ANNAMALAI UNIVERSITY

213 - BACHELOR OF COMPUTER APPLICATONS (BCA)

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges
in the academic year 2022 -2023 ONLY)

Course Code	Part	Study Components & Course Title	Hours/ Week	Credit	Maximum Marks		
					CIA	ESE	Total
		SEMESTER – I					
22UTAML11	I	Language Course - I : Tamil – I	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UBCAC13	III	Core Course – I: Programming in C	5	4	25	75	100
22UBCAC14		Core Course – II : Digital Computer Fundamentals	5	4	25	75	100
22UBCAP15		Core Practical – I :Programming in C Lab	3	2	40	60	100
22UMFOA01/ 22UMAFA01		Allied Course - I : Paper -1 Mathematical Foundations/ Mathematical Foundations-I	5	4	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
		Total	**30**	**22**			**700**
		SEMESTER – II					
22UTAML21	I	Language Course - II : Tamil - II	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UBCAC23	III	Core Course – III :C++ & Data Structures	4	3	25	75	100
22UBCAC24		Core Practical – II :C++ & Data Structures Lab	3	2	40	60	100
22USMAA02		Allied Course - I : Paper -2: Statistical Methods and their Applications	4	3	25	75	100
22UBCAE26		Internal Elective – I	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
22UNMSD01		Language Proficiency for Employability: EFFECTIVE ENGLISH	2	2	25	75	100
		Total	**30**	**21**			**900**

		SEMESTER – III					
22UTAML31	I	Language Course - III : Tamil -III	5	3	25	75	100
22UENGL32	II	English Course - III : English Through Literature-I	5	3	25	75	100
22UBCAC33	III	Core Course - IV :Java Programming	4	4	25	75	100
22UBCAP34		Core Practical – III :Java Programming Lab	4	2	40	60	100
22UCOMA19		Allied Course - II : Paper -1: Financial Accounting I	4	4	25	75	100
22UBCAE35		Internal Elective – II : 1. Management Information Systems 2. E-Commerce 3. Design & Analysis of Algorithms	3	3	25	75	100
22UBCAS36	IV	Skill Based Subject – I :Multimedia Systems	3	2	25	75	100
		Non-Major Elective – I	2	2	25	75	100
		Total	**30**	**23**			**800**
		SEMESTER – IV					
22UTAML41	I	Language Course - IV : Tamil-IV	5	3	25	75	100
22UENGL42	II	English Course - IV : English Through Literature-II	5	3	25	75	100
22UBCAC43	III	Core Course - V :Python Programming	3	3	25	75	100
22UBCAC44		Core Course - VI :Artificial Intelligence	3	2	25	75	100
22UBCAP45		Core Practical – IV :Python Programming Lab	3	2	40	60	100
22UCOMA20		Allied Course – II : Paper– 2: Financial Accounting II	4	3	25	75	100
22UBCAS46	IV	Skill Based Subject – II : Internet of Things	3	2	25	75	100
22UBCAN47		Non-Major Elective – II	2	2	25	75	100
22UNMSD02		**MS-Office Essentials**	**2**	**2**	25	75	100
			30	**22**			**900**

		SEMESTER – V					
22UBCAC51	III	Core Course – VII : RDBMS	4	4	25	75	100
22UBCAC52		Core Course – VIII : Operating System	5	4	25	75	100
22UBCAC53		Core Course – IX : Software Engineering	4	4	25	75	100
22UBCAC54		Core Course – X : Mobile Computing	4	4	25	75	100
22UBCAP55		Core Practical – V :RDBMS Lab	3	2	40	60	100
22UBCAP56		Core Practical – VI :Operating System Lab	3	2	40	60	100
22UBCAE58		Internal Elective – III : 1. Object Oriented Analysis and Design 2. Cryptography 3. Network Security	3	3	25	75	100
22UBCAS59	IV	Skill Based Subject – III : Data Communication Networks	3	2	25	75	100
22UGENS57		Gender Studies	1	1	25	75	100
		Total	**30**	**26**			**900**
		SEMESTER – VI					
22UBCAC61	III	Core Course – XI : PHP Programming	4	4	25	75	100
22UBCAC62		Core Course – XII : ASP.NET	4	4	25	75	100
22UBCAC63		Core Course – XIII : Cloud Computing	3	3	25	75	100
22UBCAC64		Core Course – XIV : Data Mining	3	3	25	75	100
22UBCAP65		Core Practical – VII :PHP Programming Lab	4	2	40	60	100
22UBCAP66		Core Practical – VIII :ASP.NETLab	4	2	40	60	100
22UBCAE68		Internal Elective – IV : 1. Digital Image Processing 2. Information Security 3. Software Project Management	3	3	25	75	100
22UBCAS69	IV	Skill Based Subject – IV : Big Data Analytics	3	2	25	75	100
22UNMSD03	**IV**	**Employability Readiness: Cyber Security**	**2**	**2**	25	75	100
22UEXTA67	**V**	**Extension Activities**		1	100	-	100
		Total	**30**	**26**			**1000**
		Grand Total	**180**	**140**			**5200**

INTERNAL ELECTIVE COURSES

22UBCAE26-1	Internal Elective - I	Computer Organization and Architecture
22UBCAE26-2		Computer Graphics
22UBCAE26-3		Internet and its Applications
22UBCAE35-1	Internal Elective - II	Management Information Systems
22UBCAE35-2		E-Commerce
22UBCAE35-3		Design and Analysis of Algorithms
22UBCAE58-1	Internal Elective - III	Object Oriented Analysis and Design
22UBCAE58-2		Cryptography
22UBCAE58-3		Network Security
22UBCAE68-1	Internal Elective - IV	Digital Image Processing
22UBCAE68-2		Information Security
22UBCAE68-3		Software Project Management

ALLIED COURSES

22UMFOA01	Theory	Mathematical Foundations
22UMAFA01	Theory	Mathematical Foundations-I
22USMAA02	Theory	Statistical Methods and their Applications
22UCOMA19	Theory	Financial Accounting I
22UCOMA20	Theory	Financial Accounting II

Non-Major Elective Courses (NME)

(Department of Computer Applications offers the following NME to other Departments)

22UBCAN37	Office Automation
22UBCAN47	Web Technology

Credit Distribution

Part	Study Components	Papers	Credits	Total Credits	Marks	Total Marks
Part I	Languages	4	3	12	100	400
Part II	Communicative English & English	4	3	12	100	400
Part III	Core Courses	14	4/3	50	100	1400
	Core Practical	8	2	16	100	800
	Allied Courses	4	4/3	14	100	400
	Internal Electives	4	3	12	100	400
Part IV	Environmental Studies	1	2	2	100	100
	Value Education	1	1	1	100	100
	Soft Skill	1	1	1	100	100
	Gender Studies	1	1	1	100	100
	Non Major Electives	2	2	4	100	200
	Skill Based Courses	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
Part VI	**SDC**	**3**	**2**	**6**	**100**	**300**
		52		**140**		**5200**

SEMESTER:I PART: III	22UBCAC13 : PROGRAMMING IN C	CREDIT: 4 HOURS: 5/W

COURSE OBJECTIVES

1) To understand simple algorithms
2) To understand language constructs
3) To understand and develop programming skills in C.
4) To understand the basic concepts of decision making and looping statements.
5) To understand the concepts of arrays , structures, union, pointers and files.

UNIT I :CONCEPT OF C PROGRAMMING **Hours:15**

History, Introduction of C programming language, Structure of C program, C character set, Data types, Variables, Constants, Keywords and Identifiers, Expression statements in C language, Operators (Arithmetic, Logical, Relational, Assignment etc.).

UNIT II: CONDITIONAL PROGRAM **Hours:15**

Execution, IF statement, IF…..ELSE statements nested IF…..ELSE and ELSE IF ladder. Program Loops and Iteration, WHILE loop, DO loop and FOR loop, Nested Loops, Use of break, continue and GOTO statements, Switch statement, use of break and default with switch, Storage Class in C language.

UNIT III: FUNCTIONS **Hours:15**

Built-In and User Defined functions, Function Declaration, Definition and Function Calling, Parameter Passing (Call by Value and Call by Reference), Recursion, Pointers, Macros.

UNIT IV: ARRAYS **Hours:15**

Definition of array, declaration, Linear Arrays, Multidimensional Arrays, Passing Array to function, String, string handling functions, Dynamic Memory Allocation.

UNIT V: STRUCTURE AND UNION **Hours:15**

Definition, Programs using Structure and Union, Difference between Structure and Union. File Handling: Opening and Closing data files, Read and Write Functions, different modes of files.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) The Student will be able to understand the concepts of Constants, Variables, and Data Types, Operators and Expressions
2) The Student will be able to understand the concepts of Managing Input and Output Operations, Decision Making and Branching, Decision Making and Looping.
3) The Student will be able to understand the concepts of Arrays, Character Arrays and Strings, User Defined Functions.

4) The Student will be able to understand the concepts of Structure and Unions, Pointers, File Management in C.
5) The Student will be able to understand the concepts of Fundamental Algorithms, Factoring Methods.

Text Books

1) Balaguruswamy E., TMH, "Programming in ANSI C".
2) Kanitkar Yashwant, BPB, "Let Us C".
3) Kanitkar Yashwant, BPB, "Working With C".

Supplementary Readings

1) Shaum's Series ,TMH, "Programming in C".
2) Forouzan, Thomson, Cengase, "Computer Science".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	3	1
CO3	3	3	3	3	2
CO4	1	3	2	2	1
CO5	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:I PART: III	22UBCAC14 : DIGITAL COMPUTER FUNDAMENTALS	CREDIT: 4 HOURS: 5/W

COURSE OBJECTIVES

1) Develop an understanding of digital circuit design and analysis.
2) Learn design techniques for working with digital electronic devices, and their application to solving problems.
3) Learn analysis skills to effectively report on the design, analysis and data of projects so that others can understand their methodology and results.
4) Become familiar with digital design, analysis and simulation tools.
5) Develop effective written communication skills using various media tools.

