AUXILIUM COLLEGE (Autonomous)
(Accredited by NAAC with A+ Grade with a CGPA of 3.55 out of 4 in the 3rd Cycle)
Gandhi Nagar, Vellore-632 006

Department of Computer Applications (B.C.A.) - (UG)

OUTCOME BASED EDUCATION - 2020
(Effective for the Batch of Students Admitted from 2020-2021)
SEMESTER I
UCCAA20- Programming in C

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I / I	UCCAA20	Programming in C	Theory	Core	4	5	40+60

COURSE OBJECTIVES

1. To introduce students to the concept of basic programming- thereby reducing the design complexity and increasing the reusability of a component.
2. The course is designed to provide complete knowledge of C language.
3. Students will be able to develop logics which will help them to create programs, applications in C.
4. Also by learning the basic programming constructs they can easily switch over to any other language in future.
5. To create a program that measures or simulates performance and use it to analyze behavior.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Introduce the students to understand the concept of basic programming- thereby reducing the design complexity and increasing the reusability of a component.
2. Construct the basic structure of C-programming, declaration and usage of variable.
3. Understand and develop conditional and iterative statements to write programs.
4. Exercise C programs that uses array and string.
5. Develop user defined functions to solve real time problems

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	L	M	M
CO2	M	L	M	H	L	M
CO3	L	H	L	M	M	L
CO4	M	M	M	L	H	M
CO5	M	L	M	L	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	L	H	L	H	M	L
CO3	M	H	M	L	H	M
CO4	H	L	H	H	L	M
CO5	H	H	L	H	M	H

Low - L, Medium - M, High - H

COURSE SYLLABUS

Unit I **Hours: 12**

1.1 Algorithm and Flowchart (K1,K2,K3,K4)
1.2 Overview of C (K2)
1.3 Basic Techniques: Sum of Two Given Numbers- Swapping Two Numbers - Simple Interest Calculation (K1,K2,K3,K4)
1.4 Constants (K2,K3)
1.5 Variables (K2, K3)
1.6 Data Types. (K2 K3)

Unit II **Hours: 12**

2.1 Operators (K1, K2)
2.2 Expressions (K1, K2)
2.3 Managing Input Operations (K1, K2, K3, K4)
2.4 Managing Output Operations (K1, K2, K3, K4)
2.5 Decision Making and Branching (K1, K2, K3, K4)
2.6 Decision Making and Looping (K1, K2, K3, K4)

Unit III **Hours: 12**

3.1 Arrays (K1, K2, K3)
3.2 One Dimensional Array (K1, K2, K3)
3.3 Two Dimensional Array (K1, K2, K3)
3.4 Multi-Dimensional Array (K1, K2)
3.5 Dynamic Array (K1, K2)
3.6 Predefined Streams (K1)

Unit IV **Hours: 12**

4.1 Character Arrays and Strings (K1, K2, K3)
4.2 Reading and Writing String (K1, K2, K3)
4.3 Arithmetic Operation on Characters (K1, K2, K3)
4.4 Putting String Together and Comparison of Two Strings (K1, K2, K3)
4.5 String Handling Functions (K1, K2, K3)

4.6 Other Features of Strings (K1, K2)

Unit V **Hours: 12**

5.1 User-Defined Functions (K1, K2, K3)
5.2 Categories of functions (K1, K2, K3)
5.3 Recursions (K1, K2, K3)
5.4 Passing Array to Functions and Passing Strings to Functions (K1, K2, K3)
5.5 Scope- Visibility and Lifetime of Variables (K1, K2, K3)
5.6 Structures and Unions. (K1, K2, K3)

Book for Study:

1. Balagurusamy, "Programming in C", 6th Edition, Tata McGraw Hill Publication, 2012.
2. M. G. Venkateshmurthy, "Programming Techniques through C: A Beginner's Companion", 1st Edition, Pearson India, 2006.

Books for Reference:

1. Ashok N. Kamathane - "Programming with C", Third Edition, Pearson Publication, 2011.

OER:

1. https://www.freebookcentre.net/programming-books-download/C-Language-Tutorial-(PDF-124P).html
2. http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20C%20Programming%20Language.pdf

SEMESTER I

UCCAC20- Practical I: C

Year / Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I / I	UCCAC20	Practical I: C	Practical	Core	2	2	40+60

COURSE OBJECTIVES

1. To introduce students to the concept of basic programming- thereby reducing the design complexity and increasing the reusability of a component.
2. To learn data types and control structures in C.
3. To improve upon a solution to a problem.
4. Analyze a given problem and develop an algorithm to solve the problem.
5. To design, develop and test programs written in C.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Exercise with basic structure of the C program, declaration and usage of variable.
2. Resolve mathematical and scientific problem.
3. Develop the programs using conditional and iterative statements.
4. Implement array and string concept in C program.
5. Write real time problems using user defined functions

CO/PO	PO					
	1	2	3	4	5	6
CO1	L	H	M	M	L	H
CO2	M	L	L	L	H	M
CO3	M	H	M	L	M	M
CO4	L	M	L	M	L	L
CO5	H	M	L	M	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	H	H	H	M	L
CO2	L	L	M	L	L	H
CO3	H	M	M	H	H	M
CO4	L	H	L	M	M	H
CO5	M	H	H	H	M	L

Low - L, Medium - M, High - H

Practical Program: **(Hours: 30)**

1. Input and Output Operations.
2. Decision Making Statements.
3. Arrays and Looping Statements.
4. Two Dimensional Arrays.
5. The Concept of Functions.
6. Recursion.

7. Character Arrays
8. Structures and Unions

SEMESTER II

UCCAD20 – PYTHON

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I / II	UCCAD20	Python	Theory	Core	4	4	40+60

COURSE OBJECTIVES

1. To describe the core syntax and semantics of Python programming language.
2. To discover the need for working with the strings and functions.
3. To illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4. To design real life situational problems and think creatively about solutions of them.
5. To apply a solution clearly and accurately in a program using Python

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
2. Express different Decision Making statements and Functions
3. Interpret Object oriented programming in Python
4. Explain how to design GUI Applications in Python and evaluate different database operations
5. Design and develop Client Server network applications using python

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	M	M	M
CO2	M	M	M	M	H	H
CO3	M	M	M	L	L	M
CO4	H	M	L	M	H	H
CO5	M	L	M	H	M	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	L	M	H
CO2	L	M	L	H	M	L
CO3	M	H	M	L	H	M
CO4	H	L	H	M	L	M
CO5	L	M	L	H	M	H

COURSE SYLLABUS

Unit I **(Hours: 12)**

1.1 Computer Systems - Python Programming Language (K1,K2)
1.2 Computational Thinking Python Data Types(K1,K2)
1.3 Expressions, Variables, and Assignments(K2,K3)
1.4 Strings - Lists (K2,K3)
1.5 Objects & Classes (K1, K2, K3,K4)
1.6 Python standard library. (K5, K6)

Unit II **(Hours: 12)**

2.1 Imperative Programming(K3)
2.2 Python Modules - Print() (K3,K4)
2.3 Function - Functional Eval() Execution Control Structures (K2,K3,K4)
2.4 User Defined Functions (K2,K3)
2.5 Python Variables(K3)
2.6 Assignments Parameter Passing.(K3)

Unit III **(Hours: 12)**

1.1 Text Data (K2,K3,K4)
1.2 Exceptions (k4)
1.3 Strings Revisited - Formatted Output(K3,K4)
1.4 Files(K2,K3)
1.5 Errors &Exceptions Execution Control Structures(K2,K3)
1.6 Decision Control & The IF Statement(K3,K4)

Unit IV **(Hours : 12)**

4.1 Container And Randomness (K2, K3)
4.2 Dictionaries (K3, K4)
4.3 Other Built-in Container Types (K2, K3)
4.4 Character Encodings (K2)
4.5 Strings (K2,K3)
4.6 Module Random (K3)

Unit V **(Hours: 12)**

5.1 FOR Loop & Iteration Patterns (K2, K3)
5.2 Two dimensional Lists While Loop (k2,K3)
5.3 More Loop Patterns - Additional Iteration (K1,K2,K3)
5.4 Control Statements Namespaces - Encapsulation in Functions(K3)
5.5 Global Vs. Local Namespaces (K2,K3,K5)
5.6 Exceptional Flow Control - Modules as Namespaces(K2,K4)

Book for Study:

1. LjubomirPerkovic, "Introduction to Computing Using Python: An Application Development Focus", 2nd Edition, John Wiley & Sons, 2012

Books for Reference:

1. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education; Fourth Edition, March 2018.
2. N. Ryan Marvin, Amos Omondi - "Python Fundamentals", 1st Edition, Packt Publishing, 2018.
3. Magnus Lie Hetland - "Beginning Python - From Novice to professional", 3rd Edition A Press Publishers, 2008.

OER:

1. www.freebookcentre.net/programming.../Python-Language-Reference.html
2. www.freebookcentre.net/.../Introduction-to-Python-Programming-Course- Notes.html

SEMESTER II

UCCAE20 - COMPUTER ORGANIZATION AND ARCHITECTURE

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I / II	UCCAE20	Computer Organization and Architecture	Theory	Core	4	5	40+60

COURSE OBJECTIVES

1. To make students understand the basic structure and operation of digital computer.
2. To understand the hardware-software interface.
3. To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
4. To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.
5. To familiarize the students with hierarchical memory system including cache memories and virtual memory.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Explain the organization of basic computer, its design and the design of control Unit.
2. Elaborate advanced concepts of computer architecture, Parallel Processing, Inter-processor communication and synchronization.

3. Demonstrate the working of central processing unit and RISC and CISC Architecture.
4. Describe the operations and language the register transfer, micro operations and input-output organization.
5. Understand the organization of memory and memory management hardware.

