data Mining Concepts and Techniques‖,2001,Harcourt India Pvt .Ltd, New Delhi.

References Books	
1.	K.P.Soman, Shyam Diwakar, 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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	2
CO3	2	2	-	3	-	3
CO4	3	3	2	3	1	1
CO5	1	3	3	3	3	2
Weight age of course Contributed to each PSO	12	14	10	15	9	11

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

Subject Code	Subject Code: 23U6CA8 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-VIII	**ASP.NET PROGRAMMING**	Core	5	-	-	-	5	6	25	75	100

	Course Objective										

LO1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
LO2	To develop ASP.NET Web application using standard controls.
LO3	To implement file handling operations.
LO4	To handle SQL Server Database using ADO.NET.
LO5	Understand the Grid view control and XML classes.

UNIT	Details	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 – String operations.	15
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.	15
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 Deleting files – File uploading.	15
IV	ADO.NET Overview– Database Connections – Commands Data Reader - Data Adapter – Datasets - Data Controls and its Properties – Data Binding.	15
V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files-Website Security-Authentication-Authorization. Creating a Web application.	15
Total		**75**

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, PO8
3	To work on various controls Files	PO1, PO3,PO7
4	To create a web application using Microsoft ADO.NET.	PO2, PO6
5	To develop web applications using XML	PO1, PO3, PO8
Text Book		
1	Svetlin Nakov, VeselinKolev & Co, Fundamentals of Computer Programming with C#, Faberpublication,2019.	
2	Mathew, MacDonald, The Complete Reference ASP.NET, TataMcGraw-Hill,2015.	
Reference Books		
1.	Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.	
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dream tech press, 2013.	
3.	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc. 2016.	
4.	Denielle Otey, Michael Otey, ADO.NET: The Complete reference, McGraw Hill, 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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	1	3
CO2	3	2	2	2	2	3
CO3	3	3	2	2	3	3
CO4	3	1	2	2	1	3
CO5	3	1	2	2	1	2
Weightage of course contributed to each PSO	15	8	10	10	8	14

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

Subject Code	Subject Code: 23U6CA9 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CC-IX	**COMPUTER NETWORKS**	CORE	5	-	-	-	4	5	25	75	100

	Course Objective
LO1	To understand the concept of Data communication and Computer network
LO2	To get a knowledge on routing algorithms.
LO3	To impart knowledge about networking and internetworking devices
LO4	To study about Network communication.
LO5	To learn the concept of transport layer

UNIT	Details	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.	15
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	15
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth	15
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	15
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection –Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.	15
Total		**75**

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference model	PO1
2	To gain knowledge on Telephone systems using Wireless network	PO1, PO2
3	To understand the concept of MAC	PO4, PO6
4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
5	To understand network security and define various Protocols such as FTP, HTTP, Telnet, DNS	PO3, PO8
Text book		
1	A.S. Tanenbaum – Computer Networks, 4th Edition, Prentice-Hallof India, 2008.	
Reference Books		
1.	B.A.Forouzan, – Data Communications and Networking ,Tata McGrawHill,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, TataMcGraw-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	2	-	2	1	-
CO2	3	2	1	2	2	-
CO3	3	-	-	2	-	2
CO4	3	1	-	2	1	-
CO5	3	3	-	2	1	-
Weightage of course Contributed to each PSO	15	8	1	10	5	2

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

Subject Code	Subject Code: 23U6CAP6 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
CP-VI	LAB – VI: ASP.NET PROGRAMMING	CP	-	-	5	-	3	5	40	60	100

	Course Objective
LO1	To develop ASP.NET Web application using standard controls.
LO2	To create rich database applications using ADO.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
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 File concepts.
7.	Web application using Data Controls.
8.	Data binding with Web controls.
9.	Data binding with Data Controls.
10.	Data base 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

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Create web applications and implement various controls	PO1, PO2, PO6
2	Create a web page in Rich control.	PO3, PO8
3	Develop knowledge about file handling operations	PO1, PO4, PO8
4	An ability to design XML classes	PO2, PO6, PO7
5	To develop a software to solve real-world problems using ASP.NET	PO1, PO3, PO5, PO8
Text Books		
1	SvetlinNakov, VeselinKolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.	
2	Mathew, MacDonald, The Complete Reference ASP.NET, TataMcGraw-Hill,2015.	
Reference Books		
1.	Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.	
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET4.5 BlackBook, Dreamtechpres, 2013.	
3.	AnneBoehm, JoelMurach, Murach's C# 2015, MikeMurach & Associates Inc. 2016.	
4.	Denielle Otey, 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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**2**	**2**	**1**	1
CO2	**3**	**2**	**3**	**2**	**2**	2
CO3	**3**	**3**	**2**	**2**	**1**	1
CO4	**3**	**2**	**3**	**2**	**1**	1
CO5	**3**	**2**	**2**	**2**	**1**	2
Weightage of course contributed to each PSO	**15**	11	12	10	6	7