UNIT–I: NUMBER SYSTEM AND CODES Hours: 12

Decimal Numbers, Binary Numbers, Decimal to Binary Conversions, Binary Arithmetic, 1's and 2's complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed numbers, Hexadecimal Numbers, Octal Numbers, Digital Codes, Error Detection Codes.

UNIT–II: LOGIC GATES Hours :12

The Inverter, The AND gate, The OR gate, The NAND gate, NOR gate, The Exclusive–OR gate and Exclusive OR gate: Boolean Algebra and Logic Simplification-Boolean Operations and Expressions, Laws and Rules, De Morgan's Theorems, Boolean Expressions and Truth Tables, The Karnaugh Map, SOP minimizations.

UNIT - III: COMBINATIONAL LOGIC ANALYSIS Hours: 12

Basic combinational Logic Circuits, Implementing Combinational Logic, The Universal Property of NAND and NOR Gates. Functions of Combinational Logic - Basic Adder, Parallel Binary Adders, Comparators, Decoders, Encoders, Code Converters, Multiplexers, Parity Generator/Checkers.

UNIT–IV: LATCHES AND FLIP-FLOPS Hours : 12

Latches, Edge Triggered Flip-Flops, Flip-Flop Operating characteristics, Flip-Flop Applications, Registers, Counters.

UNIT–V: MEMORY AND STORAGE Hours: 12

Memory Basics, The RAM, The ROM, Programmable ROMs, The Flash Memory, Memory Expansion, Special Types of Memories, Magnetic and Optical Storage.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) Identify the logic gates and their functionality.
2) Perform number conversions from one system to anothersystem.
3) Design basic electronic circuits (combinationalcircuits).
4) Perform a comparative analysis of the components of different memoryUNITs.
5) Perform numberconversions.

Text Books

1) Floyd, Thomas L,1997, University Book Stall, 10thEdition"Digital Computer Fundamentals".

Supplementary Readings

1) Malvino, Paul Albert and Leach, Donald P, 2000,TMH, 4thEdition, "Digital Principles and Applications".
2) Malvino, Paul Albert and Leach, Donald P,1995,TMH, 3rd Edition, "Digital Computer Fundamentals".
3) Bartee, Thomas C,1995, TMH,6th Edition, "Digital Computer Fundamentals".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	3	1	3
CO2	1	2	2	2	1
CO3	3	2	3	3	2
CO4	1	3	2	2	1
CO5	1	3	2	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:I PART: III	22UBCACP15: PROGRAMMING IN C LAB	CREDIT: 2 HOURS: 3/W

COURSE OBJECTIVES

1) Apply the specification of syntax rules for numerical constants and variables, data types.
2) Usage of Arithmetic operator, Conditional operator, logical operator and relational operators and other C constructs.
3) Write C programs using decision making, branching, looping constructs
4) Apply and Write C programs to implement one dimensional and two dimensional arrays
5) Writing programs using functions

LIST OF EXPERIMENTS

1) Write a program to find the largest number and smaller number by using if statement
2) Write a program to convert the decimal to binary conversion by using while statement.
3) Write a program to count the positive, negative & zero numbers.
4) Write a program to check whether a given number is a prime or not.
5) Write a program to display the Fibonacci series.
6) Write a program to concatenate two strings without using string library function.
7) Write a program to count the number of vowels, consonants, and digits in a line of Text.
8) Write a program to reverse a String.
9) Write a program to design the calculator functions as
   a) Addition
   b) Subtraction &
   c) Multiplication function.
10) Write a program to find the factorial of a number using recursion.
11) Write a program for ascending order of given N Numbers.
12) Write a program to separate odd and even numbers using file.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) Read, understand and trace the execution of programs written in C language.
2) Write the C code for a given algorithm.
3) Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
4) Write programs that perform operations using derived data types.
5) Know concepts in problem solving

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	2	2	2	3	1
CO3	2	3	3	3	2
CO4	1	3	2	2	2
CO5	1	2	3	3	1

6) 1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER -I ALLIED- I	22UMFOA01: MATHEMATICAL FOUNDATIONS	HRS/WK – 5 CREDIT – 4

COURSE OBJECTIVES:

To learn how to apply fundamental mathematical tools and techniques used in most fields of science and mathematics

UNIT–I: LOGICAL OPERATORS **Hours: 15**

Conjunction, disjunction, negation, conditional and bi-conditional operators, converse, inverse, contra-positive, logically equivalent, tautology and contradiction, arguments and validity of arguments.

UNIT-II: SET THEORY **Hours:15**

Set theory-Definitions, Types of sets, Operations on set theory, Relations - equivalance relation, partially ordered set, partition of set and Functions. (Simple problems without theorems).

UNIT –III: PERMUTATION AND COMBINATION **Hours:15**

Binary operations, types of binary operations, Permutation and Combination (simple problems).

UNIT –IV: MATRICES **Hours:15**

Types of matrices, operations on matrices, simple problems, singular and non-singular matrices, adjoint of a matrix, inverse of a matrix, symmetric and skew-symmetric, Hermitian and skew-Hermitian, orthogonal and UNITary matrices, Consistency of a system of linear equations using Rank method.

UNIT –V: MATRIX THEORY (CONTD….) **Hours:15**

Characteristic roots and characteristic vectors, Cayley-Hamilton theorem - finding inverse of a square matrix and verification of Cayley-Hamilton theorem.

TEXT BOOK:

1. "Mathematical Foundations", P.R.Vittal (2003), Margham Publications, Chennai.

UNIT-I: Chapter 1 (Pages: 1.1 -1.50),

UNIT-II: Chapter 2 &3&4 (Pages: 2.1- 2.38 &3.1 -3.25 & 4.1-4.35),

UNIT-III: Chapter 6 & 7(Pages: 6.1 -6.10 & 7.1-7.53),

UNIT-IV: Chapter 8 (Pages: 8.1 to 8.97),

UNIT-V: Chapter 8 &9 (Pages: 8.97-8.140).

SUPPLEMENTARY READINGS:

1. Schaum's outlines, Seymour Lipschutz & Marc Lipson, Tata McGraw-Hill, Second edition,**"**Discrete Mathematics".
2. B.S. Vatssa, Wishwa Prakashan, "Discrete Mathematics".

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	1	2	2	3	1
CO3	3	3	3	2	2
CO4	1	2	3	2	2
CO5	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER -I ALLIED- I	22UMAFA01: MATHEMATICAL FOUNDATIONS – I	HRS/WK – 5 CREDIT – 4

COURSE OBJECTIVES

To know about Logical operators, validity of arguments, set theory and set operations, relations and functions, Binary operations, Binary algebra, Permutations & Combinations, Differentiation, Straight lines, pair of straight lines, Circles, Parabola, Ellipse, Hyperbola.

To learn how to apply fundamental mathematical tools and techniques used in most fields of science and mathematics.

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venn diagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions, Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets, Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION Simple problems using standard limits,

$$\lim_{x\to a}\frac{x^n-a^n}{x-a}\,,\lim_{x\to 0}\frac{\sin x}{x}\,,\lim_{x\to 0}\frac{\tan x}{x}\,,\lim_{x\to 0}\frac{e^x-1}{x}\,,\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n\,,\lim_{n\to 0}(1+n)^{\frac{1}{n}}$$

Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

COURSE OUTCOMES

The students after undergoing this course will be able to

1) Understand operators and solve problems using operators
2) Know the concept of set theory, relations and functions
3) Solve problems using permutation and combination
4) Know the concept of limits, differentiation
5) Solve Problems on straight lines and pair straight lines

Text Books

1) P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai. 8

Supplementary Readings

1) U. Rizwan, Mathematical Foundation - SciTech, Chennai
2) V.Sundaram & Others, Discrete Mathematical Foundation - A.P.Publication, sirkali.
3) P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.
4) Manicavachagom Pillay & Natarajan. Analytical Geometry part I - Two Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	2	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	2	3	3	3	2

1-Low 2-Moderate 3- High

SEMESTER: II PART: III	22UBCAC23: C++ AND DATA STRUCTURES	CREDIT:3 HOURS:4/W

COURSE OBJECTIVES

1. To Understand the Principles of Object Oriented Programming
2. To understand the concepts of Classes and Objects
3. To Understand the Concepts of Inheritance
4. To Understand the Concepts of Data Structures
5. To Understand in developing C++ programs

UNIT I: BASICS OF OOP AND C++ **Hours:15**

Object Oriented Programming Concepts – Benefits and Applications of OOP – C++ Program structure, Program Statements, Classes – Creating, Compiling and Linking Source file – Keywords, Identifiers and Constants – Data types: Basic, User defined and derived – Declaration and Dynamic Initialization of Variables, Reference Variables – Operators: Scope resolution, Member Dereferencing, Memory management and Type Cast - Manipulators – Expressions and their Types – Implicit Conversions, Operator Overloading, Operator Precedence.

UNIT II: CONTROL STRUCTURES & ARRAYS. **Hours:15**

Control Structures: If, If…else, switch, do..while, while, for statements, Functions – The Main function, Function Prototyping, Call by Reference, Return by Reference, Inline functions, Classes and Objects – Specifying a Class, Defining Member Functions, Making an Outside function Inline, Nesting of Member functions, Arrays within a Class, Arrays of Objects, Objects as function Arguments, Friendly functions, Returning Objects.

UNIT III: CONSTRUCTORS & FILES **Hours:15**

Constructors Parameterized Constructors, Multiple Constructors in a class, Copy constructor and Destructors -Defining Operator Overloading, Overloading Unary and Binary Operators, Overloading, String manipulation using Operators, Rules for overloading operators, Type Conversions. Inheritance: Defining derived classes.-Single, Multilevel , Hierarchical and multiple Inheritance-Pointers, Pointers to derived classes. Files: Opening and closing file, detecting End-of-files.

