Semester 1st		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
GCAPP1-101	Operating System	3	1	0	40	60	100	4
GCAPP1-102	Information Technology	3	1	0	40	60	100	4
GCAPP1-103	Computer System Architecture	3	1	0	40	60	100	4
GCAPP1-104	Software Lab I (Information Technology)	0	0	4	60	40	100	2
Total		**9**	**3**	**4**	**180**	**220**	**400**	**14**

Semester 2nd		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
GCAPP1-201	Data Structure using Python	3	1	0	40	60	100	4
GCAPP1-202	Database Management System	3	1	0	40	60	100	4
GCAPP1-203	Software Lab II (Data Structure using Python)	0	0	4	60	40	100	2
GCAPP1-204	Software Lab III (Database Management System)	0	0	4	60	40	100	2
Total		**6**	**2**	**8**	**200**	**200**	**400**	**12**

Semester 3rd		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
GCAPP1-301	Web Development using Open Source Technology	3	1	0	40	60	100	4
GCAPP1-302	Application Development using Python	3	1	0	40	60	100	4
GCAPP1-303	Software Lab IV (Web Development using open source technology)	0	0	4	60	40	100	2
GCAPP1-304	Software Lab V (Application Development using Python)	0	0	4	60	40	100	2
Total		**6**	**2**	**8**	**200**	**200**	**400**	**12**

Operating System

Subject Code: GCAPP1-101 **L T P C** **Total Hours:-60**
3 1 0 4

Course Objectives:

1: Identify the role of different components of operating systems and process management.
2: Analyze the performance of different algorithms used in design of operating system and memory management
3: Create awareness of concepts related to input output and file management.

Course Outcomes:

1: Identify the role of different components of operating systems and process management.
2: Analyze the performance of different algorithms used in design of operating system and memory management
3: Create awareness of concepts related to input output and file management.

UNIT 1 (15 hrs.)

Introduction to Operating System: Definition, its need and Operating system services, Functions of an operating system, Structure of operating system (Role of kernel and Shell), Types of operating systems.
Process Management: Process concept, types of Process scheduling, Program vs. Process. PCB, State transition diagram.

UNIT 2 (15 hrs.)

CPU Scheduling: Basic concept of CPU Scheduling, Preemptive vs. Non-pre-emptive scheduling. Scheduling criteria, and Scheduling algorithms: FCFS, SJF, Round Robin & Queue Algorithms.
Deadlock: Definition, necessary conditions, Strategies for handling Deadlock.

UNIT 3 (15 hrs.)

Memory Management: Introduction, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation, paging with segmentation,
Virtual memory: basic concepts of demand paging, page replacement algorithms.

UNIT 4 (15 hrs.)

I/O Device Management: I/O devices and controllers, device drivers; disk storage.
File Management: File concepts, file operations, access methods, directory and disk structure, file system structure, Protection and Security.

Recommended Books:

1. Steve Heath, 'Embedded Systems Design', 2 nd Edn., Newnes, 2002.
2. Jane W.S. Liu, 'Real-Time Systems', 1 st Edn., Prentice Hall, 2000.
3. John B. Peatman, 'Design with PIC Microcontrollers, 2 nd Edn., Pearson Education, 1998.
4. Pearson Education, 1997 PIC 12F629/675 Manual.

Information Technology

Subject Code: GCAPP1-102 **L T P C** **Total Hours:-60**
3 1 0 4

Course Objectives:

1: Identify the role of different components of operating systems and process management.
2: Analyze the performance of different algorithms used in design of operating system and memory management
3: Create awareness of concepts related to input output and file management.

Course Outcomes:

1. Understand the basic fundamentals of Computer, memory and input-output devices.
2. Learn the number system and binary arithmetic operations in Computers.
3. Analyze Computer Software languages and applications of Information Technology.

UNIT 1 (17 hrs.)

Basic Anatomy of Computers: Block Diagram of computer, characteristics of computers, types of computers, computer generations,
Memory: Hierarchical Memory Structure, RAM, ROM, PROM, EPROM**,** Cache, Auxiliary Memory
Input-Output Devices: Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Voice Recognition Devices, Optical Recognition devices, Dot matrix, Character and Line printer, DeskJet printer, Laser printer, and plotters.