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

Subject Code	Subject Code: 23U6CAMBE3 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
MBE-III	**SOFTWARE ENGINEERING**	MBE	5	-	-	-	3	5	25	75	100

Course Objectives	
LO1	Gain basic knowledge of analysis and design of systems
LO2	Ability to apply software engineering principles and techniques
LO3	Model are liable 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	Details	No. of Hours
I	**Introduction**: The software engineering discipline, programs vs software products, why study software engineering?, Emergence of software engineering, Notable changes in software development practices, computer systems engineering. **Software Life Cycle Models**: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.	15
II	**Requirements Analysis and Specification:** Requirements gathering and analysis, Software requirements specification (SRS). **Software Design**: Good software design, cohesion and coupling, neat arrangement, software design approaches, object-oriented vs function-oriented design.	15
III	**Function-Oriented Software Design:** Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design. **User-Interface design:** Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.	15
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		Programme Outcome
CO	On completion of this course, students will	
1	Gain basic knowledge of analysis and design of systems	PO1
2	Ability to apply software engineering principles and Techniques	PO1, PO2
3	Model are liable and cost-effective software system	PO4, PO6
4	Ability to design an effective model of the system	PO4, PO5, PO6
5	Perform Testing at various levels and produce an efficient system.	PO3, PO8

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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	1	-
CO2	3	-	1	-	-	2
CO3	1	2	3	2	2	1
CO4	3	-	2	2	-	1
CO5	1	2	3	3	1	1
Weightage of course Contributed to each PSO	11	6	12	9	4	5

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

Subject Code	Subject Code: 23U6CAMBE4 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
MBE-IV	**INTRODUCTION TO DATA SCIENCE**	MBE	5	-	-	-	3	5	25	75	100

	Course Objective
LO1	To learn about basics of Data Science and Big data.
LO2	To learn about overview and building process of Data Science.
LO3	To learn about various Algorithms in Data Science.
LO4	To learn about Hadoop Framework.
LO5	To learn about case study about Data Science.

UNIT	Details	No.of Hours
I	**Introduction:** Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science.	15
II	**The Data science process**: Overview – research goals - retrieving data - Transformation – Exploratory Data Analysis.	15
III	**Algorithms**: Machine learning – Modeling process – Types of Machine Learning: Supervised – Unsupervised - Semi-supervised.	15
IV	**Introduction to Hadoop**: Hadoop framework – Spark – NoSQL – ACID – CAP – BASE – types	15
V	**Case Study**: What is the disease is that? - Setting research goals – Data retrieval – preparation – exploration – Disease profiling.	15
Total		**75**

	Course Outcomes	**Programme Outcome**
CO	On completion of this course, students will	
1	Understand the basics in Data Science and Big data.	PO1
2	Understand overview and building process in Data Science.	PO1, PO2
3	Understand various Algorithms in Data Science.	PO4, PO6
4	Understand Hadoop Framework in Data Science.	PO4, PO5, PO6
5	Case study in Data Science.	PO3, PO8

	Text Book
1	DavyCielen, ArnoD.B.Meysman, MohamedAli, ‒Introducing Data Science, Manning publications, 2016

	Reference Books
1.	RogerPeng,‒The Art of Data Science, lulu.com2016.
2.	Murtaza Haider,‒Getting Started with Data Science – Making Sense of Data with Analytics, IBM press, E-book.
3.	Davy Cielen, Arno D.B.Meysman, Mohamed Ali ‒Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools, Dreamtech Press 2016.
4.	AnnalynNg, KennethSoo,‒ Numsense! Data Science for the Layman: No Math Added, 2017, 1stEdition.
5.	Cathy O'Neil, Rachel Schutt ‒ Doing Data Science Straight Talk from the Frontline, O'ReillyMedia 2013.
6.	Lillian Pierson,‒Data Science for Dummies, 2017 II Edition