UNIT IV: FUNDAMENTALS OF DATA STRUCTURES **Hours:15**

Stack(Arrays)-Operations-Applications of Stack(Infix and Postfix)-Queue(Array)-operations-Linked list (Singly, circular, Doubly)- Applications of List(Polynomial Addition) Trees: Binary Trees –Binary Search Tree- Operations - Recursive Tree Traversals.

UNIT V: SORTING & SEARCHING **Hours:15**

Graph - Definition, Types of Graphs, Graph Traversal –Dijkstras shortest path-DFS and BFS-Sorting-Heaps-Quick sort-Merge sort-Bubble sort-searching-Binary search.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) To learn the basic concepts Object oriented programming.
2) To learn the control structures and arrays.
3) To implementing the constructors & File opening and closing.
4) To learn the fundamentals of stack & Queue operations.
5) To learn the concepts of graphs, sorting & searching methods.

Text Books

1) E Balagurusamy, 2014, Tata McGraw Hill,6th Edition, "Object Oriented Programming with C++".
2) Ellis Horowiz, sartajSahni,2008, Galgotia Publications " Fundamentals of Data Structure".

Supplementary Readings

1) ReemaThareja , 2015, Oxford University Press , "Object Oriented Programming with C++".
2) Balagurusamy, Tata McgRaw Hill Edition "C++ programming".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	1	2
CO2	1	2	2	3	1
CO3	2	1	2	3	2
CO4	1	2	2	2	1
CO5	2	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III	22UBCAP24 : C++ & DATA STRUCTURE LAB	CREDIT: 2 HOURS: 3/W

COURSE OBJECTIVES

1. To Impart Practical Training in C++ Programming Language

LIST OF EXPERIMENTS

3) Implementing classes, object, constructors and member functions for calculating area and perimeter of a circle.
4) Implementing function overloading(Find area/volume of rectangle, circle, sphere, cylinder, cone etc).
5) Implementing operator over loading(Addition, subtraction, multiplication of matrices)
6) Implementing single , multiple , hierarchical inheritance.
7) Implementing sequential file operations using error handling functions.
8) Implementing PUSH, POP operations of stack using Arrays.
9) Implementing add, delete operations of a queue using Arrays.
10) Implementing Infix to postfix conversion of an expression using stack.
11) Implementing Binary tree recursive traversals (in-order, pre-order, and post-order).
12) Implementing Polynomial addition using linked list.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	2	2	2	3	2
CO3	3	2	3	3	2
CO4	2	3	2	3	2
CO5	2	2	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART:III	22USMAA02 : STATISTICAL METHODS AND THEIR APPLICATIONS	CREDIT: 3 HOURS: 4

(For BCA)

COURSE OBJECTIVES

1) To know about statistics
2) To know about measurs of centeal tendencies and dispersion
3) To know about correlation and regression
4) To know the concept of probability and distribution
5) To apply test of significance

UNIT I : Introduction to statistics **Hours: 10**

Statistics, functions, characteristics, limitations.Various types of Data; Nominal, Ordinal, Ratio Scale and Interval; Primary and Secondary Data; Methods of Collecting Primary Data;Diagrammatic and Graphical representation of data. - sample and Population-Preparation of questionnaire.

UNIT II:measures of central tendencies and dispersion **Hours: 10**

Descriptive Measures – Mean, Median, Mode;geometric and harmonic ,positional averages, range,Quartile deviation Mean Deviation and Standard Deviation.

UNIT III: correlation and regression **Hours:10**

Study of relationship between variables: Concept of correlation- types of correlation, rank correlation and simple problems. Regression Analysis: Simple Regression Equations.

UNIT IV: Probability and random variables **Hours:10**

Probability Theory: definitions- axioms of probability; simple problems - addition and multiplication theorem - Baye's theorem–simple problems, types of random variables, Binomial, Poisson and Normal

UNIT V: tests of significance **Hours:10**

Test of significance: small sample t-test (mean, SD, Correlation), F test for variance–large sample z-test (mean and proportions)- chi square test-simple problems

COURSE OUTCOMES

1) At the end of the course, the student will be able to:
2) Understand the various concepts of statistics.
3) know about measures of centeal tendencies and dispersion
4) know the concept of correlation and regression
5) apply the concept of probability distribytion
6) test the population parametric value

Text Books

1) Gupta,S.P.: , Sultan Chand& Sons Pvt Ltd ,"Statistical Methods."New Delhi.
2) Rajagopalan V., (2006), New Age International Publishers (P) Ltd, "Selected Statistical Tests".., New Delhi.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	3	2	2	3
CO3	3	3	3	2	2
CO4	3	3	2	2	2
CO5	1	3	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III INTERNAL ELECTIVE-I	22UBCAE26-1: COMPUTER ORGANIZATION & ARCHITECTURE	CREDIT: 3 HOURS: 3

COURSE OBJECTIVES

1. To understand the basic concepts of instruction and its essentials.
2. To Understand the concept of programmed control.
3. To learn how to implement micro operations & instruction formats..
4. To Explain the Input , output controls .
5. To understand the concept of memory concepts.

UNIT I : Basic Computer Organization and Design Hours:9

Instruction Codes: Stored program Organization, Indirect address – Computer Registers: Common bus system – Computer Instructions: Instruction set Completeness – Timing and Control – Instruction Cycle: Fetch and decode, Determine the type of Instruction, Register reference Instructions- Memory reference Instructions – Input Output and Interrupt: I/O Configuration, I/O Instructions, Program Interrupt, Interrupt Cycle.

UNIT II: Microprogrammed Control Hours:9

Control memory – Address sequencing: Conditional Branching, Mapping of Instruction, Subroutines – Microprogram Example: Computer Configuration, Microinstruction formats, Symbolic Microinstructions, The fetch routine, Symbolic Microprogram, Binary Microprogram – Design of Control UNIT: MicroProgram Sequences.

UNIT III: Central Processing UNIT Hours:9

General Register Organization: Control word, Examples of Microoperations – Instructionformats : Three-Address, Two-Address, One-Address and Zero-Address Instructions, RISC Instructions – Addressing Modes: Numerical Example.

UNIT IV: Input-Output Organization Hours:9

Peripheral Devices: ASCII Alphanumeric Characters – Input-Output Interface: I/O Bus and Interface modules, I/O versus Memory Bus, Isolated versus Memory Mapped I/O, Example of I/O Interface – Asynchronous Data Transfer: Strobe Control, Handshaking, Asynchronous Serial Transfer, Asynchronous Communication Interface, First-In, First-Out Buffer – Modes of Transfer – DMA, DMA Controller.

UNIT V: Memory Organization Hours:9

Memory Hierarchy, Main memory: RAM, ROM, Memory Address map, Memory Connection to CPU – Auxiliary Memory - Associative Memory – Cache & virtual Memory.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) To learn the computer instructions and bus system.
2) To learn about the addressing modes.
3) To learn about the Input and output controls.
4) To learn about the memory and its types.

Text Books

1) Morris Mano M. , 2011, Prentice Hall of India Private Limited, "Computer System Architecture" New Delhi .

Supplementary Readings

1) William Stallings, 2010,Pearson publications, "Computer Organization and architecture".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	3	2	2
CO2	1	2	3	2	1
CO3	3	2	3	3	1
CO4	1	3	2	2	1
CO5	1	2	3	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III INTERNAL ELECTIVE- I	22UBCAE26-2: COMPUTER GRAPHICS	CREDIT: 3 HOURS: 3

COURSE OBJECTIVES

1) To understand the basic concepts of drawing algorithms.
2) To understand the concept of Attributes & 2D transformations
3) To understand clipping concepts & its types.
4) To understand the concepts of 3D transformations.
5) To understand the surface detection methods.

UNIT I : Overview of Computer Graphics **Hours: 9**

Video Display Devices- Raster Scan System- Random Scan Systems- Hard Copy Deices- Graphic Software- Line Drawing Algorithms: DDA- Bresenham's Line - Circle Generating Algorithms

UNIT II: Attributes & Two DimensionalTransformations **Hours: 9**

Line Attributes- Curve Attributes-Color And Gray Scale Level- Area Fill Attributes- Character Attributes- Inquiry Functions- Basic Transformations - Composite Transformation – Other transformation

UNIT III: Two Dimensional Viewing & Clipping **Hours: 9**

The Viewing Pipeline- Window To Viewport Transformation –Clipping Operations- Point Clipping- Line Clipping: Cohen Sutherland- Liang Barsky-Sutherland Hodgeman Polygon Clipping- Text Clipping- Exterior Clipping- Logical Classification Of Input Devices- Interactive Picture Construction

UNIT IV: Three Dimensional Transformations & Clipping **Hours: 9**

Translation-Rotation-Scaling-Viewing Pipeline- Viewing Coordinates-Projections -View Volumes and General Projection Transformation- Clipping

UNIT V: Visible Surface Detection Methods **Hours: 9**

Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method- BSP Tree Method -Area Sub Division Method - Octree Methods - Ray Casting Method.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) Learn about the basics of graphics drawings
2) To learn about the attributes & its transformations.
3) To learn about the clipping & its types.
4) To learn about the 3D transformations.
5) To learn about the surface detection methods.

Text Books

1) Donald Hearn and Hearn and M.Pauline ,2012, Pearson 2nd edition "Computer Graphics(C version).

Supplementary Readings

1) Edward Angel, Pearson Edition, 5th Edtion, "Interactive Computer Graphics–A top down approach using Open GL".
2) Peter Shirley , 2009, Steve Marschner, Cengage Learning, Indian Edition "Computer Graphics".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	3	1
CO3	3	3	3	3	2
CO4	1	3	2	2	1
CO5	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III INTERNAL ELECTIVE-I	22UBCACE26-3: INTERNET AND ITS APPLICATIONS	CREDIT:3 HOURS: 3

COURSE OBJECTIVES

1) Illustrate basic concepts of Internet.
2) Understand Apply the necessary of Internet Explorer.
3) Analyze, design and implement Email system.
4) Demonstrate the Hyper Text Markup languages
5) 5.To learn the E-marketing & its usage.