UNIT 2:(12 hrs.)

Number System: Non-positional and positional number systems, Base conversion, binary, decimal, hexadecimal, and octal systems.
Binary Arithmetic: Addition, subtraction and multiplication.

UNIT 3 (15hrs.)

Types of Languages: Machine, assembly and High level Language.
Computer Software: Introduction, types of software, systems software, GUI, operating system, high level languages, assemblers, compilers and interpreters, system utilities, program testing and debugging, program documentation.

UNIT 4 (16hrs.)

Applications of Information Technology and Trends: IT in Business and Industry, IT in Education & training, IT in Science and Technology, IT and Entertainment.
E-Commerce: Meaning, its advantages & limitations, Infrastructure for E-commerce, Types of E-Commerce Applications.
Multimedia: Concepts, Components and Application.

Recommended Books:

1. V. Rajaraman, 'Fundamentals of Computers', 5 th Edn., PHI, 2010.
2. Satish Jain, 'Information Technology Concepts', 4 th Edn., BPB Publications, 2006.
3. Turban, Mclean and Wetherbe, 'Information Technology for Management', 4 th Edn., John Wiley & Sons, 2006.

Computer System Architecture

Subject Code- GCAPP1-103 **L T P C** **Total Hours:-60**
3 1 0 4

Course Objectives:

1: Identify the role of different components of operating systems and process management.
2: Analyze the performance of different algorithms used in design of operating system and memory management
3: Create awareness of concepts related to input output and file management.

Course Outcomes:

1. Infer the concepts of Computer organization and architecture.
2. Understand the common bus system and Register transfer operations.
3. Analyze the concepts of Boolean algebra, combinational circuits and sequential circuits.

UNIT 1 (17 hrs.)

Introduction to Computer Organization: Introduction to Computer and CPU (Computer Organization, Computer Design and Computer Architecture), Stored Program Concept- Von Neumann Architecture, Harvard Architecture, RISC and CISC Architecture.

CPU Architecture - General register & stack organization, Instruction formats, Instruction types: Three-address, Two-address, One-address, Zero-address, Program Control, ALU & Control Unit Architecture.

UNIT 2(16 hrs.)

Register Transfer and Micro operations-: - Introduction to Registers, Instruction Format, Types of Instructions- Memory Reference Instructions, Register Reference Instructions and Input-Output Instructions. Addressing Modes, Interrupts.

Common Bus System: Introduction to Common Bus System, Types of Buses (Data Bus, Control Bus, Address Bus), 16-bit Common Bus System--Data Movement among registers using Bus.

UNIT 3 (12 hrs.)

Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.

Boolean Algebra: Introduction, Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP & POS Forms.

UNIT 4 (15 hrs.)

Combinational Logic Circuits: Half Adder & Half Subtractor, Full Adder & Full Subtractor, Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer, Encoders & Decoders.

Sequential Circuits: SR, JK, D, T Flip-Flop, Excitation Tables, State Diagram, State Table, Race Around Condition, Removing Race Around Condition, Applications of Flip-Flops.

Recommended Books:

1. M. Morris Mano, 'Computer System Architecture', PHI.
2. P.V.S. Rao, 'Computer System Architecture', 2nd Edn., PHI.
3. J.P. Hayes, 'Computer Architecture & Organization, 3rd Edn., McGraw Hill.

Software Lab I (Information Technology)

Subject Code: GCAPP1-104 **L T P C** **Total Hours:-60**
0 0 4 2

This laboratory course will comprise as exercises to supplement that is learnt under the Subject

1. Draw and explain block diagrams of a computer system with peripherals.

2. Identify various peripherals of a computer system such as Printers, keyboard, mouse, scanners, modem, Joy tick, Track Ball, Touch Screen, Light Pen, Speakers, Microphone, Projectors, Monitors and other display devices.