	Web Resources
1.	https://www.w3schools.com/datascience/
2.	https://en.wikipedia.org/wiki/Data_science
3.	http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	`1	2	2	-
CO2	2	3	2	2	-	1
CO3	3	2	2	1	1	3
CO4	1	2	2	1	3	1
CO5	2	2	-	3	1	1
Weightage of course Contributed to each PSO	11	11	7	9	7	6

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

Details of

Skill Enhancement Courses (SEC)

in Lieu of

NAAN MUDHALVAN

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U2CAEC1	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	SEC	2	-	-	-	2	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** – Generations of Computer –Data and Information – Components of Computer – Software – Hardware – Input Devices – Output Devices — Types of Operating System.	6
II	**MS Word**: Introduction – Elements of Window –Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment – Bullets and Numbering – Header and footer - Watermark – inserting objects (images, other application document) – Table creation – Mail merge.	6
III	**Ms Excel**: Introduction – Inserting rows and columns –Sizing rows and columns – Implementing formulas – Generating series – Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	6
IV	**MS Power Point**: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show – Types of Views – Types of Animations – Inserting Objects –Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	6
V	**Internet**: Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail – How to send group mail. **E-Commerce**: Digital Signature – Digital Currency – Online shopping and transaction.	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

Text books

1	Anoop Mathew, S.Kavitha Murugeshan (2009), ―Fundamental of Information Technology, Majestic Books.
2	Alexis Leon, Mathews Leon, ‖ Fundamental of Information Technology, 2nd Edition.
3	S.KBansal, ‒Fundamental of Information Technology.

Reference Books

1	Bhardwaj Sushil Puneet Kumar, ‒Fundamental of Information Technology
2	G G 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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	1	1
CO2	3	2	3	2	3	3
CO3	3	2	2	2	2	3
CO4	2	3	3	3	3	1
CO5	3	3	3	3	3	2
Weightage of course Contributed to each PSO	13	13	13	12	12	10

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

SECOND YEAR
SEMESTER III

Subject Code	Subject Name	Category	L	T	P	S	Credits	CIA	External	Total
								Marks		
23U3CASEC3	**OFFICE AUTOMATION**	SEC	2	-	-	-	2	25	75	100

Course Objective	
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 spread sheet software.
LO4	Understand and apply the basic concepts of database management system.
LO5	Understand and create a presentation using Power Point tool.

UNIT	Details	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; SpellChecker – Document formatting –Paragraph alignment, indentation, headers and footers, numbering; printing –Preview, options, merge.	6
III	**Spreadsheets:** Excel –opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing –analysis tables, preparation of financial statements, introduction to data analytics.	6
IV	**Database Concepts:** The concept of database management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries and reports – Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS–Access).	6
V	**Power point:** Introduction to Power point - Features – Understanding slide type casting & 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	
1	Possess the knowledge on the basics of computers and its components	PO1,PO2,PO3,PO6, PO8
2	Gain knowledge on Creating Documents, spread sheet and presentation.	PO1,PO2,PO3,PO6
3	Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
4	Demonstrate the understanding of different automation tools.	PO3,PO4,PO5,PO7
5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8
TextBook		
1	Peter Norton, ‒Introduction to Computers‖ –Tata Mc Graw - Hill.	
ReferenceBooks		
1	Jennifer Ackerman Kettel, GuyHat - Davis, Curt Simmons, ‒Microsoft 2003‖, Tata Mc Graw Hill.	
Web Resources		
1.	https://www.udemy.com/course/office-automation-certificate-course/	
2.	https://www.javatpoint.com/automation-tools	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**2**	**2**	**2**	**3**	**3**	**1**
CO2	**3**	**1**	**2**	**3**	**3**	**3**
CO3	**3**	**2**	**1**	**2**	**1**	**3**
CO4	**3**	**3**	**2**	**2**	**2**	**1**
CO5	**2**	**2**	**1**	**3**	**1**	**3**
Weightage of course Contributed to each PSO	13	10	8	13	10	11

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U4CASEC5	**UNDERSTANDING INTERNET**	SEC	2	-	-		2	25	75	100

Course Objectives	
LO1	Knowledge of Internet medium
LO2	Internet as a mass medium
LO3	Features of Internet Technology
LO4	Internet as source of infotainment
LO5	Study of internet audiences and about cybercrime