UNIT – I:Fundamentals of Internet **Hours:9**

Introduction to Computers Programming Language types History of Internet Personal Computers, History of World Wide Web- Micro software .NET Java-Web resources.

UNIT – II: Web Browsers **Hours:9**

Web Browsers- Internet Explorer- connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) Browser settings.

UNIT – III:E-Mail **Hours:9**

Attaching a file, Electronic mail Creating an E-mail id Sending and Receiving mails-attaching a file-Instance messaging- other web browsers.

UNIT – IV:HTML **Hours:9**

Introduction to HTML headers - Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT – V:E-Marketing **Hours:9**

E-marketing consumer tracking Electronic advertising search engine-CRM-credit card Payments- Digital cash – e wallets – smart card.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1) Explain basic usages of internet and its applications.
2) Define and demonstrate the use of Web Browsers.
3) To Explain the E-Mail applications.
4) To demonstrate the HTML & its tags.
5) To Know the E-Marketing and its advertisements.

Text Books

1) P.J. Deital and A.B.Goldberg , PHI, third Edition"Internet and World Wide Web".

Supplementary Readings

1) Harley hahn , Tata McGraw hill "The Internet- Complete Reference".
2) P.Rizwan Ahmed, 2014, , Margham Publication," Internet and its Applications".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	2	1
CO3	3	1	3	1	3
CO4	2	3	3	3	3
CO5	1	3	3	1	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III PART: III	22UBCAC33 : JAVA PROGRAMMING	CREDIT:4 HOURS:4/W

COURSE OBJECTIVES

1. Knowing about a General-purpose and Purely object-oriented programming
2. language including data types.
3. To know the control statements
4. To know the concepts of classes
5. Secured, well-suited for internet programming using applets
6. To understand the concept of GUI-based techniques.

UNIT – I:FUNDAMENTALS OF JAVA Hours: 15

Declarations and Access Control: Identifiers and Keywords: Oracle„s Java Code Conventions. Define Classes: Import Statements and the Java API - Static Import Statements. Use Interfaces: Declaring an Interface - Declaring Interface Constants. Declare Class Members: Access Modifiers –Non access Member Modifiers - Constructor Declarations - Variable Declarations. Declare and Use enums: Declaring enums. Object Orientation: Encapsulation - Inheritance and Polymorphism-Polymorphism - Overriding / Overloading: Overridden Methods - Overloaded Methods.

UNIT – II: JAVA INTERFACES AND OPERATORS Hours: 15

Object Orientation: Casting - Implementing an Interface - Legal Return Types: Return Type Declarations - Returning a Value. Constructors and Instantiation: Overloaded Constructors - Initialization Blocks. Statics: Static Variables and Methods. Assignments: Stack and Heap - Literals, Assignments, and Variables: Literal Values for All Primitive Types. Scope - Variable Initialization - Passing Variables into Methods: Passing Object Reference Variables - Passing Primitive Variables. Garbage Collection. Operators: Java Operators - Assignment Operators - Relational Operators – instance of Comparison - Arithmetic Operators - Conditional Operator - Logical Operators.

UNIT –III: JAVA EXCEPTIONS Hours: 15

Working with Strings, Arrays, and Array Lists: Using String and StringBuilder: The String Class - The StringBuilder Class - Important Methods in the StringBuilder Class. Using Arrays: Declaring an Array -Constructing an Array - Initializing an Array. Using ArrayList:ArrayList Methods in Action - Important Methods in the ArrayList Class. Flow Control and Exceptions: Using if and switch Statements -Creating Loops Constructs - Handling Exceptions - Catching anException Using try and catch - Using finally. String Processing, Data Formatting

UNIT – IV: FILES & PACKAGES **Hours: 15**

I/O and NIO: File Navigation and I/O: Creating Files Using the File Class - Using FileWriter and FileReader. File and Directory Attributes -DirectoryStream - Serialization. Generics and Collections: toString(), hashCode(), and equals(): The toString() Method - Generic Types -Generic Methods - Generic Declarations. Inner Classes: Method – Local. Inner Classes - Static Nested Classes - Threads: Defining, Instantiating, and Starting Threads - Thread States and Transitions - Synchronizing Code, Thread Problems - Thread Interaction.

UNIT – V: APPLETS **Hours: 15**

Applets: Applet fundamentals - Applet class - Applet life cycle - Steps for developing an applet program - Passing values through parameters - Graphics in an applet - Event-handling. GUI Applications : Graphical user interface - Creating windows - Dialog boxes - Layout managers - AWT component classes. GUI Applications .

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic principles of Java programming language
2. Define and demonstrate the use of built-in data structures “lists” and
3. “dictionary”.
4. Design and implement a program to solve a real world problem.
5. Design and implement GUI application and how to handle exceptions and files.
6. Make database connectivity in Java programming language.

TEXT BOOK(S):

1. Kathy Sierra, Bert Bates OCA/OCP Java SE 7 Programmer I & II Study Guide, Oracle Press. (UNIT I,II,III,IV).
2. Sagayaraj, Denis, Karthik and Gajalakshmi, 2018, Java Programming - For Core and Advanced Learners, University Press (India) Private Limited, Hyderabad.(UNIT V).

Supplementary Readings:

1. Hebert Schild, 2002, The Complete Reference Java2, [Fifth Edition]. Tata McGraw-Hill, New Delhi.
2. John Hubbard, R.2004. Programming with Java. [Second Edition]. Tata McGraw-Hill,New Delhi.
3. Debasish Jana. 2005. Java and Object-Oriented Programming Paradigm, [SecondPrinting]. Prentice-Hall of India, New Delhi.
4. Sagayaraj, Denis, Karthik and Gajalakshmi 2018, Java Programming for core and advanced Learners, University Press India Pvt. Ltd., Hyderabad.

SEMESTER:III PART: III	22UBCAP34 – JAVA PROGRAMMING LAB	CREDIT:2 HOURS:4/W

COURSE OBJECTIVES

1. Illustrate basic concepts of Java programming.
2. Understand Apply the necessary operations and classes in the required fields.
3. Analyze, design and implement the inheritance concepts using OOP concepts.
4. Demonstrate the simple file operations and data manipulation techniques.
5. To Know the Packages using Java classes.

LIST OF EXPERIMENTS

1. Develop a program that for sorting a numbers using arrays.
2. Develop a program to find and replace method.
3. Develop a program to implement arithmetic operations
4. Develop a program to find a area of rectange.
5. Develop a program to prepare a student mark list.
6. Develop a program to implement the concept of AWT and graphics.
7. Develop a program to prepare a company detail using inheritance.
8. Develop a program to implement the a thread creation
9. Develop a program for audio clip applet.
10. Develop a program for creating a checkbox using applet.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	2	1
CO3	1	3	3	1	3
CO4	1	3	2	3	1
CO5	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III PART: III ALLIED –II PAPER-1	22UCOMA19: FINANCIAL ACCOUNTING - I	CREDIT:4 HOURS:4/W

COURSE OBJECTIVES

1. To understand the basic Principles and practical Applications of Accounting
2. To have practical knowledge in the preparation of Double Entry System
3. To acquire knowledge about Depreciation accounting
4. To gain expertise in preparation of Bank Reconciliation Statement.
5. To draft the Final Accounts as per the Accounting Standards

UNIT – I:Introduction **Hours:10**

Accounting-Meaning – Definition- Need for Accounting –scope of Accounting – Branches of Accounting – Methods of Accounting – Types of accounts – Accounting rules – Book Keeping and Accounting -Advantages and limitations of accounting - Accounting concepts and conventions. Journal -Introduction – Meaning- Transaction analysis for journal entries-Ledger – Meaning – Difference between journal and ledger.

UNIT – II: Subsidiary books **Hours:10**

Subsidiary books –Meaning benefits of subsidiary books – preparation of individual subsidiary books – purchase – sales – purchase returns – sales returns – cash book –single column, Double column and Triple column cash book.

UNIT – III: Trial Balance **Hours:10**

Trial Balance Introduction – Trial balance – Meaning – Definition – Objectives – Errors not disclosed by trial balance – Errors disclosed by trial balance.

UNIT – IV: Depreciation Accounting **Hours:10**

Depreciation – Introduction, meaning, causes, factors affecting the amount of depreciation.Methods of providing Depreciation – Straight line method and writtendown value methods only.

UNIT – V: Final Accounts of Sole Trader **Hours:10**

Final Accounts – Introduction – Preparation of manufacturing account – Trading Account profit and loss account – Balance sheet – Adjustments (Simple).

COURSE OUTCOMES

1. Explain basic principles of Accounting
2. Define and demonstrate the use of subsidiary books
3. Design and implement a Bank Reconciliation Statement.
4. Design and implement depreciation Accounting.
5. To design the Manufacturing acount.

TEXT BOOKS

1. R. L. Gupta & V. K. Gupta, Sultan Chand , “Financial Accounting “, New Delhi.
2. M. C. Skukla& T. S. Grewal , Sultan Chand & Sons ,”Advanced Accounting I” , NewDelhi

REFERENCE BOOKS

1. Jain &NArang , Kalyani Publications ,”Advanced Accountancy I “ , New Delhi,
2. Arulandam& Raman , Himalaya Publications,”Advanced Accountancy I “, New Delhi,
3. P. C. Thulsian, Tata McGraw Hill ,”Financial Accounting”, New Delhi.
4. T.S. Reddy& Murthy, Margham Publications,” Financial Accounting “, Chennai.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	2	1	2	1	2
CO3	3	1	3	2	3
CO4	3	1	3	1	3
CO5	3	1	3	1	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III PART: III	INTERNAL ELECTIVE-II 22UBCAE35-1 MANAGEMENT INFORMATION SYSTEM	CREDIT: 3 HOURS: 3/W

COURSE OBJECTIVES

1. To understand the basic concepts of Information systems.
2. To Understand the concept of Information system types.
3. To learn how to implement system planning & support
4. To Explain the various types of systems .
5. To understand the concept of maintenance of MIS.