CO/PO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	H	M	M	M	L
CO2	H	M	M	M	H	L
CO3	M	H	H	M	L	H
CO4	H	L	M	M	L	M
CO5	M	L	M	L	M	L

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	M	H	M	L
CO2	L	M	L	H	M	L
CO3	M	L	M	L	M	M
CO4	H	L	H	L	L	M
CO5	H	M	L	M	M	H

Low - L, Medium - M, High – H

COURSE SYLLABUS

Unit I **Hours: 13**

1.1 Digital Computers-Logic Gates-Boolean Algebra (K1, K2)
1.2 Map Simplification – Combinational Circuits – Sequential Circuits (K3)
1.3 Flip-Flops (SR D JK T) (K3, K4)
1.4 Digital Components: Decoders – Multiplexers (K2, K3)
1.5 Register – Shift Register (K3)
1.6 Data Representation: Data Types - Complements - Other Binary Codes. (K1, K2, K4)

Unit II **Hours: 11**

2.1 Basic Computer Organization and Design: Instruction Codes (K2, K3)
2.2 Computer Registers (K4)
2.3 Computer Instructions (K3, K4)
2.4 Timing and Control (K2)
2.5 Instruction Cycle (K3, K4)
2.6 Memory Reference Instructions. (K3, K4)

Unit III **Hours: 12**

3.1 Programming the Basic Computer: Introduction - Machine Language (K2)
3.2 Assembly Language (K3, K6)
3.3 The Assembler (K3, K4)
3.4 Central Processing Units: Introduction - General Register Organization (K2, K3)
3.5 Instruction Formats - Addressing Modes (K3, K4)
3.6 RISC and CISC Characteristics. (K4)

Unit IV **Hours: 12**

4.1 Input Output Organization: Peripheral Devices (K1, K2)
4.2 Input/output Interface (K3, K4)
4.3 Asynchronous Data Transfer (K3)
4.4 Modes of Transfer (K3, K4)
4.5 Priority Interrupt (K3)
4.6 Direct Memory Access. (K3)

Unit V **Hours: 12**

5.1 Memory Organization: Memory Hierarchy (K1, K2)
5.2 Main Memory (K1, K2)
5.3 Auxiliary Memory (K2, K3)
5.4 Cache Memory (K3, K4)
5.5 Virtual Memory: Address Space and Memory Space – Address Mapping using Pages (K3, K6)
5.6 Associative Memory Page Table – Page Replacement (K3, K6)

Book for Study:

1. M.Morris Mano, "Computer System Architecture", Edition 3, Prentice Hall of India Pvt. Ltd., 2013.
2. Miles Murdocca and Vincent Heuring, "Computer Architecture and Organization: An Integrated Approach", Second Edition, Wiley Publication, 2015.

Books for Reference:

1. Vincent P.Heuring and Harry F. Jordan, "Computer System Design and Architecture, Edition 2, Pearson Education, 2012.
2. William Stallings, "Computer Organization and Architecture Designing for Performance", Eighth Edition, Pearson Education, 2013.

OER:

1. https://www.academia.edu/31003870/Computer_System_Architecture_3rd_Ed_by_M_Morris_Mano_text_pdf
2. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

SEMESTER II

UCCAF20 – PRACTICAL V: PYTHON

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I / II	UCCAF20	Practical V: Python	Practical	Core	2	2	40+60

COURSE OBJECTIVES

1. To describe the core syntax and semantics of Python programming
2. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.
3. To understand why Python is a useful scripting language for developers.
4. To learn how to design and program Python applications.
5. To learn how to use lists, tuples, and dictionaries in Python programs.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. To Understand the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
2. Express different Decision Making statements and Functions
3. Interpret Object oriented programming in Python
4. Explain how to design GUI Applications in Python and evaluate different database operations
5. Design and develop Client Server network applications using python

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	L	M	L	M	H
CO2	M	M	M	M	H	H
CO3	M	M	M	L	M	H
CO4	H	M	L	M	H	M
CO5	H	L	M	H	M	L

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

CO4	M	L	H	M	L	M
CO5	H	H	L	H	M	M

Low - L, Medium - M, High - H

Practical Programs: **Hours: 30**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
    i. Grade A: Percentage >=80
    ii. Grade B: Percentage>=70 and <80
    iii. Grade C: Percentage>=60 and <70
    iv. Grade D: Percentage>=40 and <60
    v. Grade E: Percentage<40
3. Program, using user defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series
5. Program to find factorial of the given number.
6. Program to find sum of the following series for n terms: 1 - 2/2! + 3/3! n/n!
7. Program to calculate the sum and product of two compatible matrices.

SEMESTER III

UCCAG20-Data Structures

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / III	UCCAG20	Data Structures	Theory	Core	5	4	40+60

COURSE OBJECTIVES

1. On learning this paper students will gain the knowledge on different types of data along with the structures and its algorithm.
2. To impart the basic concepts of data structures and algorithms
3. To understand concepts about searching and sorting techniques
4. To Understand basic concepts about stacks, queues, lists, trees and graphs
5. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Discuss the concept of complexity of algorithms, data types, algorithms, Big O notation.
2. Apply basic data structures such as arrays, linked lists, stacks and queues.
3. Identify problem involving trees and binary search trees.
4. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data using linked list.
5. Analyze graphs and describe the hash function and concepts of collision and its resolution methods.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	M	L	M
CO2	L	M	L	M	L	H
CO3	M	M	H	H	M	L
CO4	H	M	L	M	L	M
CO5	M	L	M	L	L	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	H	M	H	H	M
CO2	L	M	H	H	M	L
CO3	H	M	M	H	M	H
CO4	L	H	M	H	L	H

CO5	H	H	H	L	M	M

Low - L, Medium - M, High - H

COURSE SYLLABUS

Unit I **Hours: 15**

1.1 Introduction - Data structure operations (K1)
1.2 Complexity and Time Space of Algorithms (K2)
1.3 Mathematical Notation and Functions - Algorithmic Notation K2)
1.4 Control Structures - Complexity of Algorithms - Sub Algorithms - Variables - Data Types (K2)
1.5 String Processing: Basic Terminology - Storing Strings (K3)
1.6 Character Data Type - String Operations (K2)

Unit II **Hours: 15**

2.1 Linear Arrays Representation in Memory (Cognitive Level: K1)
2.2 Traversals (Cognitive Level: K2)
2.3 Inserting and Deleting (Cognitive Level: K3)
2.4 Sorting – Searching (Cognitive Level: K3)
2.5 Multidimensional Arrays (Cognitive Level: K1)
2.6 Pointer Arrays. (Cognitive Level: K1)

Unit III **Hours: 15**

3.1 Linked Lists: Representation in Memory - Traversing a Linked List (K1)
3.2 Searching – Garbage Collection (K1)
3.3 Insertion and Deletion - Headers – Two Way Lists (K3)
3.4 Array Representation - Arithmetic Expressions- Recursion (K1)
3.5 Queues - Application Circular queues - Priority Queues. (K1.K3)

Unit IV **Hours: 15**

4.1Trees - Binary Trees - Representation in Memory (K1)
4.2 Tree Traversals (K2)
4.3 Binary Search Trees (K2)
4.4 Searching (K3)
4.5 Inserting and Deleting (K2)
4.6 Path Lengths - General Trees (K1)

Unit V **Hours: 15**

5.1 Graphs - Sequential Representation (K1)

5.2 Adjacency Matrix - Path Matrix (K2)
5.3 Heap Sort (K1)
5.4 Warshall's Algorithm for Shortest Path (K2)
5.5 Linked Representation - Graph Traversals (K1)
5.6 Hashing (K1)

Book for Study:

1. Seymour Lipschutz, "Data Structures: Schaum's Outline Series", Revised Edition, McGraw Hill Publication, 2011.

Reference Books :

1. Ellis Horowitz,SartajSahni,SusanAndeson Freed, "Fundamentals of Data Structures in C", 2nd Edition, Universities Press Pvt Ltd, ,2018

2. YashavantP.Kanetkar, " Data Structures through C" , 2nd Edition, BPB Publications, 2003. Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman , "Data Structures and Algorithms" , 1st Edition, Pearson Education.

OER:

1. http://www.freebookcentre.net/ComputerScience-Books-Download/Fundamentals-of-Algorithms-with-Applications.html
2. http://www.freebookcentre.net/ComputerScience-Books-Download/Algorithms-and-Data-Structures-Lecture-Materials.html

SEMESTER III

UCCAH20 - Java Programming

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / III	UCCAH20	Java Programming	Theory	Core	5	4	40+60

COURSE OBJECTIVES

1. This course provides an introduction to object oriented programming (OOP) using the Java programming language.
2. Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm
3. Concepts of object oriented programming in java are needed.
4. To provide sufficient knowledge about developing real world projects with object oriented concept.
5. To have the knowledge of Exception handling and Event handling and applets.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Able to understand the use of OOPs concepts.
2. Able to solve real world problems using OOP techniques. To understand the use of polymorphism and Inheritance.
3. Able to understand the use of Packages and Interface in java.
4. Able to develop and understand exception handling, multithreaded applications with synchronization.
5. Able to design GUI based applications and develop AWT and applets for web applications.