UNIT	Contents	No. Of. Hours
I	The emergence of internet as a mass medium – the world of _worldwide web'.	**6**
II	Features of internet as a technology.	**6**
III	Internet as a source of infotainment – classification based on content and style.	**6**
IV	Demographic and psychographic descriptions of internet_audiences '– effect Of internet on the values and life-styles.	**6**
V	Present issues such as cyber crime and future possibilities.	**6**
	TOTAL HOURS	**30**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Knows the basic concept in internet Concept of mass medium and world wide web	PO1, PO2, PO3,PO4,PO5,PO6
CO2	Knows the concept of internet as a technology.	PO1, PO2, PO3,PO4,PO5,PO6
CO3	Understand the concept of infotainment and classification based on content And style	PO1, PO2,PO3, PO4,PO5,PO6
CO4	Can be able to know about Demographic and psychographic description of Internet	PO1, PO2,PO3, PO4,PO5,PO6
CO5	Understand the concept of cybercrime and future possibilities	PO1, PO2, PO3,PO4,PO5,PO6

Textbooks	
1	Barnou w, E and Krishnaswamy S[1990] Indian Film. NewYork, OUP.
2	Kumar, Keval [1999] Mass Communication in India. Mumbai, Jaico.
3	**Srivastava, KM[1992] Media Issues. Sterling Publishers Pvt Ltd.**
ReferenceBook	
1	Acharya, RN[1987] Television in India. Manas Publications, New Delhi.
2	Barnouw, E[1974] Documentary – A History of Nonfiction. Oxford, OUP
3	Luthra, HR[1986] Indian Broad casting. Ministry of I& B, New Delhi.
4	Vasudev, Aruna[1986] The New Indian Cinema. Macmillan India, New Delhi.
Web Resources	
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2.	https://www.w3schools.com/html/default.asp

Mapping with Programme Outcomes:

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

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

THIRD YEAR
SEMESTER V

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5CASEC6	**INTRODUCTION TO HTML**	SEC	2	-	-		2	25	75	100

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

UNIT	Contents	No. Of. Hours
I	Introduction: Web Basics: What is Internet – Web browsers – What is Webpage – HTML Basics: Understanding tags.	6
II	Tags for Document structure (HTML, Head, Body Tag). Block level text elements: Headings paragraph (<p> tag) – Font style elements: (bold, italic, font, small, strong, strike, big tags)	6
III	Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR – Using Images – Creating Hyperlinks.	6
IV	Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan – Cell padding.	6
V	Frames: Frameset – Targeted Links – No frame – Forms :Input, Textarea, Select, Option.	6
	TOTAL HOURS	**30**

	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1, PO2, PO3,PO4,PO5,PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.	PO1, PO2, PO3,PO4,PO5,PO6
CO3	Understand the page formatting Concept of list	PO1, PO2, PO3,PO4,PO5,PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1, PO2,PO3, PO4,PO5,PO6
CO5	Concept of adding images Understand the table creation.	PO1, PO2,PO3, PO4,PO5,PO6
Text books		
1	Mastering HTML 5 and CSS 3 Made Easy ‖, Teach U CompInc., 2014.	
2	**Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS"**	
Web Resources		
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf	
2.	https://www.w3schools.com/html/default.asp	

Mapping with Programme Outcomes:

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

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U6CASEC7	**WEB DESIGNING**	SEC	2	-	-	-	2	25	75	100

Course Objective	
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	Details	No. of Hours
I	**HTML:** HTML – Introduction – tag basics – 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.	6
II	**Forms & Images Using Html:** Graphics: Introduction - How to work efficiently with images in webpages, imagemaps, GIF animation, adding multimedia, data collection with html forms - textbox, password, listbox, combobox, textarea, tools for building webpage front page.	6
III	**XML & DHTML:** Cascading style sheet (CSS) – what is CSS - Why we use CSS - adding CSS to your webpages – Grouping styles – extensible markup language(XML).	6
IV	**Dynamic HTML:** Document object model (DCOM) - Accessing HTML & CSS through DCOM Dynamic content styles & positioning – Event bubbling-data binding. **JavaScript:** Client-side scripting – What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.	6
V	**Advance script:** Java Script and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	6
Total		**30**