UNIT I : Fundamentals of Management Information **Hours: 9**

Management Information: Meaning of Information – Attributes of information – Information needs of managers – Web databases – Data warehousing – Knowledge management – Information system for decision making

UNIT II: Information system types **Hours:9**

Types of information systems: Transaction processing systems – Office automation systems – Decision support systems – Executive support systems – Management information systems: Evolution of MIS – Computers and MIS.

UNIT III: System Analysis **Hours : 9**

System analysis – System planning and the mutual investigation – System design – The process and stages of system design - Input/Output forms design – File organization – System implementation.

UNIT IV: System Types **Hours: 9**

Management information needs and communication links for marketing system, Production system, Accounting system, Manufacturing system, Inventory control system and budgetary control system – IS organization – Top managements responsibility – Data processing group's responsibility.

UNIT V: Maintenance of MIS **Hours: 9**

Development, maintenances of MIS – Operation of manual information system, Role of computer in MIS – Database concepts, Expert systems – System audit.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. To learn the Management Information systems.
2. To learn about the information system types.
3. To learn about the analysis & planning of system.
4. To learn about the various systems.
6. To learn about the needs &maintenance of MIS.

Text Books (In API Style)

1. 1.Effy oz, 2002, Thomson Learning Course Technology, Second Edition "Management Information Systems".
2. Jawadekar W.S,2002, Tata McGraw Hill Publishing Company Limited "Management Information Systems".
3. Kenneth.C Laudon and Jane P.Laudon, 2002, Prentice Hall of India Ltd "Management Information Systems".

Supplementary Readings:

1. 1.David Knoenke, 1989, Tata McGraw Hill ,"management information systems"
2. landon K.C. and Landon J.P,2001, MaxWell Macmillan publishing company "Management Information systems".
3. Murdick Rose and Elaggett , Prentice Hall "Information System for Modern Management".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	2	1
CO3	3	3	3	3	2
CO4	1	3	2	3	1
CO5	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III	INTERNAL ELECTIVE-II	CREDIT:3
PART: III	22UBCACE35-2: E-COMMERCE	HOURS:3/W

COURSE OBJECTIVES

1. To provide the knowledge about commerce through electronic medium & information system.
2. To understand the concepts of security.
3. To understand the basic knowledge of E- Payments.
4. To understand the concepts of EDI.
5. 5.To understand the concepts of Trading relationships.

UNIT – I:Fundamentals of E-Commerce **Hours:9**

Electronic Commerce Framework, Traditional Vs. Electronic Business Application,The Anatomy of E-Commerce Applications. Network infrastructure for E-Commerce – Components of the I-way – Global Information Distribution Networks – Public policy issues shaping the I – way. Network Access Equipment

UNIT – II: Network Security **Hours:9**

The internet as a Network Infrastructure, Network Security and Firewalls – Client Server Network Security – Firewalls and Network Security – Data and Message Security – Encrypted Documents and Electronic Mail.

UNIT – III: World Wide Web **Hours:9**

Electronic Commerce and World Wide Web, Consumer Oriented E-Commerce, Electronic Payment Systems

UNIT – IV: Electronic Data Interchange **Hours:9**

Electronic Data Interchange (EDI), EDI application in business, EDI and E-commerce – EDI implementation. Intra-organizational Electronic Commerce - Supply Chain Management.

UNIT – V:Applets **Hours:9**

Corporate Digital Library – Advertising and marketing on the Internet – E-Commerce Catalogs or Directories- On demand Education and Digital Copyright – Applets, Browsers & Software Agents.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic concepts of E-Commerce
2. Define and demonstrate the use of firewalls in Network Security
3. Design and implement a World Wide Web.
4. Design and implement EDI and its applications.
5. Make Digital library & advertising in a Internet.

Text Books (In API Style)

1. R. Kalakota and Andrew. B. Whinston , 2011, Pearson , 11th Edition, "Frontiers of Electronic Commerce".

Supplementary Readings

1. DaidKosiur , 1997, Microsoft Press, "Understanding Electronic Commerce".
2. Soka,1995, McGraw Hill,. "From EDI to Electronic Commerce".
3. Saily Chan , 1998, John Wiley ,"Electronic Commerce Management".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	2	2	1	2	1
CO3	3	3	3	3	1
CO4	3	3	3	3	1
CO5	3	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III PART: III	INTERNAL ELECTIVE-II 22UBCAE35-3: DESIGN AND ANALYSIS OF ALGORITHMS	CREDIT: 3 HOURS: 3/W

COURSE OBJECTIVES

1. To understand how the choice of data structures and algorithm.
2. To understand about design methods impacts the performance of programs.
3. To solve problems using algorithm design methods such as the greedy method, divide
4. and conquer.
5. To solve problems using dynamic programming, backtracking and branch and bound.
6. To solve NP-hard and NP-complete problems.

UNIT I : DIVIDE AND CONQUER TECHNIQUE Hours: 12

Algorithm Analysis Framework – Asymptotic Notations and Basic Efficiency Classes – Analysis of Non-recursive and Recursive Algorithms – Divide and Conquer: Merge Sort – Quick Sort – Strassen's Matrix Multiplication.

UNIT II: DECREASE AND CONQUER TECHNIQUE Hours:12

Depth First Search and Breadth First Search – Decrease and Conquer: Insertion sort – Binary Search – Selection Problem – Transform and Conquer: Presorting – Balanced Search Trees: AVL tree – 2-3 Tree.

UNIT III: DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE Hours:12

Dynamic Programming: Knapsack Problem – Optimal Binary Search Trees – Warshall's Algorithm – Floyd's Algorithm – Greedy Technique: Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Trees and Codes.

UNIT IV: BACKTRACKING,BRANCH AND BOUND TECHNIQUES Hours:12

Backtracking: 8-Queens – Hamiltonian Circuit – Sum of Subset – Graph Coloring – Branch and Bound: Assignment Problem – Knapsack Problem – Traveling Salesman Problem.

UNIT V:NP PROBLEMS AND APPROXIMATION ALGORITHMS Hours: 12

P and NP Problems – NP Complete Problems – Approximation Algorithms for NP Hard Problems –Travelling Salesman Problem: Nearest Neighbor Algorithm – Multifragment Heuristic Algorithm – Knapsack Problem.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Analyze the efficiency of algorithms.
2. Design and analyze problems using decrease, transform and conquer technique.
3. Identify optimal solution by applying dynamic techniques.
4. Evaluate various backtracking, branch and bound techniques.
5. Summarize the knowledge about P and NP problems.

Text Books

1. Anany Levitin, 2017, Pearson Education, India, Third Edition. " Introduction To The Design And Analysis Of Algorithms".
2. A.V.Aho, J.E. Hopcroft and J.D.Ullman, 2010,pearson Education Asia, 4th Edition"The Design and Analysis of Computer Algorithms" India.

Supplementary Readings

1. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, 2007, Prentice Hall of India, India, Second Edition ,"Introduction to Algorithms".
2. Sara Baase and Allen Van Gelder, 2010, Pearson Education, Third Edition "Computer Algorithms - Introduction to Design and Analysis", India.
3. Robert Sedgewick, Philippe Flajolet, 2013, Addison-Wesley , Second Edition, "An Introduction to the Analysis of Algorithms",USA.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	1	2	1
CO2	3	1	2	2	1
CO3	3	1	2	3	3
CO4	2	2	1	2	2
CO5	2	2	3	1	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III	SKILL BASED SUBJECT-I	CREDIT:2
PART: IV	22UBCAS36 : MULTIMEDIA SYSTEMS	HOURS:3/W

COURSE OBJECTIVES

1. Illustrate basic Multimedia components and its Tools.
2. Understand Video animation and Apply the necessary of Internet Explorer.
3. Analyze, design the file formats in a presentation.
4. Demonstrate the Color pallet & its usages.
5. To learn the image special effects& its usages.

UNIT – I: INTRODUCTION **Hours: 9**

Introduction to Multimedia: Introduction to Multimedia PCs – Components of Multimedia – Multimedia Tools Sound and Graphics : Digital Sound – Editing and Mixing sound files – MIDI creation – Tracking Procedure – Interactive and Non Interactive Graphics – High Resolution Graphics – Difference between TV and Computer Display.

UNIT – II: ANIMATION **Hours: 9**

Video and Animation: Digital Image concepts – Video Capturing – Scanning Images – Digital Filters Morphing and Warping – Two Dimensional and Three dimensional animation – Animation Tools – Layering technique – Blue Screen technique – Latest movie technologies – Motion Tracking System – Motion Capturing System.

UNIT – III: PRESENTATION & FILE FORAMTES **Hours: 9**

Creating Presentation: Script Writing and creating interactive and non-interactive presentation – Linear and Non Linear Editing – Authoring Tools – File Formats SOUND, VIDEO, ANIMATION, Presentation Images. Multimedia Programming: Text Links – Hyper Text system – Form Creation – File storing - Error Trapping.

UNIT – IV: SOUND LINKS **Hours: 9**

Multimedia interfaces – MCI- API- High Level Multimedia Functions – WAVE, MIDI file processing. Animation: Color Palette – Events – ROPs.

UNIT – V: VISUAL EFFECTS **Hours: 9**

Imaging Special Visual Effects: Bitmap – Brushes – Dissolve –Hotspot Editor – Scorlling. Media Control Interface: Simple Commands – API functions – CD Player – Video Capturing – Form – AVI Play Form.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic concepts & tools in multimedia.
1. Define and demonstrate Animations & its effects.
2. To Explain the presentation & file formats.
3. To demonstrate the sound links using the interfaces.
4. To Know the visual effects & its applications.