3. Hierarchical Memory Structure, various types of memory: RAM, ROM, Cache, Auxiliary Memory and Secondary Memory.

4. Understanding number systems, binary, decimal, hexadecimal and octal systems and conversion from one type to another.

5. Concept of Binary Arithmetic: Addition, Subtraction and Multiplication.

6. Program examples written in Machine Language and Assembly Language.

7. Program examples (as written in Machine and/or Assembly Language) written in High Level Language and their comparison with Machine Language and Assembly Language code.

8. Installation of various Operating Systems: Windows/Linux.

9. Installation of System Software and Utility Software.

10. Working of E-Commerce and Multimedia websites.

2ND SEMESTER

Data Structure Using Python

Subject Code: GCAPP1-201 **L T P C** **Total Hours:-60**

3 1 0 4

COURSE OBJECTIVES:

1. To introduce the core data structures using Python programming language.
2. To explore the applications of Python built-in data structures.
3. To understand the complexity analysis of various algorithms.

COURSE OUTCOMES:

1. Demonstrate basic concepts of Python, its flow control and Functions.
2. Understanding the basics of implementing Data structure and array using python.
3. Analyzing different operations performed on linear and non-linear data structures.

UNIT – I (17 hrs.)

Python Basics: - Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program.

Flow control:-Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(),
Functions.

UNIT-II (15 hrs.)

Data Structures: Definition, Linear Data Structures, Non-Linear Data Structures

Python Specific Data Structures: List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing.

Arrays - Overview, Types of Arrays, Operations on Arrays, Arrays vs List.

UNIT-III (16 hrs.)

Linked Lists – Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists.

Stacks - Overview of Stack, Implementation of Stack.

Queues-Overview of Queue, Implementation of Queue.

Applications of stack and queue.

UNIT-IV (12 hrs.)

Searching -Linear Search and Binary Search.

Sorting - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

TEXTBOOKS:

1. Data structures and algorithms in python by Michael T. Goodrich
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

Database Management System

Subject Code: GCAPP1-202 **L T PC** **Total Hours:-60**

3 1 0 4

COURSE OBJECTIVES:

1. To explain basic database concepts, applications, data models, schemas and instances.
2. To emphasize the importance of normalization in databases.
3. To familiarize issues of concurrency control and transaction management.

Course Outcomes:

1. To understand the basic concepts of DBMS.
2. To understand the concept of normalization theory.
3. To demonstrate the concepts of database security.

UNIT 1 (17 hrs.)

Database Concept: Introduction to Data, Field, Record, File, Database, Database management system, Database Vs File Oriented Approach, Basic DBMS terminology, DBA and its responsibilities, Data Independence, DBMS architecture, Components of DBMS, Advantages and Disadvantages of DBMS. **Database languages:** DDL, DML, DCL. Database utilities, Data Models, Keys: Super, candidate, primary, unique, foreign.

UNIT 2 (16 hrs.)

Database Design: Introduction to Data Models, Hierarchical model, network model, Entity Relationship Model, Entities, Attributes, E-R Diagrams. Relational Data Model: concepts, constraints. **Relational Database:** Relational Algebra: Basic operations and Calculus, SQL Fundamentals, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions.

UNIT 3 (15 hrs.)

Normalization: Introduction to Normalization, Functional dependency, First, Second, Third Normal Forms, Boyce-Codd Normal Form (1NF, 2NF, 3NF, BCNF), multivalued dependency, Fourth Normal Form, Fifth Normal Form.

Database security: Authentication, authorization, methods of implementing security.

UNIT 4 (12 hrs.)

Database Security: Database Recovery, Concurrency Management: Definition and problems arising out of Concurrency. Integrity and Control. Structure of a Distributed Database, Design of Distributed Databases.

Recommended Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', 6 th Edn., Tata McGraw Hill, 2010.
2. Ramez Elmasri andShamkant B. Navathe, 'Fundamentals of Database Systems', 6 th Edn., Pearson, 2010.

Software Lab II (Data Structure Using Python)

Subject Code: GCAPP1-203	L T P C	Total Hours:-60
	0 0 4 2	

This laboratory course will comprise exercises to supplement that is learnt under the Subject.