	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 aj avascript	PO1, PO2, PO3, PO7
5	An ability to develop web application using Ajax.	P02, PO6, PO7
TextBook		
1	Pankaj Sharma, ‒Web Technology‖, Sk Kataria & Sons Bangalore 2011.	
2	Mike Mc grath, ‒JavaScript‖, Dream Tech Press 2006, 1ˢᵗ Edition.	
3	Achyut S Godbole & Atul Kahate, ‒Web Technologies‖, 2002, 2ⁿᵈ Edition.	
Reference Books		
1.	Laura Lemay, Rafe Colburn, 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)‖, Paper back 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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	-	2	1	1
CO2	3	3	-	2	-	1
CO3	3	3	-	2	2	1
CO4	3	3	-	2	-	1
CO5	3	3	3	2	-	1
Weightage of course contributed to each PSO	15	15	3	10	3	4

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

B.Sc. STATISTICS

ALLIED COURSES

B.SC. STATISTICS

SECOND YEAR

SEMESTER III

Subject Code	Subject Code: 23U3SCA1 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
AC-I	**PROGRAMMING IN C**	Core	5	-	-	-	4	5	25	75	100

Course Objectives		
LO1	To implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems and statistical problem.
LO2	To Demonstrate an understanding of computer programming language concepts.
LO3	To define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures.
LO4	To define union and enumeration user defined data types.
LO5	To be able to develop C programs on windows/ linux platform.

UNIT	Details	No. of Hours
I	Introduction to C – Constants, Variables, Data types – Operators and Expressions, Type Conversion , Mathematical functions.	15
II	Managing Input and Output Operations , Reading a Character , Writing a Character, Formatted Input , Formatted Output . Decision Making and Branching : Simple If Statement, IF – ELSE, ELSE – IF, Switch Statements , GoTo Statements.	15
III	Decision Making and Looping - The WHILE Statement, DO Statement, The FOR Statement, Jumps in Loops. Arrays: One Dimensional Arrays - Two dimensional Arrays - Multi Dimensional Arrays.	15
IV	User Defined Functions : Need for User-defined functions , Calling a Function, Category of Function , Recursion. Structure and Union : Structure definition , Giving values to members , Structure Initialization , Comparison of Structure Variables, Arrays of Structure – Union.	15
V	File management in C - Introduction , Defining & opening a file, Closing a file, Input/Output Operations on files, Error handling during I/O operations, Random access to files, Command line arguments.	15
Total		**75**

Course Outcomes		
CO	On completion of this course, students will;	**Programme Outcomes**
1	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems and statistical problem.	PO1,PO2,PO6
2	Demonstrate an understanding of computer programming language concepts. To be able to develop C programs on windows/ linux platform.	PO2,PO3,PO8
3	Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures.	PO1,PO3,PO7
4	Student must be able to define union and enumeration user defined data types.	PO2,PO6
5	Develop confidence for self education and ability for life-long learning needed for Computer language.	PO1,PO3,PO8

Text Books:	
1.	Balagurusamy. E, "Programming in ANSI C", Second Edition, Tata McGraw – Hill, 1992.

References:	
1.	"The C Programming Language" – Brain W Kernighan Dennis M Ritchie – Eastern Economy Edition.
2.	Byron S Gottfried., "Programming With C", Shaum; S Outline Series – Tata McGraw Hill Publications, New Delhi.

Web Resources	
1.	https://www.javatpoint.com/c-programming-language-tutorial
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	https://www.w3schools.com/c/c_intro.php

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	2	2	2
CO2	3	1	2	1	2	2
CO3	1	-	2	2	2	2
CO4	2	2	2	2	2	2
CO5	1	2	-	2	2	2
Weightage of course Contributed to each PSO	10	7	6	9	10	10

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

B.SC. STATISTICS

SECOND YEAR

SEMESTER IV

Subject Code	Subject Code: 23U4SCA2 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
										Marks	
AC-II	**PROGRAMMING IN C++**	Core	3	-	-	-	3	3	25	75	100

	Course Objectives
LO1	To develop programming skills of students, using object oriented programming concepts.
LO2	To learn the concept of class and object using C++.
LO3	To develop classes for simple applications.
LO4	To use various object oriented concepts to solve different problems.
LO5	To be able to develop C++ programs on windows/ linux platform.