Text Books

1. Kaliyaperumal Karthikeyan,2011, LAP Lambert Academic Publishing, "Introduction to Multimedia System",
2. TayVaughan, 2011, Tata McGraw-Hill "Multimedia Making It Work Eighth Edition".

Supplementary Readings

1. ParagHavaldarand Gerald Medioni,2011, Cengage Learning, "Multimedia Systems".
2. 2.S. K. Bansal, 2011, Aph Publishing Corporation "Multimedia Systems".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	2	2	3	2
CO2	1	3	1	2	3
CO3	1	3	3	3	3
CO4	3	3	3	3	2
CO5	3	3	2	2	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:III PART: IV NON-MAJOR-ELECTIVE-I	22UBCAN37 : OFFICE AUTOMATION	CREDIT:2 HOURS:2/W

COURSE OBJECTIVES

1) To familiarize student with Office Automation and Component of Office Automation.
2) To make them comfortable to evaluate, select ,use Office Software appropriate to specific task.
3) To make them work on Open Software for Office Automation.
4) To develop expertise in Word Processing, Spreadsheet, and Presentation Skills
5) To know the Office automation tools.

UNIT – I:INTRODUCTION **Hours:9**

Introduction to Office Automation Suit- Elements & Area of Use. Word Processing, Spreadsheet – Database. Introduction of various Office Suites - Word Basics Using MS Office - Word Processor, Window, Menus & Commands, Toolbars & Buttons - New Document, Different Page Views and Layouts, Applying various Text Enhancements, Formatting Text and Documents. Tables: Creating a Simple Table, Table Menu, Selecting in Table, Adding , Changing Row Heights, Deleting Rows, Columns, Inserting Deleting Columns, Changing Column Width.

UNIT – II: GRAPHICS **Hours:9**

Graphics: Clipart, Insert Picture, Using Drawing Features, Drawing Objects, Text in Drawing. Templates: Template Types, Using Templates, Exploring Templates, Modifying Templates. Macros: Macro, Recording Macros, Editing Macros, Running a Macro. Mail Merge: Mail Merge Concept, Main Document, Data Sources, Merging Data Source and Main Document.

UNIT – III: SPREADSHEET BASICS

Overview of Spreadsheet, Features, Creating a New Worksheet, Selecting Cells, Entering and Editing Text, Numbers, Formulas, Referencing Cells, Moving , Copying Cells, Sorting Cell Data, Inserting Rows, Columns, Cells, Deleting Parts of a Worksheet, Clearing Parts of a Worksheet. Formatting: Page Setup, Changing Column Widths and Row Heights, Auto Format, Changing Font Sizes and Attributes, Using Border Buttons and Commands, Changing Colors and Shading, Hiding Rows and Columns.

UNIT – IV: FUNCTIONS IN SPREADSHEET **Hours:9**

Function in Spreadsheet, Functions by category: Date and Time functions, Math and Trigonometry functions, Statistical functions, Text functions. Spreadsheet Charts: Chart parts and Terminology, Instant Charts with the Chart Wizard, Creation of different types of Charts, Printing, Deleting Charts, Linking in Spreadsheet. Spreadsheet Graphics: Creating and Placing Graphic Objects, Resizing Graphics, Drawing Lines and Shapes.

UNIT – V: PRESENTATIONS **Hours:9**

Creating Presentations: Using Blank Presentation Option, Using Design Template , Adding Slides, Deleting a Slide, Importing Images from Outside, Transition and Build Effects, Deleting a Slide, Numbering a Slide, Saving Presentation, Closing Presentation, Printing Presentation

COURSE OUTCOMES

1) Explain basic principles of Office suite & elements.
2) Define and demonstrate the use of Graphics and its features.
3) Design and implement a Spreadsheet and its usages.
4) To know the functions of Spreadsheet & its category
5) To understand the presentation & its functions.

Text Books

1) Beth Melton,Mark Dodge, Published with the authorization of Microsoft Corporation : O'Reilly Media "Microsoft Office Step by step ".
2) Ron Mansfield,200, Tata McGraw-Hill edition 'working in Microsoft Office'.
3) Sanjay Saxsen BPB Publication 'Microsoft Office,4 Microsoft Office.
4) Lisa A. Bucki ,Office 2013 Bible: "The Comprehensive Tutorial Resource Paperback".

Supplementary Readings

1) Ramesh Bangia , 2013,Khanna Publishers , "Learning Microsoft Office ".
2) Lalit mali, , Math Formula Book- Vol 1, " Libre Office 5.1 writer".

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	1	3	3
CO2	3	3	3	3	3
CO3	3	3	1	3	3
CO4	1	3	2	3	3
CO5	3	3	1	2	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:IV PART: III	22UBCAC43 : PYTHON PROGRAMMING	CREDIT:3 HOURS: 3/W

COURSE OBJECTIVES

1. Illustrate basic concepts of python programming.
2. Understand Apply the necessary data structures includes list, tuple and dictionary in the required fields and exception handling.
3. Analyze, design and implement the problems using OOP concepts.
4. Demonstrate the simple file operations and data manipulation techniques.
5. Design web site using python GUI.

UNIT – I: FUNDAMENTALS OF PYTHON Hours: 9

Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – I/O function –Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.

UNIT – II: HANDLING STRINGS AND EXCEPTIONS Hours: 9

Strings – List – Tuples – Dictionaries – Sets – Exception Handling: Built-in Exceptions – User-defined exception– Modules and Packages.

UNIT – III: OBJECT ORIENTED PROGRAMMING CONCEPTS Hours: 9

Object Oriented Programming basics –Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling –Duck Typing – Relationships.

UNIT – IV: FILES AND DATA BASES Hours: 9

File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using Oracle, MySQL and SQLite.

UNIT – V: GUI AND WEB PROGRAMING USING PYTHON Hours: 9

UI design: Tkinter – Events – Socket Programming – Sending email – CGI: Introduction to CGI Programming, GET and POST Methods, File Upload.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic principles of Python programming language
2. Define and demonstrate the use of built-in data structures “lists” and “dictionary”.
3. Design and implement a program to solve a real world problem.
4. Design and implement GUI application and how to handle exceptions and files.
5. Make database connectivity in python programming language.

Text Books

1. Mark Lutz, 2013, O'Reilly Media, California, Fifth Edition. "Learning Python".
2. Wesley J.Chun,2017, Pearson Education, India, Second Edition ,"Core Python Programming".

Supplementary Readings

1. Bill Lubanovic, 2014, O'Reilly Media, California, First Edition, "Introducing Python Modern Computing in Simple Packages".
2. Mark Lutz, 2014, O'Reilly Media, California, Fifth Edition ,"Python Pocket Reference".
3. Allen B. Downey, 2016, O'Reilly Media, California, Second Edition ,"Think Python".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	1	3	2	2
CO5	2	3	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:IV PART: III	22UBCAC44 :ARTIFICIAL INTELLIGENCE	CREDIT: 2 HOURS: 3/W

COURSE OBJECTIVES

1. To impart knowledge about Artificial Intelligence.
2. Understood the system Artificial intelligence, Knowledge acquisition and representation, Reasoning, Uncertainty, Search techniques
3. Understood the AI Technologies, Expert systems, Natural networks.
4. To give understanding of the main abstractions and reasoning for intelligent systems.
5. To understand the basic principles of AI in Various applications.

UNIT I : OVERVIEW OF ARTIFICIAL INTELLIGENCE Hours:15

Introduction –History of AI – Application of Al –Objectives of Al – Future of Al - Symbolic Logic c: Normal Forms in Propositional Logic–Logical Consequences – Resolution Principal – Predicate Calculus – Well Formed Formulas –Clausal Form – Rules of Inference.

UNIT II: KNOWLEDGE ACQUISITION AND REPRESENTATION Hours:15

Knowledge Engineering – Producer for Knowledge Acquisition – Knowledge Representation – Network Representation Schemes Reasoning and (KRR) Systems.

UNIT III: UNCERTAINTY: INTRODUCTION Hours:15

Non-Monotonic and Monotonic Reasoning – Confidence Factor –Bayes Theorem – Dempster and Shafer's Theory of Evidence – Non classical Logics Search Techniques – Problem Representation – Problem Solving In Ai.

UNIT IV: AI TECHNOLOGIES Hours:15

Computer Vision – Natural Languages Processing – Speech Recognition Expert Systems: Introduction - Basic Character of an Expert System – Knowledge Engineering.

UNIT V: NEURAL NETWORK Hours:15

Introduction – Difference between Human and Machine Intelligence –Features of Biological Neural Network – Human neurons to artificial neurons.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Solve basic AI based problems.
2. Define the concept of Artificial Intelligence.
3. Apply AI techniques to real-world problems to develop intelligent systems.
4. Select appropriately from a range of techniques when implementing intelligent systems.
5. Understand concept of neural Networks.

Text Books

1. Rajendra Akerkar, 2005, PHI publisher ,"Introduction to Artificial Intelligence",New Delhi,

Supplementary Books

1. Matt Henderson, 2019, This Is Charlotte "Machine Learning for Beginners 2019".
2. Dan W.Patterson, 2015,Pearson,"Introduction to Artificial Intelligence &Expert Systems".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	2	3	3	3
CO2	3	1	2	2	2
CO3	2	1	3	3	1
CO4	3	1	3	3	2
CO5	3	1	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:IV PART: III	22UBCAP45: PYTHON PROGRAMMING LAB	CREDIT: 2 HOURS: 3/W

COURSE OBJECTIVES

1. Illustrate basic concepts of python programming.
2. Understand Apply the necessary data structures includes list, tuple and dictionary in the required fields and exception handling.
3. Analyze, design and implement the problems using OOP concepts.
4. Demonstrate the simple file operations and data manipulation techniques.
5. Design web site using python GUI.