1. Write a program to demonstrate the
   (a) use of basic Data Types (b)Operators and Expressions(c)flow control(d)Modules (e)Built-in Functions.
2. Write a Python program to illustrate List Comprehensions.
3. Write a Python program to illustrate Dictionary Comprehensions.
4. Write a Python program to illustrate Set Comprehensions
5. Program to insert, delete and traverse an element from an array.
6. Write a program to implement a Singly Linked List.
7. Write a program to implement Stacks .
8. Write a program to implement Bubble Sort and Selection Sort.
9. Write a Python script for implementing linear search technique.
10. Write a Python script to for implementing binary search technique

Software Lab III (Database Management System)

Subject Code: GCAPP1-204 **L T P C** **Total hours:-60**

0 0 4 2

This laboratory course will comprise as exercises to supplement that is learnt under the Subject

1. Use of CREATE, ALTER, RENAME and DROP statements in the database tables (relations).
2. Use of CREATE, ALTER, RENAME and DROP statements in the database tables (relations).
3. Use of simple select statements.
4. Use of traditional operators.
5. Use of nesting of queries.
6. Use of substring comparison.
7. Use of aggregate functions.
8. Use of order by statement.
9. Write a PL/SQL code to add two numbers and display the result. Read the numbers during run time.
10. . Write a PL/SQL code to find the sum of the first 10 natural numbers using while and for loop.

3RD SEMESTER

Web Development Using Open-Source Technology

Subject Code- GCAPP1-301 **L T P C** **Total Hours:-60**
3 1 0 4

Course Objectives

The Objective of the Course is to help students in analyzing and evaluating the web technology components for formulating web related problems. The students will be able to learn the concepts of different web technologies such as WWW, HTML, Java Script, Ajax, PHP-MySQL.

Course Outcomes

1. Analyze and evaluate web technology components for formulating web related problems.
2. Demonstrate the use of advanced technologies in dynamic websites to provide performance efficiency and reliability for customer satisfaction.
3. Infer basic concepts of Ajax, JSON and PHP.

UNIT 1 (16 hrs.)

Introduction to WWW: Protocols and programs, secure connections, application and development tools, the web browser, internet domains.

Introduction to HTML: The development process, Html tags and simple HTML forms, web site structure.

UNIT 2 (16 hrs.)

Style sheets: Need for CSS, introduction to CSS, basic syntax and structure, using CSS, CSS Properties - Background images, Colors and properties, Text Formatting, Margin, Padding, Positioning etc.

Java Script: Introduction, JavaScript's history and versions, Basic syntax, Variables, Data types, Statements, Operators, loops and repetition.

UNIT 3 (14 hrs.)

Ajax: Introduction, HTTP request, XHTTP Response, Advantages & disadvantages, Purpose of it, Ajax based web application, and alternatives of Ajax.

JSON: JSON– Syntax, Data types, Objects, Reading and writing JSON on client and server.

UNIT 4 (14 hrs.)

PHP and MySQL: Introduction and basic syntax of PHP, Data types, Variables, Decision and looping with examples, String, Functions, Array, Form processing, Cookies and Sessions, E-mail, PHP-MySQL: Connection to server.

Reference Books:

1. Computer Basics and Beyond by Michael A. Price.
2. MS-Office 2007 for Dummies by Wallace Wang, Wiley Publishing Inc.
3. Fundamentals of Computers. Delhi: Prentice-Hall.

Application Development Using Python

Subject Code: GCAPP1-302 **L T P C** **Total Hours:-60**
3 1 0 4

Course Objectives

The Objective of the Course is to help students in analyzing and understanding the concepts related to the language Python. The students will be able to

Course outcomes:

1. Demonstrate basic concepts of Python .
2. Infer the flow control and functions in python.
3. Understanding the concepts of lists and dictionaries in python.

UNIT-I (17 hrs.)

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program

Pattern matching with Regular Expressions: Finding Patterns of Text Without Regular Expressions, Finding Patterns of Text with Regular Expressions,More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making Your Own Character Classes, The Caret and Dollar Sign Characters.

UNIT-II (14 hrs.)

Reading and Writing Files: Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module,Saving Variables with the pprint.pformat() Function, Project: Generating Random Quiz Files, Project: Multi Clipboard.