CO/ PO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	H	L	M	L	H
CO2	M	L	H	L	M	M
CO3	L	M	M	M	H	M
CO4	M	M	L	L	M	L
CO5	H	M	H	M	H	L

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	M	H	H	M	L
CO2	L	M	H	M	H	H
CO3	M	H	H	M	L	H

CO4	H	M	M	H	H	L
CO5	M	H	M	L	H	M

Low - L, Medium - M, High - H

COURSE SYLLABUS

Unit I **Hours: 15**

1.1 Introduction to Java (K1)
1.2 Features of Java (K1)
1.3 Lexical issues &Data types (K1)
1.4 Variables - Operators (K1)
1.5 Type conversion and casting (K2)
1.6 Control Statements (K2)

Unit II **Hours: 15**

2.1 Arrays – Strings (K1)
2.2 Classes - Objects-Constructors - Overloading method (K2)
2.3 Access Control - Static and Fixed method (K2)
2.4 Inner Class –String class (K2)
2.5 Inheritance - Overriding Method (K3)
2.6 Using Super Class. (K2)

Unit III **Hours: 15**

3.1 Input/output: Exploring Java i/o: The Java I/O classes (K1)
3.2 Interfaces (K2)
3.3 File Stream Classes (K2)
3.4 Packages (K3)
3.5 Access Protection - Importing Packages (K3)
3.6 Interfaces (K2)

Unit IV **Hours: 15**

4.1 Exception Handling: try, catch (K1)
4.2 Throw and Throws - Finally (K2)
4.3 Thread - Creating a Thread (K4)
4.4 Multithreading (K2)
4.5 Synchronization (K3)
4.6 Deadlock. (K2)

Unit V **Hours: 15**

5.1 The Java Applet and (K4)
5.2 HTML APPLET tag (K4)
5.3 getDocumentBase() and getCodeBase() (K5)
5.4 Event Handling (K3)

5.5 Working with Windows (K4)
5.6 AWT Classes. (K2)

Book for Study:

1. Herbert Schildt - "The Complete Reference: Java 2", 10th Edition Tata McGraw Hill Publication, 2018.

Books for Reference:

1. C. Muthu, "Programming with Java", 2nd Edition, Tata McGraw Hill Publishing, 2015.
2. E.Balagurusamy, "Programming with Java: A Primer", 4th Edition, Tata McGraw Hill Publication, 2015.

OER:

1. https://www.tutorialspoint.com/java/index.htmhttps://www.tutorialspoint.com/php/php_tutorial.pdf
2. http://www.freebookcentre.net/JavaTech/javaCategory.html
3. http://freecomputerbooks.com/javaCategory.html

SEMESTER III

UCCAI20 - Design and Analysis of Algorithms

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / III	UCCAI20	Design and Analysis of Algorithms	Theory	Core	5	4	40+60

COURSE OBJECTIVES

1. To demonstrate a familiarity with major algorithms and data structures.
2. To apply important algorithmic design paradigms and methods.
3. To synthesize efficient algorithms in problem solving situations.
4. To apply important algorithmic design paradigms and methods of analysis.
5. To apply important algorithmic design paradigms and methods of analysis.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Define the basic concepts of algorithms and analyze the performance of algorithms.
2. Discuss various algorithm design techniques for developing algorithms
3. Identify the usage of set of rules design methods including the greedy approach, divide and overcome, dynamic programming, and certain.
4. Understand the variations among backtracking, graph coloring and 8 Queens problems
5. Understand NP completeness and identify different NP complete problems

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	L	M	M
CO2	M	L	M	H	L	M
CO3	L	H	L	M	M	L
CO4	M	M	M	L	H	M
CO5	M	L	M	L	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	L	H	L	H	M	L
CO3	M	H	M	L	H	M
CO4	H	L	H	H	L	M
CO5	H	H	L	H	M	H

Low - L, Medium - M, High - H

COURSE SYLLABUS

Unit I **Hours: 15**

1.1 Basic Concepts: Overview - System Life Cycle (K1)
1.2 PsuedoCode for Expressing Algorithms (K1)
1.3 Algorithm Specification (K1)
1.4 Performance Analysis (K2)
1.5 Performance Measurement Space Complexity, Time Complexity (K2)
1.6 Asymptotic Notation - Big Oh Notation, Omega Notation, Theta Notation and Little Oh Notation. (K2)

Unit II **Hours: 15**

2.1 Divide and Conquer: General Method (K2)
2.2 Finding the Maximum and Minimum (K3)
2.3 Merge Sort (K3)
2.4 Quick Sort (K3)
2.5 Selection (K2)
2.6 Optimal Binary Search Trees (K2)

Unit III **Hours: 15**

3.1 Greedy method: General method - Knapsack Problem (K2)
3.2 Minimum Cost Spanning Trees (K2)
3.3 Single Source Shortest Path Problem (K2).
3.4 Dynamic Programming: General method (K2)
3.5 All Pairs Shortest Path Problem (K2)
3.6 Travelling Sales Person Problem (K2,K3,K4)

Unit IV **Hours: 15**

4.1 Backtracking: General Method (K1)
4.2 8 Queens Problem (K2,K3)
4.3 Sum of Subsets (K2)
4.4 Graph Coloring (K2)
4.5 Hamiltonian Cycles (K2,K3)
4.6 Knapsack Problem (K2,K3)

Unit V **Hours: 15**

5.1 Branch and Bound: General method (K2)
5.2 Least Cost (LC) Search (K2,K3)

5.3 FIFO Branch and Bound (K2,K4)
5.4 LC Branch and Bound Solution (K2,K3)
5.5 NP Hard and NP Complete Problems- basic concepts (K2,K3)
5.6 Non deterministic algorithms (K2,K3)

Book for Study:

1. Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publication Pvt.Ltd., 2009.

Books for Reference:

1. Yashavant P. Kanetkar, "Data Structure through C", 2nd Edition, BPB Publications, 2003.
2. Thomas H Corman, Charles Eleiserson, RonaldL. Rivest,Clifford Stein, "Introduction to Algorithms", 3rd Edition,PHI Learning Pvt. Ltd, 2010.
3. Seymour Lipschutz, "Data Structures with C", Revised Edition, Schaum's Outline Series, 2009

OER:

1. http://freecomputerbooks.com/compscAlgorithmBooks.html
2. http://www.freebookcentre.net/ComputerScience-Books-Download/Introduction-to-the- Design-and-Analysis-of-Algorithms.html
3. http://www.freebookcentre.net/ComputerScience-Books-Download/Analysis-and-Design-of-Computer-Algorithms-by-Ganesh-Kumar.html

SEMESTER III

UCCAJ20 - Practical - III: Java

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / III	UCCAJ20	Practical - III: Java	Practical	Core	3	2	40+60

COURSE OBJECTIVES

1. To introduce the object oriented programming concepts.
2. To understand object oriented programming concepts, and apply them in solving problems.
3. To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
4. To introduce the concepts of exception handling and multithreading.
5. To introduce the design of Graphical User Interface using applets and swing controls.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and I/O Streams.
2. Establish exception handling is used to minimize the errors in Java programming.
3. Demonstrate the concepts of Packages and Interface.
4. Evaluate the Java programs to implement error handling techniques using exception handling.
5. Design GUI based applications and develop applets for web applications.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	M	H
CO2	H	H	L	M	L	L
CO3	L	M	M	H	M	M
CO4	M	L	L	M	H	M
CO5	H	M	M	L	M	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	L	H	L	H
CO2	L	H	M	H	H	M
CO3	M	H	H	L	M	H
CO4	H	L	H	L	H	M
CO5	L	M	H	H	H	H

Low -L, Medium -M, High-H

Practical Program **Hours: 40**

1. Implementing String manipulation using character Array.
2. Implementing Input and Output Stream.
3. Implementing Packages and Interface.
4. Implementing Exception handling.
5. Implementing Real time application using multithread.
6. Implementing Applet using Graphics class.

7. Implementing AWT controls.

8. Implementing Colors and fonts.

9. To create any applications using Applets and AWT.

SEMESTER III

UCCAK20 - Practical: Data Structures and Algorithms

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / III	UCCAK20	Practical - IV: Data Structures and Algorithms	Practical	Core	3	2	40+60

COURSE OBJECTIVES:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Simplify efficient algorithms in common engineering design situations.
6. Analyze the asymptotic performance of algorithms.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Implement PUSH, POP and Add and delete operations of Stack using Arrays.
2. Explore the Infix to postfix conversion and binary tree traversals and its algorithms like depth first and breadth first traversal
3. Understanding polynomial addition and merge sort using Divide and Conquer Technique.
4. Implement travelling Salesman problem using Dynamic programming and Hashing with two collision techniques.
5. Implement PUSH, POP and Add and delete operations of Stack using Arrays.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	M	L	M
CO2	L	M	L	M	L	H

CO3	M	M	H	H	M	L
CO4	H	M	L	M	L	M
CO5	M	L	M	L	L	H

CO/PSO	**PSO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	H	M	H	H	M
CO2	L	M	H	H	M	L
CO3	H	M	M	H	M	H
CO4	L	H	M	H	L	H
CO5	H	H	H	L	M	M

Low -L, Medium -M, High-H

Practical Program: **Hours: 40**

1. Implementing PUSH, POP operations of Stack using Arrays.
2. Implementing add, delete operations of a Queue using Arrays.
3. Implementing Infix to postfix conversion of an expression using Stack.
4. Implementing Binary tree traversals (inorder, preorder, postorder).
5. Implementing Polynomial addition using linked list.
6. Implementing the following graph traversal algorithms:

a) Depth first traversal b) Breadth first traversal

7. Implementing Merge sort using Divide and Conquer Technique.
8. Implementing Travelling Salesman problem using Dynamic Programming technique.
9. Implementing Hashing - any two Collision techniques.
10. Implementing Knapsack problem

SEMESTER IV

UCCAL20 -DATA COMMUNICATIONS AND NETWORKING

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / IV	UCCAL20	Data Communications and Networking	Theory	Core	5	4	40+60

COURSE OBJECTIVES

1. To discuss and explain about basics of data communication and networking concepts.
2. To introduce analysis and design of computer and communication networks.
3. Understand the network layered architecture and the protocol stack.
4. Design the basic configuration of routers and switches.
5. Resource sharing in the computer network to provide high Reliability.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Describe the Functions of each layer in OSI and TCP/IP Model.
2. Explain the types of Transmission Media with Real-Time Applications.
3. Apply Time and Frequency concept of analysis.
4. Manage Network functions for an Organization.
5. Analyze various Routing Algorithms and Protocols.