LIST OF EXPERIMENTS

1. Write a simple program to display a single level and multilevel string.
2. Write a function to compute the GCD of two numbers
3. Create a program to change, delete, add and remove elements in Dictionary.
4. Develop a program to perform operations on list.
5. Write a program to display the Fibonacci series and multiplication table by using looping constructs.
6. Create a Python program to demonstrate inheritance.
7. Write a python program to implement polymorphism with inheritance.
8. Display a simple calendar in python program without using the calendar module using string array or list.
9. Write a program to demonstrate the user-defined exception handling mechanism in Python.
10. Design and implement a graphical user interface to perform any arithmetic operation.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Design simple programs using conditional statements and loops.
2. Using python list, tuples and dictionaries.
3. Detecting the exception handling mechanism in python.
4. Construct GUI applications using python programming.
5. Demonstrate the use of files in python.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	1	2	2
CO2	3	1	2	2	2
CO3	2	3	3	3	2
CO4	1	2	2	2	1
CO5	3	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:IV PART: III ALLIED - II PAPER-2	22UCOMA20: FINANCIAL ACCOUNTING - II	CREDIT: 3 HOURS: 4/W

COURSE OBJECTIVES

1. To promote knowledge about calculation of Average Due date.
2. To understand the branch accounts and its types.
3. To have practical knowledge in the preparation departmental accounting.
4. To acquire practical knowledge in Partnership accounts – Admission.
5. To enrich the understanding about Partnership accounts – Retirement and Death of a partner.

UNIT- I: AVERAGE DUE DATE **Hours:12**

Average Due Date-meaning of Average due date-Uses of Average due date-basic problems in average due date-calculation of interests.

UNIT-II:BRANCHACCOUNTS **Hours:12**

Branch – Meaning - Types of branches - Department branches – difference between branch and Department – Preparation of trading account of branches under debtor system – Stock and debtors' system – whole sale branch system and Final account systems.

UNIT- III: DEPARTMENTAL ACCOUNTS **Hours:12**

Introduction-Allocation of expenses –Calculation department purchase Interdepartmental transfers at cost price – Selling price – Preparation of trading and Profit & Loss account of the department.

UNIT- IV: PARTNERSHIP - ADMISSION OF PARTNERS **Hours:12**

Partnership Fundamentals - Calculation of managerial remuneration - Accounting Treatments - Admission of partner.

UNIT- V PARTNERSHIP – ACCOUNTING TREATMENTS DURING ADMISSION OF PATNER. **Hours:12**

Adjustments Regarding profit sharing Ratio, Good will and Capital (simpleproblems) – Preparation of revaluation account - capital account and balance sheet.

COURSE OUTCOMES

1) Understand the concept and gain the knowledge on Average Due Date.
2) Be familiar with the nuances of different systems of accounting
3) followed for Branches.
4) Acquire the Knowledge about Departmental Accounts.
5) Be acquainted with the accounting treatments required for admission of
6) partners in Partnership firms.
7) Understand the accounting procedures involved in the retirement and death of partners in Partnership firms

TEXT BOOKS

1. R.L. Gupta, & V.K. Gupta Sultan Chand ,"Financial Accounting ", New Delhi.
2. Dr. T.S. Reddy & Dr. A. Murthy, Margham Publication "Financial Accounting ", Chennai.

REFERENCE BOOKS

1. M.C. Shukla& T.S. Grewal, Sultan Chand & Sons ,"Advanced Accounting ", New Delhi.
2. I Jain &Narang, Kalyani Publications ,"Advanced Accounting ", New Delhi.
3. M.A. Arulandam& Raman, Himalaya Publishers," Advanced Accounting", New Delhi.
4. P.C. Thulsian, Tata MC Graw Hill, "Financial Accounting ", New Delhi.
5. R.L. Gupta & V.K. Gupta, Gupta Edition "Advanced Accounting ", New Delhi.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	1	2	2	1	3
CO3	3	1	3	1	3
CO4	2	3	3	2	2
CO5	1	3	3	1	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:IV	SKILL BASED SUBJECT-II	CREDIT: 2
PART: IV	22UBCAS46: INTERNET OF THINGS	HOURS: 3/W

COURSE OBJECTIVES

To learn about the basics of IOT protocols

To understand the fundamentals of Internet of Things

To build a small low cost embedded system using Raspberry Pi.

To apply the concept of Internet of Things in the real world scenario.

To understand the real world application concepts.

UNIT I: INTRODUCTION TO IoT **Hours: 9**

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M .

UNIT II: IoT ARCHITECTURE **Hours: 9**

IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

OGC architecture - IoT reference model - Domain model - information model - functional model - communication model – IoT reference architecture

UNITIII: IoT PROTOCOLS **Hours: 9**

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Network layer – 6LowPAN - CoAP.

UNIT IV: BUILDING IoT WITH RASPBERRY **Hours: 9**

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi - Board - Linux on Raspberry Pi - Raspberry Pi Interfaces.

UNIT V: CASE STUDIES AND REAL-WORLD APPLICATIONS **Hours: 9**

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Analyze various protocols for IoT
2. Develop web services to access/control IoT devices.
3. Design a portable IoT using Rasperry Pi
4. Deploy an IoT application and connect to the cloud.
5. Analyze applications of IoT in real time scenario.

Text Books (In API Style)

1. ArshdeepBahga, Vijay Madisetti,2015, Universities Press, “Internet of Things – A hands-on approach”.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), 2011,Springer “Architecting the Internet of Things”.
3. Honbo Zhou,2012, A Middleware Perspective‖, CRC Press, “The Internet of Things in the Cloud”.
4. Jan Ho ¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, 2014, Elsevier,"From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence".
5. Olivier Hersent, David Boswarthick, Omar Elloumi ,2012, Wiley Key applications and Protocols“The Internet of Things”.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	1
CO2	2	2	3	3	2
CO3	3	3	3	3	3
CO4	3	3	3	3	2
CO5	3	1	2	2	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER - IV PART - IV	22UBCAN47: WEB TECHNOLOGY	CREDITS: 2 HOURS: 2/W

COURSE OBJECTIVES

1. To teach the basics involved in publishing content on the World Wide Web.
2. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function.
3. To teach a basic understanding of graphic production with a specific stress on creating graphics for the Web.
4. Introduction to more advanced topics such as programming and scripting.
5. This will also expose students to the basic tools and applications used in Web publishing

Unit 1: HTML & Internet **Hours: 9**

Internet Basic –Introduction to HTML-List-Creating Table – Linking document Frames- Graphics to HTML Doc.

Unit 2: Using Style Sheet and Color **Hours: 9**

Style sheet- Style sheet basic-Add style to document-Creating Style sheet rules- Style sheet properties -Font-Text-List-Color and back ground color-Box-Display properties.

Unit 3: Object in HTML **Hours: 9**

Introduction-ObjectinHTML-EventHandling-WindowObject-Documentobject-BrowserObject-FormObject-NavigatorobjectScreenobject-BuildinObject- User defined object.

Unit 4: HTML Server Controls **Hours: 9**

HTML server controls - Anchor, Tables, Forms, Files. Basic Webserver Controls - Lable, Text box, Button, Image, Links, Check & Radio button, Hyperlink.

Unit 5: Web Server Controls **Hours: 9**

Data List Web Server Controls – Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

COURSE OUTCOMES

1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Style Sheets.
3. Build dynamic web pages using JavaScript (Client side programming).
4. Create XML documents and Schemas.
5. Build interactive web applications using AJAX.

Text Books

1. Deitel&Deitel, Pearson Education ,"internet & worldwideweb How to program"
2. I.Bayross,2000, BPBPublications,"Web Enable Commercial Application Development Using HTML, HTML,Javascript,PenCGI".
3. J.Jaworski,1999, BPBPublications,"MasteringJavascript"
4. T.A.Powell, 2002,TMH, 3rd Edition "Complete Reference HTML"
5. G.Buczek,2002, TMH, "ASP.NET Developers Guide".

Supplementary Readings

1. Raj Kamal, Tata McGraw-Hill. "Internet and Web Technologies".
2. Achyut Godbole,Atul Kahate, McGraw Hill Education , Third Edition "Web Technologies:TCP/IP,Web/Java Programming, and Cloud Computing".

SEMESTER: V PART: III	22UBCAC51: RDBMS	CREDIT:4 HOURS: 4/W

COURSE OBJECTIVES

1. Students are able to understand database concepts and ER model.
2. The students are able to understand the relational data model.
3. Students are able to know about relational database design concepts.
4. Knowledge about file structure and organization.
5. The students are able to write PL/SQL commands to create tables, insert/update/delete data, and query data in a relational DBMS.

UNIT I : DATABASE ARCHITECTURE &ENTITY-RELATIONSHIP MODEL Hours: 12

Database system applications - Purpose of database systems - View of data- Database languages and design – Data storage and querying – Transaction Management Concept - Database architecture - Database users and administrators. Entity-Relationship Model: Entity Sets -Relationship Sets - Attributes - Constraints: Mapping Cardinalities - Keys - Entity Relationship Diagrams: Basic Structure of E-R Diagram - MappingCardinalityinE-Rdiagram-ComplexAttributes-Roles–Non-BinaryRelationshipSets-WeakEntitySets.

UNIT II: RELATIONAL MODEL Hours:12

Relational Model Structure - Relational Algebra - The Tuple Relational Calculus - The Domain Relational Calculus – SQL Introduction: Overview of SQL – SQL Data Definition Language - Basic Structure of SQL Queries –Basic Operations - Set Operations- Aggregate Functions-Null Values -Nested Sub Queries-Modification of the Database – Join Expressions - Integrity Constraints.

UNIT III: RELATIONAL DATABASE DESIGN Hours:12

Normalization: First Normal Form – Decomposition using Functional Dependencies - Keys and Functional Dependencies – Boyce Codd Normal Form – Third Normal Form – Decomposition using Multivalve Dependencies: Multivalve Dependencies – Fourth Normal form.