UNIT-III (15 hrs.)

Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying

Classes and methods: Object-oriented features, Printing objects, Another example, A more complicated example,The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,

UNIT-IV(14 hrs.)

Web Scraping: Project: MAPIT.PY with the webbrowser Module, Downloading Files from the Web with the requests Module, Saving Downloaded Files to the Hard Drive, HTML, Parsing HTML with the BeautifulSoup Module.

Reference Books:

1. Gowrishankar S, Veena A, “Introduction to Python Programming”, 1st Edition, CRC Press/Taylor & Francis, 2018.
2. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, 1 st Edition, O’Reilly Media, 2016.

Software Lab IV (Web Development Using Open Source Technology)

Subject Code: GCAPP1-303 **L T P C** **Total Hours:-60**
0 0 4 2

This laboratory course will comprise as exercises to supplement that is learnt under the Subject Web Development Using Open Source Technology :

Programs based on different web technologies:

1. Write a HTML code that displays various formatting tags.
2. Write a HTML code to create an ordered list.
3. Write a HTML code to create an unordered list.
4. Write a HTML code to create a table having 5 rows and 5 columns.
5. Write a HTML code to create an admission form.
6. Write a HTML code to create a frame.
7. Write a HTML code to create an image map.
8. Write a HTML code to create hyperlink b/w multiple pages.
9. Write a HTML code to create a hyperlink to an image. [DHTML]
10. Write a DHTML code to create a cascading style sheet. [JAVA SCRIPT]
11. Write a Program in JavaScript to show if a number is big or not.
12. Write a Program in JavaScript to implement for loop.
13. Write a Program in JavaScript to implement a while loop.
14. Write a Program in JavaScript to show the usage of if statement.
15. Write a Program in JavaScript to show the usage of if-else statement.
16. Write a Program in JavaScript to show the usage of switch statement.
17. Write a Program in JavaScript to call a function.
18. Write a Program in JavaScript to show a function with an arguments.
19. Write a Program in JavaScript to show the number is even or odd.
20. Write a Program in JavaScript to show if a number is prime or not.

Software Lab V (Application Development Using Python)

Subject Code: GCAPP1-304 **L T P C** **Total Hours:-60**
0 0 4 2

This laboratory course will comprise exercises to supplement that is learnt under the Subject.

1 Write an algorithm and program to search an element using linear search.
2 Write a program to implement a Binary search tree.
3 Write Quicksort algorithm and program in language C.
4 Implement the Polynomial representation using Array.
5 Create a program to sort it in ascending order using heap sort (Min Heap and Max Heap both). Given an array of 6 elements:
6. Write programs for finding the element in the array using the binary search method using iteration and recursion concepts.
7 Write a program to create a link list and perform operations such as insert, delete, update and reverse.
8 Write a program to insert value in a Linear Array at Specified Position.
9 Write a program to swap two numbers using calls by value and call by reference.
10 Write a C program to simulate the working of a circular queue of integers using an array. Provide the following operations, Insert, Delete.
11 Write a program to sort elements using the Merge Sort method.
12 Write a program to support the following operations on a doubly linked list where each node consists of integers.
13 Write a program to construct a stack of integers and to perform the following options on it
PUSH
POP
The program should print appropriate messages for stack overflow, stack underflow and stack empty.
14 Write a program to find shortest path using Dijkstra's Algorithm
15 Write a C program using dynamic variables and pointers to construct a queue of integers using singly link list and perform the following operations:
Insert
Delete
16 The program should print appropriate messages for queue full and queue empty conditions
17 Write a program to arrange words in dictionary order using Binary Search Tree (In order Traversal) and implement binary search tree for word representation and make in order traversal for sorting in dictionary order
18 Write a program to implement Breadth First Search and Depth First Search Algorithm.

19 Write a program to implement any one hashing technique in c and also measure its complexity.

20 Write a program to design a priority queue which is maintained as a set of queues (maximum of three queues). The elements are inserted based upon the given priority; the deletion of an element is to be done starting from the first queue, if it is not empty. If it is empty then the second queue will be deleted and so on.