CO/PO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	L	H	M	M	H
CO2	H	M	M	L	M	M
CO3	M	L	M	H	M	L
CO4	H	M	L	M	M	H
CO5	L	M	L	M	L	M

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	H	H	M	H
CO2	L	H	L	L	M	L
CO3	M	L	M	L	H	M
CO4	H	L	H	H	L	M
CO5	H	M	L	H	M	M

Low - L, Medium - M, High – H

COURSE SYLLABUS

Unit I **Hours: 14**

1.1 Data Communications, Data Networking, and the Internet: Data Communications and Networking for Today's Enterprise - Communications Model.(K1, K2)
1.2 Data Communications - Networks - The Internet. (K2, K3)
1.3 Protocol Architecture, TCP/IP, and Internet - Based Applications: The Need for Protocol Architecture. (K2, K3)
1.4 The TCP/IP Protocol Architecture –The OSI Model. (K3, K4)
1.5 Standardization within a Protocol Architecture - Traditional Internet (K2, K3)
1.6 Data Transmission: Concepts and Terminology - Analog and Digital Data Transmission - Transmission Impairments (K2, K3)

Unit II **Hours: 16**

2.1 Transmission Media: Guided Transmission Media. (K3)
2.2 Wireless Transmission - Wireless Propagation (K3)
2.3 Signal Encoding Techniques: Digital Data, Digital Signals - Digital Data, Analog Signals. (K3, K4)
2.4 Analog Data, Digital Signals - Analog Data, Analog Signals. (K3)
2.5 Digital Data Communication Techniques: Asynchronous and Synchronous Transmission - Types of Errors (K2, K3, K4)
2.6 Error Detection. Error Correction (K2,K3)

Unit III **Hours: 14**

3.1 Data Link Control Protocols: Flow Control - Error Control. (K2)
3.2 High Level Data Link Control (HDLC). (K3)
3.3 Multiplexing: Frequency Division Multiplexing - Synchronous Time Division Multiplexing - Statistical Time Division Multiplexing. (K3, K4)
3.4 Asymmetric Digital Subscriber Line –xDSL.(Cognitive Level: K2, K3)
3.5 Spread Spectrum: The Concept of Spread Spectrum - Frequency Hopping Spread Spectrum. (K3, K4, K5)
3.6 Direct Sequence Spread Spectrum – Code Division Multiple Access. (K3, K4, K5)

Unit IV **Hours: 16**

4.1 Circuit Switching and Packet Switching: Switched Communications Networks - Circuit Switching Networks. (K2, K4)
4.2 Circuit Switching Concepts - Softswitch Architecture. (K2, K4)
4.3 Packet Switching Principles - X.25 - Frame Relay. (K4, K5)
4.4 Asynchronous Transfer Mode: Protocol Architecture. (K4)
4.5 ATM Logical Connections - ATM Cells - Transmission of ATM Cells. (K5)
4.6 ATM Service Categories. (K4, K5)

Unit V **Hours: 15**

5.1 Routing in Switched Networks: Routing in Packet Switching Networks - Examples: Routing in ARPANET. (K2, K3)
5.2 Least Cost Algorithms. (K3, K4)
5.3 Effects of Congestion - Congestion Control.(K4)
5.4 Traffic Management - Congestion Control in Packet Switching Networks.(K4, K5, K6)
5.5 Frame Relay Congestion Control - ATM Traffic Management. (K5, K6)
5.6 ATMGFR Traffic Management. (K5, K6)

Book for Study:

1. William Stallings, "Data and Computer Communications", 8thEdition , Pearson Education, Inc., 2016.

Books for Reference:

1. Andrews S. Tanenbaum, "Computer Networks", 4th Edition , Prentice Hall of India Private Limited, 2011
2. Leon Garcia and Widjaja, "Communication Networks, Fundamental Concepts and Key Architecture ", 2nd Edition, Tata McGraw Hill, 2001.
3. Behrouz A. Forouzan, "Data Communications and Networking", Fourth Edition, Tata McGraw Hill, 2017.

OER:

1. http://www.freebookcentre.net/Networking/networkCategory.html
2. http://freecomputerbooks.com/networkCategory.html

SEMESTER IV

UCCAM20 – OPERATING SYSTEM

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / IV	UCCAM20	Operating System	Theory	Core	5	4	40+60

COURSE OBJECTIVES

1. To describe basic components of operating system.
2. To understand basic principles used in the design of modern operating systems.
3. To illustrate the general architecture of computers.
4. To Understand and analyze theory.
5. To analyze: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Acquire the important computer system resources and the role of operating system in their management policies and algorithms
2. Understand the process management policies and scheduling of processes by CPU.
3. Evaluate the requirement for process synchronization and coordination handled by operating system
4. Describe and analyze the memory management and its allocation policies
5. Entity use and evaluate the storage management policies with respect to different storage management technologies

CO/PO	**PO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	**L**	**M**	**L**	**M**	**M**	**L**
CO2	**H**	**M**	**M**	**L**	**L**	**M**
CO3	**M**	**H**	**M**	**M**	**L**	**M**
CO4	**L**	**M**	**L**	**M**	**M**	**L**
CO5	**L**	**L**	**H**	**M**	**M**	**L**

CO/PSO	**PSO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	H	H	M	H
CO2	L	H	L	L	M	L
CO3	M	H	M	L	L	M
CO4	H	L	H	H	L	M
CO5	H	M	L	H	M	M

Low - L, Medium - M, High - H

COURSE SYLLABUS

Unit I **Hours: 12**

1.1 LINUX: Introduction, Brief history. Unix Components/Architecture (K1)
1.2 Features of Unix. (K1)
1.3 Basic Commands: Directory and File Commands: pwd, ls, cd, cp, mv, rm, mkdir, rmdir, chmod. (K2)
1.4 Full and Relative Pathnames (K2)
1.5 File and Directory Naming Conventions. (K1,K2)
1.6 Wildcard Characters? - Ownership and Permission: chmod, chgrp, chown. (K1,K2)

Unit II **Hours: 12**

2.1 Shell Programming Language (K2)
2.2 Naming Shell Programs. (K2)
2.3 Shell Variables and Arguments. (K2,K3)
2.4 Command Line Arguments. (K2,K3)
2.5 Looping and Conditional Execution: if..then..else..elseif..fi.(K1,K2,K3)
2.6 While ..do, for..do..done, for, while, until and case statements, break and continue, true and false commands. (K3)

Unit III **Hours: 12**

3.1 System calls - Types of System calls (K3)
3.2 Process Management: Process Concepts (K2,K3,K5)
3.3 Inter Process Communication (K2,K3,K5)
3.4 Multithreaded Programming: Multithreading Models. (K5)
3.5 Process Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms. (K3,K4)
3.6 Deadlock: Deadlock Characterization - Deadlock Avoidance. (K3,K4)

Unit IV **Hours: 12**

4.1 Memory Management: Background – Swapping. (K3, K4)
4.2 Contiguous Memory Allocation – Paging. (K3, K4)
4.3 Structure of the Page Table (K3, K4)
4.4 Segmentation. (K3, K4)
4.5 Virtual Memory Management: Demand Paging (K3, K4)
4.6 Page Replacement - Thrashing. (K4)

Unit V **Hours: 12**

5.1 File System: File Concept - Access methods (K1, K2, K3)
5.2 Directory Structure. (K1, K2, K3)
5.3 Implementing File Systems: File System Structure and Implementation. (K1, K2, K4)
5.4 Allocation Methods - Free Space Management. (K1, K2, K4)
5.5 Secondary Storage Structure Disk Structure (K1, K2, K3)
5.6 Disk Scheduling. (K1, K2, K4)

Book for Study:

1. Behrouz A. Forouzan, Richard F. Gilberg.Thomson, “Unix and shell Programming”, 2005.
2. Meeta, Tilak & Rajiv, “The ‘C’ Odyssey UNIX - The Open, Boundless C”, First Edition, BPB Publication 1992.
3. Silberschatz Galvin Gagne, “Operating System Principles”, 7 th Edition, Prentice Hall, 2011.

Books for Reference:

1. Your UNIX the ultimate guide, Sumitabha Das, 2nd Edition, TMH, 2007.
2. UNIX for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.
2. Richard Rosinski, Douglas Host, Kenneth Rosen, Rachel Klee, "UNIX: The Complete Reference", Second Edition, 2007.
3. Andrew S. Tanenbaum, "Operating Systems, Design and Implementation", 2nd Edition, Prentice Hall of India, 2012.