UNIT	Details	No. of Hours
I	Basic Concepts of Object- Oriented Programming, Benefits of OOP, Applications of OOP, Structure of C++ Program, Tokens and Expressions: Keywords, Basic Data Types, User Defined Data Type, Derived Data Type, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Type Cast Operator, Expressions and Implicit Conversions.	15
II	Control Structures: Simple If Statement, If.. Else Statement, Switch Statement, Do-While Statement, While Statement, For Statement, Functions in C++: Main Function, Function Prototyping, Call By Reference, Return By Reference, Inline Functions.	15
III	Classes and Objects: Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Arrays within a Class. Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects.	15
IV	Constructors and Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Copy Constructor. Manipulation of Strings Using Operators, Rules for Overloading Operators, Type Conversions.	15
V	Operator Overloading and Type Conversions: Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Inheritance: Introduction, Defining Derived Classes, Single Inheritance, Multilevel Inheritance.	15
Total		**75**

Course Outcomes

CO	On completion of this course, students will;	Programme Outcomes
1	Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.	PO1,PO2,PO6
2	Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures.	PO2,PO3,PO8
3	Student must be able to make use of objects and classes for developing programs.	PO1,PO3,PO7
4	Able to use various object oriented concepts to solve different problems	PO2,PO6
5	Develop confidence for self education and ability for life-long learning needed for Computer language.	PO1,PO3,PO8

Text Books:

1.	Balagursamy E, Object Oriented Programming with C++, Tata McGraw Hill Publications, Sixth Edition, 2013

References:

1.	Ashok Kamthane, Programming in C++, Pearson Education, 2013.

Web Resources

1.	https://www.programiz.com/cpp-programming
2.	https://www.coursera.org/articles/what-is-c-plus-plus
3.	https://www.codecademy.com/learn/learn-c-plus-plus

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	2	2	2
CO2	3	1	2	1	2	2
CO3	1	-	2	2	2	2
CO4	2	2	2	2	2	2
CO5	1	2	-	2	2	2
Weightage of course Contributed to each PSO	10	7	6	9	10	10

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

Subject Code	Subject Code: 23U4SCAP1 & Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
AP-I	**PROGRAMMING IN 'C' AND 'C++' - PRACTICAL**	CP	-	-	3	-	3	4	40	60	100

	Course Objective
LO1	To create excellent programs in various aspect of C & C++ language.
LO2	To provide fundamental knowledge of object-oriented programming.
LO3	To implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems and statistical problem.
LO4	To use various object oriented concepts to solve different problems.
LO5	To be able to develop C & C++ programs on windows/ linux platform.

S. No.	**Details**
1	Write a C program to calculate simple interest.
2	Write a C program to find the Biggest number using Nested loop statement.
3	Write a menu-driven program for arithmetic operations using switch case in C.
4	Write a C program to calculate Factorial using Recursion function.
5	Write a C program to find the average of N numbers using while loop statement.
6	Write a C program to check the given string is palindrome or not.
7	Write a C++ program to prepare student mark list.
8	Write a C++ program to prepare the electricity bill using if else ladder.
9	Write a C++ program to find the grade of the student mark statement using switch case.
10	Write a C++ program to sort the given list of N numbers (ascending order and descending order) using selection sort.

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understanding a concept of functional hierarchical code organization.	PO1
2	Ability to define and manage data structures based on problem subject domain and to work with textual informati0on, character and strings.	PO1,PO2
3	Understanding a defensive programming concept. Ability to handle possible errors during program execution.	PO4,PO6
4	Understanding a concept of object thinking within the framework of functional model.	PO4,PO5,PO6
5	Develop confidence for self education and ability for life-long learning needed for Computer language.	PO3,PO8
Text Book		
1	Balagurusamy. E, "Programming in ANSI C", Second Edition, Tata McGraw – Hill, 1992.	
2.	Balagursamy E, Object Oriented Programming with C++, Tata McGraw Hill Publications, Sixth Edition, 2013	
Reference Books		
1.	"The C Programming Language" – Brain W Kernighan Dennis M Ritchie – Eastern Economy Edition.	
2.	Ashok Kamthane, Programming in C++, Pearson Education, 2013.	
Web Resources		
1.	https://www.javatpoint.com/c-programming-language-tutorial	
2.	https://www.geeksforgeeks.org/c-programming-language/	
3.	https://www.programiz.com/cpp-programming	
4.	https://www.coursera.org/articles/what-is-c-plus-plus	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	3	2	3
CO2	3	2	1	3	1	3
CO3	3	2	1	3	2	3
CO4	3	2	1	3	2	3
CO5	3	2	1	3	2	3
Weightage of course contributed to each PSO	15	10	5	15	9	15

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