OER:

1. http://www.freebookcentre.net/UnixCategory/unixCategory.html
2. http://freecomputerbooks.com/unixCategory.html

SEMESTER IV

UCCAN20 - .NET PROGRAMMING

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / IV	UCCAN20	.Net Programming	Theory	Core	5	4	40+60

COURSE OBJECTIVES

1. Understand code solutions and compile C# projects within the .NET framework.
2. Design and develop professional Console and Window based .NET application.
3. Demonstrate knowledge of object-oriented concepts design user experience and functional requirements C#.NET application.
4. Understand and implement string manipulation, events and exception handling within .NET application environment.
5. Identify and resolve problems in C#.NET window based application.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand the concepts of .NET Framework and C#.
2. Apply the usage of Methods, Arrays and Strings.
3. Interpret the concepts of Constructors, Inheritance and Interfaces.
4. Analyze Operator Overloading, Delegates, Events and Exceptions.
5. Create Windows Applications and Web - based Applications.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	M	L	M

CO2	L	M	L	M	L	H
CO3	M	M	H	M	H	L
CO4	H	M	L	M	L	M
CO5	M	L	M	L	L	H

CO/PSO	**PSO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	H	M	H	H	M
CO2	L	M	H	H	M	L
CO3	H	M	M	H	M	H
CO4	L	H	M	H	L	H
CO5	H	H	H	L	M	M

Low - L, Medium -M, High-H

COURSE SYLLABUS

Unit I **Hours: 13**

1.1 Introduction – Evolution of C# – Characteristics of C# – Applications of C# (K1, K2)
1.2 Origins of .NET Technology – .NET Framework (K1, K2)
1.3 Common Language Runtime–User and Program Interfaces – .NET Languages (K2, K3)
1.4 Benefits of the .NET Approach – Simple C# Program – Namespaces (K3, K4)
1.5 Providing Interactive Input – Literals, Variables and Data Types (K5,K2)
1.6 Decision Making and Branching Statements. (K3, K5)

Unit II **Hours: 14**

2.1 Decision Making and Looping Statements – Methods in C# (K3, K4)
2.2 Declaring Methods – Invoking Methods – Nesting of Methods (K2, K3)
2.3 Method Parameters – Pass by Value – Pass by Reference – Output Parameters (K2)
2.4 Method Overloading – One Dimensional Array – Creating an Array – Two Dimensional Arrays (K3, K4)
2.5 Array List Class – Manipulating Strings – Creating Strings – String Methods (K5, K6)
2.6 Inserting strings – Comparing Strings – Finding Substrings – Array of Strings. (K5)

Unit III **Hours: 11**

3.1 Classes and Objects – Defining a Class – Adding variables and methods (K1, K3)
3.2 Creating objects – Constructors – Member Initialization – this Reference (K2, K4)
3.3 Nesting of Classes–Indexers –Classical Inheritance –Containment Inheritance (K4, K5)
3.4 Defining a subclass – Defining Subclass Constructors – Multilevel Inheritance – Hierarchical Inheritance (K3)
3.5 Overriding Methods – Defining an interface – Implementing interfaces (K4, K5)
3.6 Interface and Inheritance – Explicit interface implementation. (K6)

Unit IV **Hours: 12**

4.1 Need for Operator Overloading – Defining Operator Overloading (K3, K4)
4.2 Overloading Binary Operators – Overloading Comparison Operators (K5)
4.3 Delegate Declaration – Delegate Methods – Delegate Instantiation (K2, K4)
4.4 Delegate Invocation – Using Delegate – Events – Exceptions (K2, K3)
4.5 Types of errors – Multiple Catch Statements – Exception Hierarchy (K3)
4.6 General Catch Handler – Using Finally Statement. (K3, K4)

Unit V **Hours: 10**

5.1 Creating Window Forms (K3, K4)
5.2 Customizing a Form (K2, K3)
5.3 Creating a Windows Application (K5)
5.4 Running a Windows Application (K3, K4)
5.5 Creating Web based Application on .NET (K3, K4)
5.6 Creating a .NET application to send SMS to mobile phones. (K2, K3)

Books for Study:

1. E. Balagurusamy, "Programming in C#", Fourth Edition, Tata McGraw Hill Education, 2017.

Books for Reference:

1. Herbert Schildt, "Complete Reference C#", Tata McGraw-Hill, 2010.
2. John Sharp, "Microsoft Visual C# Step by Step", Eighth Edition, PHI Publications, 2016.
3. Harsh Bhasin, "Programming in C#", First Edition, Oxford University Press, 2014.

OER:

1. https://www.w3schools.com/cs/
2. https://docs.microsoft.com/en-us/dotnet/csharp/getting-started/introduction-to-the-csharp-language-and-the-net-framework
3. https://www.homeandlearn.co.uk/csharp/csharp.html
4. https://dotnet.microsoft.com/languages

SEMESTER IV

UCCAO20 – PRACTICAL V: LINUX

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / IV	UCCAO20	Practical V: Linux	Practical	Practical	3	2	40+60

COURSE OBJECTIVES

1. To Provides the skills in Linux Shell Script

2. To learn programmatically to implement simple OS mechanisms.
3. To understand shell script in files
4. To learn about standard I/O and system calls.
5. To learn suspending and resuming process.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Become familiar with the C language, gcc compiler, and make files to understand the high-level structure of the Linux kernel.
2. Understand the high-level structure of the Linux kernel both in concept and source code.
3. Acquire a detailed understanding of one aspect (the scheduler) of the Linux kernel
4. To learn to develop software for Linux systems.
5. To obtain a foundation for an advanced course in operating systems.

CO/PO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	L	M	L	M	M	L
CO2	H	M	M	L	L	M
CO3	M	H	M	M	L	M
CO4	L	M	L	M	M	L
CO5	L	L	H	M	M	L

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	H	H	M	H
CO2	L	H	L	L	M	L
CO3	M	H	M	L	L	M
CO4	H	L	H	H	L	M
CO5	H	M	L	H	M	M

Practical Programs: **Hours: 40**

1. Write a shell script that accepts a file name, starting and ending line numbers as

arguments and displays all the lines between the given line numbers.

2. Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.
3. Write a shell script to find the factorial of a given number.
4. Write a C program that makes a copy of a file using standard I/O and system calls.
5. Implement in C the following Linux commands using system calls:
    a. (a) cat (b) ls (c) mv .
6. Write a C program to list every file in a directory, its inode number and file name.
7. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: ls -l | sort.
8. Write a C program that illustrates suspending and resuming processes using signals.
9. Write a C program that implements a producer-consumer system with two processes (using semaphores).
10. Write a C program that illustrates two processes communicating using shared memory.

SEMESTER IV

UCCAP20 - PRACTICAL VI: .NET

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II / IV	UCCAP20	Practical VI: .NET	Practical	Practical	3	2	40+60

COURSE OBJECTIVES

1. Understand code solutions and compile C# projects within the .NET framework.
2. Design and develop professional Console and Window based .NET application.
3. Demonstrate knowledge of object-oriented concepts design user experience and functional requirements C#.NET application.
4. Understand and implement string manipulation, events and exception handling within .NET application environment.
5. Identify and resolve problems in C#.NET window based application.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand code solutions and compile C# projects within the .NET framework.
2. Create user interactive web pages using .NET.
3. To develop, implement and creating Applications with C#.
4. Debug, compile, and run a simple application.

5. Create Mobile Application using .NET compact Framework

CO/PO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	L	M	M	L	M
CO2	L	M	L	M	L	H
CO3	M	M	H	H	M	L
CO4	H	M	L	M	L	M
CO5	M	L	M	L	L	H

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	H	M	H	H	M
CO2	L	M	H	H	M	L
CO3	H	M	M	H	M	H
CO4	L	H	M	H	L	H
CO5	H	H	H	L	M	M

Low - L, Medium - M, High – H

Practical Programs: **Hours: 40**

1. Program using Decision Statements.
2. Program using Iteration Statements.
2. Program using Method Overloading.
3. Program using One Dimensional and Two Dimensional Arrays.
4. Program using Strings.
5. Program using Classes and Objects.
6. Program using Constructors.
7. Program using Inheritance.
8. Program using Binary Operator Overloading.
9. Program using Exception Handling with Multiple Catch Statements.
10. Designing a Windows Application using Window Forms.
11. Creating a .NET application to send SMS to Mobile Phones using Web.

SEMESTER V

UCCAQ20 -Relational Database Management Systems

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / V	UCCAQ20	Relational Database Management Systems	Theory	Core	5	3	40+60

COURSE OBJECTIVES

1. The objective of this course is to expose the students to the fundamentals & basic concepts in relational Data Base Management Systems.
2. This course discusses architecture of Database Systems with concept of relational model & ER model.
3. This course explains techniques for database design, Normalization and database recovery and protection.
4. To understand and apply database normalization principles.
5. To analyze the database transaction management, database recovery, security.

COURSE LEARNING OUTCOMES (CLOS)

The Learners will be able to

1. Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS
2. Write the SQL commands to create tables and Triggers, insert/update/delete data, and query data in a relational DBMS.
3. Analyze and Design a database based on a data model considering the normalization to a specified level.
4. Apply the storage size of the database and design appropriate storage techniques.
5. Analyze the requirements of transaction processing, concurrency control Analyze and XML Structure

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	H	H
CO2	L	H	L	M	L	M
CO3	L	M	M	H	L	M
CO4	L	H	L	M	H	M
CO5	M	L	M	H	M	H

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	H	L	H	L

CO2	L	M	L	H	M	H
CO3	M	H	L	H	L	H
CO4	L	M	H	H	M	L
CO5	M	H	M	H	H	M

Low - L, Medium - M, High - H

COURSE SYLLABUS

Unit I: **Hours: 15**

1.1 File System vs. DBMS Database System Applications (K1)
1.2 View of Data Database language - Data Storage & Querying (K1)
1.3 Data Architecture - Database Users and Administrators (K1, K2)
1.4 Relational Model - Structure of Relational Databases (K3)
1.5 Database Schemas -Relational Query Languages (K2)
1.6 Relational Operations. (K3)

Unit II: **Hours: 15**

2.1 Introduction to SQL:SQL Data Definition Basic Structure (K1)
2.2 Additional Basic Operations - Set Operations (K3)
2.3 Aggregate Functions - Null Values - Nested Sub queries (K1)
2.4 Modification of the Database; Intermediate SQL Join Expressions (K4)
2.5 Views Transactions - Integrity Constraints (K3)
2.6 SQL Data Types and Schemas -Advanced SQL Triggers.(K1)

Unit III: **Hours: 15**

3.1 Database Design and the E_R Model :Entity Relationship Model (K1)
3.2 Constraints Removing - Redundant Attributes ER Diagrams (K2)
3.3 Reduction to Relational Schemas - ER Design Issues - Extended ER Features (K1)
3.4 Alternative Notations for Modeling Data; (K1)
3.5 Functional Dependencies (K2)
3.6 Normalization using Functional Dependencies (K4)

Unit IV: **Hours: 15**

4.1 Storage and File Structure: Overview of Physical Storage Media (K1)
4.2 Magnetic disks - File Organization (K2)
4.3 Organization of records in Files (K3)
4.4 Data Dictionary (K2)
4.5 Storage Ordered Indices (K3)
4.6 B+ Tree Index Files. (K2)

Unit V: **Hours: 15**

5.1 Distributed Databases : Homogeneous and Heterogeneous Databases (K2)
5.2 Distributed Data Storage (K1)
5.3 Distributed Transactions - Commit - Protocols -Concurrency Control (K3)
5.4 Object Based Databases (K1)
5.5 Complex Data types - Structured Types and Inheritance in SQL (K3)
5.6 Object identity and ReferenceTypes in SQL (K2)

Book for Study:

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2010.

Books for Reference:

1. R Elmasri, S.B. Navathe - "Fundamentals of Database Systems", Seventh Edition - Pearson Education/Addison Wesley, 2011.
2. C.J.Date, A. Kannan and S.Swamynathan - "An Introduction to Database System", Eighth Edition - Pearson Education, 2006

OER:

1. http://freecomputerbooks.com/dbCategory.html
2. http://www.freebookcentre.net/Database/dbCategory.html

SEMESTER V

UCCAS20 - Mobile Application Development

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / V	UCCAS20	Mobile Application Development	Theory	Core	4	3	40+60

COURSE OBJECTIVES

1. To study about the android architecture and the tools for developing android applications.
2. To create an android application.
3. To learn about the user interfaces used in android applications.
4. To learn about how to handle and share android data.
5. To learn about how to develop an android services and to publish android application for use.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understanding of Android and Android SDK and know about its development environment. Recognize the architecture of Android and its tools. Analyze Eclipse and Android Development Tools(ADT).

2. Understanding of the specific requirements, possibilities and challenges when developing for a mobile context.
3. Understanding of the interaction between user interface and underlying application infrastructure.
4. Define to plan and carry out a design work including developing a prototype that can be evaluated with a specified user group.
5. Develop practical skills and knowledge to construct software for a mobile application and the ability to reflect over possibilities and demands in collaborative software development.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	M	M	L	H	M
CO2	H	L	L	M	M	L
CO3	L	M	L	H	M	H
CO4	M	H	M	M	L	M
CO5	L	M	L	L	H	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	H	H	M	H
CO2	L	H	M	H	H	H
CO3	H	L	M	H	L	M
CO4	H	M	L	M	H	H
CO5	M	H	H	L	H	H

Low - L, Medium - M, High – H

COURSE SYLLABUS

Unit I **Hours: 15**

1.1 Introduction- Android-Android Versions - Features of Android (K1)
1.2 Architecture of Android Obtaining the Required Tools-Android SDK (K2)
1.3 Installing the Android SDK Tools Configuring the Android SDK Manager –Eclipse (K2)
1.4 Android Development Tools (ADT)-Creating Android Virtual Devices (AVDs)-Creating Your First Android Application (K5)
1.5 Types of Android Application (K2)
1.6 Anatomy of an Android Application.(K2)

Unit II **Hours: 15**

2.1 Activities, Fragments and Intents-Understanding Activities (K2)
2.2 Linking Activities Using Intents (K1)
2.3 Fragments-Adding Fragments Dynamically-Life Cycle of a Fragment (K1, K2)
2.4 Interactions between Fragments-Calling Built-In Applications Using Intents (K1)

2.5 Understanding the Intent Object-Using Intent Filters (K2)
2.6 Adding Categories-Displaying Notifications.(K3)

Unit III **Hours: 15**

3.1 Android User Interface-Understanding the Components of a Screen(K1, K3)
3.2 Adapting to Display Orientation (K2)
3.3 Managing Changes to Screen Orientation(K2)
3.4 Utilizing the Action Bar (K3)
3.5 Creating the User Interface Programmatically (K5)
3.6 Listening for UI Notifications. (K4)

Unit IV **Hours: 15**

4.1 Databases-Content Providers and Messaging-Saving and Loading User Preferences (K1, K3)
4.2 Persisting Data to Files(K2)
4.3 Creating and Using Databases-Content Providers (K2)
4.4 Sharing Data in Android-Using a Content Provider-Creating Your Own Content (K2, K3)
4.5 Providers-Using the Content Provider (K4)
4.6 Messaging-SMS Messaging-Sending E-mail. (K2)

Unit V **Hours: 15**

5.1 Android-lifecycle:activity-lifecycle (K1, K2)
5.2 Life cycle concepts (K2)
5.3 lifecycle callbacks-onCreate()-onStart()-onResume()-onRestart()(K1, K2)
5.4 onPause()-onStop()-onDestroy()(K1, K2)
5.5 ios lifecycle – (K5)
5.6 Deployment methodologies (K5)

Book for Study:

1. Wei Meng Lee, "Beginning Android 4 Application Development", John Wiley & Sons Inc,1st Edition Inc, 2012.
2. Reto Meier, "Professional Android 4 Application Development", John Wiley & Sons Inc, 1st Edition, 2012.

Books for Reference:

1. ZigurdMednieks, Laird Dornin, Blake Meike G, and Masumi Nakamura, "Programming Android", O'Reilly Inc, 2nd Edition, 2012.
2. OnurCinar, "Android Apps with Eclipse", Apress, Springer (India) Private Limited, 2nd Edition, 2012.

OER:

1. http://devcloper.android.com/training/basics/firstapp/index.html
2. www.vogella.com/articles/Android/article.html
3. https://hackernoon.com/applicationlifecycleinios12b6ba6af78b

4. https://www.tutlane.com/tutorial/ios/ioslifecyclearchitecture
5. https://developer.android.com/guide/components/activities/activitylifecycle

SEMESTER V

UECAC20 - Elective I C: Object Oriented Analysis and Design

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / V	UECAC20	Elective I C: Object Oriented Analysis and Design	Theory	Core	5	3	40+60

COURSE OBJECTIVES

1. Understand the importance and basic concepts and of object oriented modeling.
2. To understand the Object-based view of Systems
3. To develop robust object-based models for Systems
4. Specify, analyze and design the use case driven requirements for a particular system.
5. Identify, Analyze the subsystems, various components and collaborate them interchangeably Model the event driven state of object and transform them into implementation specific layouts.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Analyse, design, document the requirements through use case driven approach.
2. Identify, analyse, and model structural and behavioural concepts of the system.
3. Develop, explore the conceptual model into various scenarios and applications.
4. Apply the concepts of architectural design for deploying the code for software.
5. Apply the Testing Strategies and Debugging Principles for measuring the User Satisfaction

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	M	H
CO2	L	H	M	M	L	M
CO3	H	M	M	L	M	L
CO4	M	H	M	L	H	L
CO5	M	L	L	H	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	H	H	L	M
CO2	H	H	M	L	H	H

CO3	M	L	M	H	H	M
CO4	M	H	H	M	H	L
CO5	L	M	H	M	H	H

Low - L, Medium - M, High – H

COURSE SYLLABUS

Unit I **Hours: 15**

1.1 System Development (K1, K2)
1.2 Object Basics (K1, K2)
1.3 Development Life Cycle (K1, K2, K3)
1.4 Methodologies - Patterns (K1, K2, K3, K4)
1.5 Frameworks (K1, K2, K3, K4)
1.6 Unified Approach - UML. (K1, K2, K3, K4)

Unit II **Hours: 15**

2.1 Use-Case Models (K1, K2, K3)
2.2 Object Analysis (K1, K2, K3, K4)
2.3 Object relations (K1, K2, K3, K4)
2.4 Attributes - Methods (K1, K2, K3)
2.5 Class and Object responsibilities (K1, K2)
2.6 Case Studies (K1, K2, K3, K4)

Unit III **Hours: 15**

3.1 Design Processes (K1, K2, K3)
3.2 Design Axioms (K1, K2)
3.3 Class Design (K1, K2, K3)
3.4 Object Storage (K1, K2)
3.5 Object Interoperability (K1, K2, K3)
3.6 Case Studies. (K1, K2, K3, K4)

Unit IV **Hours: 15**

4.1 User Interface Design (K1, K2, K3)
4.2 View layer Classes (K1, K2, K3)
4.3 Micro-Level Processes (K1, K2, K3)
4.4 Micro-Level Processes (K1, K2, K3)
4.5 View Layer Interface (K1, K2)
4.6 Case Studies (K1, K2, K3, K4)

Unit V **Hours: 15**

5.1 Quality Assurance Tests (K1, K2)
5.2 Testing Strategies - Object orientation on testing (K1, K2, K3, K4)

5.3 Test Cases – Test Plans - Continuous testing (K1, K2, K3, K4)
5.4 Debugging Principles (K1, K2
5.5 System Usability - Measuring User Satisfaction (K1, K2, K3, K4)
5.6 Case Studies (K1, K2, K3, K4)

Book for Study:

1. Ali Bahrami, Reprint 2009, Object Oriented Systems Development, Tata McGraw Hill International Edition.

Book for Reference:

1. Roger S.Pressman, 2010, Software Engineering A Practitioner's approach, Seventh Edition, Tata McGraw Hill, New Delhi.
2. Rumbaugh, Blaha, Premerlani , Eddy, Lorensen, 2003, Object Oriented Modeling and design , Pearson education, Delhi.

OER:

1. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_system.htm
2. https://warin.ca/ressources/books/2015_Book_Object-OrientedAnalysisDesignA.pdf
3. https://zjnu2017.github.io/OOAD/reading/Object.Oriented.Analysis.and.Design.with.Applications.3rd.Edition.by.Booch.pdf

SEMESTER V

UCCAT20 - Practical - VII: RDBMS

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / V	UCCAT20	Practical - VII: RDBMS	Practical	Core	3	2	40+60

COURSE OBJECTIVES

1. The objective of this course is to expose the students to the fundamentals & basic concepts in relational Data Base Management Systems.
2. To identify the basic concepts and various data model used in database design
3. To analyze various aggregate functions using SQL commands.
4. To use an SQL interface of a relational DBMS package to create, populate, maintain, and query a database.
5. To apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression from queries.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand, Appreciate and effectively explain the underlying concepts of Database technologies. Programming PL/SQL including stored procedures, stored functions, cursors, packages.
2. Attain a good practical understanding of the Oracle.
3. Design and implement a database schema for a given problem-domain.
4. Construct a query using SQL DDL, DML, and DCL Commands.
5. Prepare various database tables and joins them using SQL commands. Analyze various aggregate functions using SQL commands
6. Design and develop front end tool VB .NET to design forms, and select, insert, delete, update using Data Source Binding.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	M	M	M
CO2	L	H	M	M	M	L
CO3	L	L	M	L	M	M
CO4	M	H	M	M	H	L
CO5	M	L	M	H	M	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	H	M	M	H	L
CO2	M	M	H	H	M	M
CO3	H	L	H	L	H	H
CO4	M	H	H	H	L	M
CO5	M	H	L	H	H	L

Low -L, Medium -M, High-H

Practical Program **Hours: 40**

1. Creating data base tables and using data types. Create table Modify table Drop table
2. Practical Based on Data Manipulation Adding data with Insert Modify data with Update Deleting records with Delete
3. Practical Based on Implementing the Constraints NULL and NOT NULL Primary Key and Foreign Key Constraint Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses Simple select clause Accessing specific data with Where Ordered By Distinct and Group By
5. Practical Based on Aggregate Functions AVG -COUNT - MAX -MIN -SUM – CUBE

6. Practical Based on implementing all String functions and Date and Time Functions, union, intersection, set difference.
7. Implement Nested Queries & JOIN operation.
8. Practical Based on implementing use of triggers, cursors & procedures.
9. Make Database connectivity with front end tool VB and Oracle as back end perform Insertion, Deletion and Updation for the following:
    - Staff Information System
    - Electricity Bill Processing System

SEMESTER V

UCCAU20 - Practical VIII: Mobile Application Development

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / V	UCCAU20	Practical IX: Mobile Application Development	Practical	Core	2	2	40+60

COURSE OBJECTIVES

1. To introduce students to the concept of basic programming- thereby reducing the design complexity and reusability of a component.
2. To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
3. To understand how to work with various mobile application development frameworks.
4. To learn the basic and important design concepts and issues of development of mobile applications.
5. To understand the capabilities and limitations of mobile devices.

COURSE LEARNINNG OUTCOMES

The Learners will be able to

1. Establishing the development environment
2. Implementing the layout to add action bar
3. Understanding the interfaces using views , menus and notification
4. Apply and learn multiple screens to emulate android application
5. Perform basic interaction with application.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	M	L	H	H	L
CO2	M	H	L	M	M	M

CO3	L	M	M	H	M	M
CO4	M	L	M	M	H	L
CO5	M	L	M	H	H	M

CO/PSO	**PSO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	H	L	L	M	H
CO2	H	M	H	H	M	L
CO3	H	M	H	H	L	M
CO4	M	L	H	L	H	H
CO5	H	H	M	L	H	H

Low -L, Medium -M, High-H

Practical Program: **Hours: 40**

1. Creating a simple “Hello World” application
2. Adding an action bar to android app to make application interactive
3. Build user interfaces using Views, Menus and Notifications
4. Handle file operations in Android application program.
5. Build an android application with multiple screens.
6. Learning Android Emulator to emulate android apps on various devices.
7. Use of Intents to perform basic interaction with apps.
8. Using Android styles and themes to make application.

SEMESTER VI

UCCAV20 - INTERNET AND WEB PROGRAMMING

Year /Sem	**Course Code**	**Title of the Course**	**Course Type**	**Course Category**	**H/W**	**Credits**	**Marks**
III / VI	UCCAV20	Internet and Web Programming	Theory	Core	4	3	40+60

COURSE OBJECTIVES

1. Enhance the programming experience with the help of tools like editors and debuggers that makes JavaScript coding easier and more interactive.
2. Understand the concepts commonly used in dynamic language programming such as higher-order functions and closures.
3. Understand the server-side programming works on the web.
4. Develop dynamic and interactive web pages using the powerful tool and server scripting language like PHP.
5. Understanding File handling concepts to connect, access, and update a MySQL database.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Acquire the basic concept of JavaScript**.**
2. Use operators, variables, arrays, control structures, functions and objects in JavaScript.
3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
4. Design a responsive web site using HTML, PHP, MySQL and Apache.
5. Students will be able to build dynamic web pages using JavaScript (Client Side Programming) and apply their knowledge to create interactive websites.

CO/PO	**PO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	L	H	M	M	L
CO2	L	M	M	L	M	L
CO3	M	M	M	M	L	H
CO4	L	M	M	H	M	L
CO5	M	M	M	L	H	M

CO/PSO	**PSO**					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	M	M	M	H
CO2	L	H	L	H	M	L
CO3	M	H	M	L	L	M
CO4	H	L	H	L	L	M
CO5	M	H	L	H	M	M

Low - L, Medium - M, High – H

COURSE SYLLABUS

Unit I: JAVA SCRIPT **Hours: 15**

1.1 Introduction - Values - Numbers - Strings - Unary Operators. (K1, K2)

1.2 Boolean Values - Empty Values - Automatic Type Conversion. (K2)
1.3 Program Structure: Expressions and Statements- Bindings - Binding Names - The Environment. (K2, K3)
1.4 Functions - The Console Log Function - Return Values - Control Flow - Conditional Execution - While and Do Loops. (K2, K3)
1.5 Indenting Code - For Loops - Breaking out of a Loop - Updating Bindings Succinctly. (K2, K3)
1.6 Dispatching on a Value with Switch – Capitalization – Comments. (K3)

Unit II **Hours: 15**

2.1 Functions - Bindings and Scopes - Functions as Values. (K2)
2.2 Declaration Notation - Arrow Functions - The Call Stack. (K2, K3, K4
2.3 Optional Arguments - Closure – Recursion - Growing Functions. (K3, K4)
2.4 Data Structures: Objects and Arrays: The Were Squirrel - Data Sets – Properties – Methods – Objects. (K3, K4)
2.5 Mutability - The Lycanthrope's Log - Computing Correlation - Array Loops - The Final Analysis - Further Arrayology - Strings and their Properties. (K2, K3, K4, K5)
2.6 Rest Parameters - The Math Object - Destructuring – JSON. (K2, K3, K4)

Unit III: PHP PROGRAMMING **Hours: 15**

3.1 Web Server – Apache - PHP Introduction - PHP Install - PHP Syntax - PHP Variables. (K1, K2)
3.2 PHP Echo / Print - PHP Data Types - PHP Strings - PHP Constants - PHP Operators. (K1, K2)
3.3 Control Structures - PHP Functions - Directory Functions - File System Functions. (K2, K3)
3.4 PHP Arrays - PHP Sorting – Arrays - PHP - Super Global. (K3, K4)
3.5 String Functions - Date and Time Functions. (K1,K2, K3, K4)
3.6 Mathematical Functions - Miscellaneous Functions. (K3, K4)

Unit IV **Hours: 15**

4.1 Basic Form Processing (GET And POST Method) - PHP Form Handling. (K1, K2)
4.2 PHP Form Validation - PHP Form Required– URL - E-Mail. (K1, K2)
4.3 PHP Form Complete PHP MYSQL Functions -Connect- Create DB. (K4, K6)
4.4 Create Table- Insert Data - Get Last ID - Insert Multiple. (K3, K4, K5)
4.5 Prepared-Select Data - Delete Data - Update Data - Limit Data. (K3, K4, K5)
4.6 Table Join - Database Driven Application. (K3, K4)

Unit V **Hours: 15**

5.1 PHP Arrays Multi-PHP Date and Time - PHP Include. (K2, K3)
5.2 PHP File Handling- PHP File Open/Read. (K3)
5.3 PHP File Create/Write - PHP File Upload-PHP Cookies. (K4, K5)
5.4 PHP Sessions-PHP Filters - PHP Filters Advanced. (K4)
5.5 PHP Error Handling - PHP Exception. (K4, K5)
5.6 COM-DOM-CURL-SOAP. (K5, K6)

Books for Study:

1. MarijiHaverbeke, “Eloquent Javascript, A Modern Introduction to Programming”, Third Edition,Published by No Starch Press, 2018.
2. Julie C Meloni, Sams “Teach yourself PHP, MySQL and Apache”, 6th edition, Sams Publishing, 2012.

Books for Reference:

1. Phil Ballard , JavaScript in 24 Hours, 6th Edition, Sams Teach Yourself, 2015.
2. Ed LeckyThompson Steven D. Nowicki Thomas Myer, “Professional PHP6”, Wrox Press, Paperback Edition, 2011.

OER:

1. https://www.google.com/url?sa=t&source=web&rct=j&url=https://eloquentjavascript.net/Eloquent_JavaScript.pdf&ved=2ahUKEwjEhbu95qnrAhVo8XMBHb4VBXEQFjAQegQIDBAB&usg=AOvVaw1_3Ap2aatDU0qxPmbiCRbI&cshid=1598184133112

SEMESTER VI

UCCAW20 - Data Mining

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / VI	UCCAW20	Data Mining	Theory	Core	5	3	40+60

COURSE OBJECTIVES

1. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.
2. To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
3. To develop research interest towards advances in data mining
4. To impart the knowledge of how Data Mining could be used to solve scientific and social problems.
5. To expose to various Data Mining techniques

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand Data Warehouse fundamentals and Data Mining Principles
2. Understand and implement classical algorithms in data mining and identify the application area of algorithms.

3. Compare and evaluate different data mining techniques like, prediction, clustering and association rule mining
4. Describe complex data types with respect to spatial and web mining.
5. Analyze the temporal mining techniques to detect patterns in the e-world.

CO/PO	PO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	M	L	L	H	L	M
CO2	H	M	M	L	L	H
CO3	M	L	M	M	L	M
CO4	L	M	L	M	M	L
CO5	H	L	L	M	H	L

CO/PSO	PSO					
	1	**2**	**3**	**4**	**5**	**6**
CO1	H	L	M	L	M	H
CO2	L	M	L	M	M	L
CO3	M	H	M	L	L	M
CO4	L	L	H	M	L	M
CO5	H	L	L	H	M	L

Low – L, Medium – M, High - H

COURSE SYLLABUS

Unit I **Hours: 14**

1.1 Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery In Databases (K1, K2)
1.2 Data Mining Issues – Social Implications of Data Mining (K2)
1.3 Data Mining from A Database Perspective. Data Mining Techniques: Introduction – A Statistical Perspective on Data Mining (K2, K3)
1.4 Similarity Measures (K1, K2, K3)
1.5 Decision Trees (K2, K3)
1.6 Neural Networks – Genetic Algorithms. (K1, K2, K3)

Unit II **Hours: 13**

2.1 Classification: Introduction (K1, K2, K3)
2.2 Statistical – Based Algorithms (K2, K3, K5)
2.3 Distance- Based Algorithms (K2, K3, K5)
2.4 Decision Tree- Based Algorithms (K2, K3, K5)

2.5 Neural Network – Based Algorithms (K2, K3, K5)
2.6 Rule-Based Algorithms (K2, K3, K5)

Unit III **Hours: 15**

1.1 Clustering: Introduction – Similarity and Distance Measures – Outliers (K2, K3, K5)
1.2 Hierarchical Algorithms – Partitional Algorithms (K3, K4, K5)
1.3 Association Rules: Introduction - Large Item Sets – Basic Algorithms (K2, K3, K5)
1.4 Parallel and Distributed Algorithms (K2, K3, K5)
1.5 Comparing Approaches – Incremental Rules (K3, K5, K6)
1.6 Advanced Association Rules Techniques – Measuring the quality of Rules (K3, K5)

Unit IV **Hours: 15**

4.1 Web mining: Introduction – Web content Mining Crawlers (K2, K3)
4.2 Web Structure Mining (K2, K3)
4.3 Web Usage Mining (K2, K3)
4.4 Spatial Mining: Overview – Primitives (K2, K3, K5)
4.5 Generalization and specialization (K2, K3, K5)
4.6 Spatial Rules- Spatial Classification Algorithm. (K2, K3, K5)

Unit V **Hours: 12**

5.1 Temporal Mining: Introduction (K2)
5.2 Modeling temporal events (K2, K3)
5.3 Time series (K2, K3, K5)
5.4 Pattern detection (K2, K3, K4, K5, K6)
5.5 Sequences (K2, K3, K5, K6)
5.6 Temporal Associations Rules (K2, K3, K5)

Books for Study:

1. Margaret H.Dunham - "Data Mining: Introductory and Advanced Topics", 1st Edition, Pearson Education 2012.
2. Jiawei Han and MichelineKamber - "Data Mining Concepts and Techniques" - Elsevier Fifth Edition, 2009.

Books for Reference:

1. Soumendra Mohanty - "Data Warehousing DesignDevelopment and best practices", First Edition, TataMcGraw Hill, 2005.
2. William H Inmon - "Building the Datas warehousing", Fourth Edition, Wiley India.
3. RajanChattamvelli"Data Mining Methods", Second Edition, Narosa Publishing House Pvt. Ltd. New Delhi, 2016

OER:

1. https://www.slideshare.net/akannshat/data-mining-15329899

2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
3. https://www.youtube.com/watch?v=f7NfO16l04U&list=PL8eNk_zTBST-gN6Y5E-5FZdARXjglYpyT

SEMESTER VI

UECAD20 - ELECTIVE – II A: CRYPTOGRAPHY

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / VI	UECAD20	Elective – II A: Cryptography	Theory	Elective	5	3	40 + 60

COURSE OBJECTIVES

1. To understand Cryptography Theories, Algorithms and Systems.
2. To understand necessary Approaches and Techniques
3. To build protection mechanisms in order to secure computer networks.
4. Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.
5. Understand vulnerability assessments and the weakness of using passwords for authentication.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Basic concepts of system level security.

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	L	M	M	L	L
CO2	M	M	L	H	L	L
CO3	H	L	M	L	M	M
CO4	L	M	L	M	L	M
CO5	H	L	M	M	L	L

CO/PSO	PSO

	1	2	3	4	5	6
CO1	H	L	H	L	M	H
CO2	L	H	L	H	M	L
CO3	M	L	M	L	H	M
CO4	H	L	M	M	L	M
CO5	H	L	L	H	M	L

Low – L, Medium – M, High – H

COURSE SYLLABUS

Unit I **Hours: 15**

1.1 Computer Security Concepts (K2)
1.2 The OSI Security Architecture (K2 K4)
1.3 Security Attacks - Security Services Security Mechanisms - A model for Network Security(K2)
1.4 Symmetric Cipher Model (K2, K4)
1.5 Substitution Techniques (K2, K5)
1.6 Transposition Techniques - Stenography.(K2, K5)

Unit II **Hours: 16**

1.1 Block Cipher Principles (K2, K3)
1.2 The DES - A DES example - The strength of DES(K2, K4)
1.3 Differential and Linear Cryptanalysis (K2)
1.4 Block Cipher Design Principles (K2, K4)
1.5 Divisibility and Division algorithms (K2, K4)
1.6 The Euclidean Algorithm - Modular Arithmetic.(K2, K4)

Unit III **Hours: 15**

3.1 Origin of AES - AES Structure (K2)
3.2 AES round function (K2, K4)
3.3 AES Key Expansion (K2)
3.4 AES Implementation. (K2, K3)
3.5 Multiple Encryption (K2, K3)
3.6 Triple DES (K2, K3)

Unit IV **Hours: 14**

4.1 Prime Numbers (K2, K3)
4.2 Fermat's and Euler's Theorem (K2, K3)
4.3 Testing for Primality (K2, K3)
4.4 The Chinese Remainder Theorem (K2, K4)
4.5 Principles of Public Key Cryptosystems(K2, K4)

4.6 The RSA Algorithm.K2, K3, K4)

Unit V **Hours: 12**

5.1 Diffie - Helman Key Exchange (K2, K3)
5.2 Digital Signatures (K2)
5.3 Symmetric Key Distribution Using Symmetric Encryption (K2, K4)
5.4 Symmetric Key Distribution Using Asymmetric Encryption (K2, K4)
5.5 Distribution of Public Keys (K2)
5.6 Kerberos.(K2)

Book for Study:

1. William Stallings, "Cryptography and Network Security Principles and Practices", Seventh Edition, Prentice Hall, 2017.
2. BehrouzA.Foruzan, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill 2007.

Book for Reference:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: "Cryptography and Network Security", First Edition, Wiley India Pvt.Ltd, 2011.
2. Sudha Sridhar , " Cryptography and Network Security", Charulatha Publications, 2013

OER:

1. https://faculty.nps.edu/dedennin/publications/Denning-CryptographyDataSecurity.pdf
2. https://www.youtube.com/watch?v=9X1rSWLFhLY&list=PL9FuOtXibFjV77w2eyil4Xzp8eooqsPp8

SEMESTER VI

UCCAX20 -Practical X: INTERNET AND WEB PROGRAMMING

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / VI	UCCAY20	Practical X: Internet and Web Programming	Practical	Core	3	2	40+60

COURSE OBJECTIVES

1. Comprehend the usage of PHP and JavaScript in dynamic web development.
2. Understand PHP language data types, logic controls, built-in and user-defined functions.

3. Describe Object oriented programming paradigm in PHP.
4. Understand user validation techniques and cookies.
5. Build a simple, yet functional web application using PHP/MySQL.

COURSE LEARNING OUTCOMES

The Learners will be able to

1. Know variable naming rules and JavaScript data types.
2. Use operators, variables, arrays, control structures, functions and objects in JavaScript.
3. Demonstrate objects and arrays usage
4. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
5. Validate user input and create cookies in PHP

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	M	L	M
CO2	L	H	M	M	L	M
CO3	H	L	L	M	M	L
CO4	M	M	M	M	H	L
CO5	M	L	M	L	M	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	L	M	H
CO2	L	H	L	H	M	L
CO3	M	M	M	L	H	M
CO4	H	L	H	M	L	M
CO5	H	M	L	H	M	L

Low -L, Medium -M, High-H

Practical Programs: **Hours: 40**

1. Implementing factorial of a number in JavaScript,
2. Animation in JavaScript.
3. Addition and Multiplication of two numbers in JavaScript.
4. Convert the first letter of each word of the sting toUppercase in JavaScript.

5. Implementing Arrays in JavaScript.
6. Implementing Control Statements and Looping in PHP.
7. Implementing Functions in PHP.
8. Implementing Form Processing (GET & POST) in PHP.
9. Implementing Validation in PHP.
10. Implementing Cookies in PHP.

SEMESTER VI

UCCAY20 - PROJECT WORK

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / VI	UCCAY20	Project Work	Practical	Core	3	2	40+60

The objective of the project is to enable the students to work in a project of latest topic.. Students have to do project throughout the semester in any application to gain practical knowledge of what they have studied in five semesters. Each student shall have a guide from the Department, the students are expected to complete the project and submit a fullfledged report comprising of the complete system developed along with implementation and test results. The submitted report will be evaluated by conducting project viva at the end of the semester. Their progress is monitored continuously to award the internal assessment marks.