UNIT IV: STORAGE AND FILE STRUCTURE Hours:12

Disks - RAID -Tertiary Storage - File Organization – Organization of Records in Files - Data Dictionary storage – Database Buffer.

UNIT V: PL/SQL Hours: 12

Introduction to PL/SQL: PL/SQL B lock Structure – PL/SQL Tables - Cursors – Exception Handling S ection– Procedures - Functions - Packages - Triggers.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. 1.Describe the database architecture and the ER diagram for real world applications.
2. Knowledge about the relational algebra and calculus.
3. Knowledge about the normalization forms.
4. Explain the storage and accessing of data.
5. Programming skills in SQL and PL/SQL.

Text Books

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, ,2010, McGraw Hill, Sixth Edition, " Database Systems Concepts".
2. Raghu Ramakrishnan and Johannes Gehrke,2002,Third Edition," Database management systems"
3. S.K.Singh, 2010, PHI Learning Private Limited , Sixth Edition,"Database Management Systems" , New Delhi,

Supplementary Readings

1. Ramakrishnan, Gehrke,2003, Mc Graw Hill ,Third Edition,"Database Management Systems", New Delhi.
2. Bipin Desai,2010, Galgotia Publications "An Introduction to database systems".
3. RamezElamassri, Shankant B-Navathe, 2015, Pearson, 7th Edition, "Fundamentals of Database Systems".
4. Rajesh Narang,2010, PHI Learning Private Limited, Sixth Edition,"Database Management Systems", New Delhi.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	3	3	1	3	3
CO3	3	1	3	1	3
CO4	2	2	1	2	2
CO5	2	1	3	1	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:III	22UBCAC52: OPERATING SYSTEM	CREDIT:4 HOURS:5/W

COURSE OBJECTIVES

1. Enable the student to understand the basics of OS, structure and functions of operating systems.
2. The students are able to understand the principles of scheduler, scheduler algorithms and Deadlock.
3. Enable the student to learn various memory management schemes.
4. Enable the student to study File system and Mass Storage Structure.
5. Knowledge about UNIX system.

UNIT I :BASICS of OPERATING SYSTEM Hours: 12

Basic Concepts of Operating System – Services of Operating System – Classification of Operating System – System Calls – System Programs – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operations on Process – Interprocess Communication.

UNIT II: OPERATING SYSTEM SCHEDULING Hours:12

CPU Scheduling: Types of CPU Scheduler - Scheduling Criteria - Scheduling Algorithms – FCFS Scheduling – SJF – Priority Scheduling – Round Robin Scheduling – Multilevel Queue Scheduling – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.

UNIT III: MEMORY MANAGEMENT Hours:12

Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Demand Paging – Page Replacement Algorithm and its types.

UNIT IV: FILE MANAGEMENT Hours:12

File Management – Basics File Concept– File Access Methods – Directory Structure – File Protection –File System Structure – Allocation Methods – Disk Scheduling Algorithms.

UNIT V: CASE STUDIES Hours:12

UNIX System – A Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Knowledge in basics of OS.
2. Knowledge pertaining about scheduling algorithms and deadlock.
3. Knowledge in memory management.
4. Explore in file concepts.
5. Knowledge in UNIX OS.

Text Books

1. Operating System Concepts" –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. "Operating System" – Willam Stalling, Fourth Edition, Pearson Education,2003.

Supplementary Readings

1. Achyut Godbole and Atul Kahate, 2010, McGraw Hill Publishing,"Operating Systems".
2. Andrew S.Tanenbaum ,2001, Addison Wesley Second Edition, "Modern Operating Systems",
3. Prof. R. Sriddhar, Dynaram Publication, Bangalore Company."Fundamentals of Operating System",

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	2	3	3	3	3
CO3	2	3	3	3	2
CO4	3	1	2	2	2
CO5	2	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:III	22UBCAC53: SOFTWARE ENGINEERING	CREDIT:4 HOURS:4/W

COURSE OBJECTIVES

1. Enable the students to learn basic concepts of software process models.
2. Give knowledge about requirements in engineering and estimation.
3. Enables to understand software analysis and design.
4. To impart knowledge on testing and debugging.
5. Enable to understand software quality maintenance.

UNIT I : SOFTWARE PROCESS **Hours: 12**

The Evolving Role of Software - Software Characteristics - Software Applications - Software Myths - Software Process Models - The Linear Sequential Model - The Prototyping Model - The RAD Model - Evolutionary Software Process Models - The Incremental Model - Spiral Model - Agile Process Extreme Programming and Scrum.

UNIT II: REQUIREMENTS ENGINEERING AND ESTIMATION **Hours:12**

Functional requirements - Requirements Elicitation - Requirements Analysis and Negotiation - Requirements Validation - Requirements Management — Relationship between Size and Effort - Different techniques for Effort estimation - COCOMO - Function Point Analysis

UNIT III: SOFTWARE ANALYSIS AND DESIGN **Hours:12**

Analysis modeling - Translating Analysis Model into Design Model - Design Process - Modularity - Functional Independence - Cohesion - Coupling - Design Documentation – Software Architecture - User Interface Design.

UNIT IV: TESTING TECHNIQUES **Hours:12**

Software Testing Fundamentals - Test Case Design - White Box Testing - Black Box Testing - Testing for Specialized Environments - Testing Strategies - UNIT Testing - Integration Testing — Validation Testing - System Testing Performance Testing - Case Study.

UNIT V:SOFTWARE QUALITY ASSURANCE **Hours:12**

Quality Concepts - Cost of Quality - Software Quality Group - Roles and Responsibilities of SQA Group - Formal Technical Reviews - Quality Standards - Software Configuration Management - Baselines - SCM Process - Version Control - Software Configuration Audit - Software Maintenance

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Knowledge pertaining about process models.
2. Knowledge in requirements functionalities.
3. Knowledge pertaining in various analysis models.
4. Knowledge to test software.
5. Knowledge pertaining in quality and maintenance in project development.

Text Books

1. Roger S Pressman , 2015, McGraw Hill International Edition , "Software Engineering - A Practitioners Approach", , Singapore,.
2. Pankaj Jalote ,2011, Springer "A Concise Introduction to Software Engineering", , New Delhi.

Supplementary Readings

1. Ian Sommerville , 2017, ", Pearson Addison Wesley "Software Engineering, Boston.
2. Shari Lawrence Pfleeger ,2009, Pearson,"Software Engineering: Theory and Practices", New Delhi.
3. James Peter, Pedrycz W ,2007, John Wiley & Sons."Software Engineering: An Engineering Approach".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	2	2	1	2	1
CO3	1	2	2	2	1
CO4	1	3	3	1	3
CO5	1	3	2	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:III	22UBCAC54: MOBILE COMPUTING	CREDIT:4 HOURS:4/W

COURSE OBJECTIVES

1. Students are able to understand various types of wireless data networks and wireless protocols.
2. To understand basic concepts of mobile telecommunication system.
3. To understand the basics of wireless mobile computing.
4. Knowledge about wireless LAN and cellular systems.
5. Enable to understand application and transport layers.

UNIT I : WIRELESS COM MUNICATION FUNDAMENTALS **Hours:12**

Introduction – Wireless Transmission – Frequencies for Radio Transmission–Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread Spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II: TELECOMMUNICATION NETWORKS **Hours:12**

Telecommunication Systems – GSM – GPRS – UMTS – IMT-2000 – Satellite Networks - Basics – Parameters and Configurations – Capacity Allocation – FAMA and DAMA – Broadcast Systems – DAB - DVB.

UNIT III: WIRELESS LAN **Hours:12**

Wireless LAN – IEEE 802.11 - Architecture – Services – MAC – Physical layer – IEEE 802.11a -802.11b - 802.11g Standards – HIPERLAN – Bluetooth.

UNIT IV: MOBILE NETWORK LAYER **Hours:12**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics.

UNIT V: TRANSPORT AND APPLICATION LAYERS **Hours:12**

Traditional TCP – Classical TCP improvements – WAP - WAP 2.0

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Knowledge in wireless fundamental concepts.
2. Knowledge in telecommunication protocols.
3. Knowledge pertaining in wireless devices.
4. Capability to understand network layer functionalities.
5. Knowledge in TCP and WAP.

Text Books

1. Jochen Schiller, 2003, PHI/Pearson Education, Second Edition ,“Mobile Communications”.

Supplementary Readings

1. William Stallings, 2002, PHI/Pearson Education, “Wireless Communications and Networks”.
2. Kaveh Pahlavan and Prasanth Krishnamoorthy, 2003, PHI/Pearson Education “Principles of Wireless Networks: A UnifiedApproach”.

3. Uwe Hansmann et. al, 2009, Springer,"Principles of Mobile Computing", India.
4. Krzysztof Wesolowshi, 2002, John Wiley and Sons Ltd , "Mobile Communication Systems".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	2	2	2	1
CO2	1	3	3	1	3
CO3	1	3	2	3	1
CO4	2	2	1	2	1
CO5	2	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:III	22UBCAP55: RDBMS LAB	CREDIT:2 HOURS:3/W

COURSE OBJECTIVES

1. Programming skill set to know basic simple queries.
2. Programming skill set to know DDL, DML, DCL commands.
3. Programming skill set to know nested sub queries and join operations.
4. Programming skill set to know built in functions and create view of a table.
5. Programming skill set to know PL/SQL concepts.

LAB EXPERIMENTS:

1. Create a table and execute simple queries using Aggregate functions.
2. Execute DDL Commands.
3. Execute DML, DCL Commands
4. Implement the Nested Sub Queries.
5. Implement Join operations in SQL.
6. Implement Built in Functions.
7. Implement Set Operations.
8. Create views for a particular table.
9. PL/SQL procedure for an application using cursors.
10. PL/SQL procedure for an application using functions.
11. PL/SQL procedure for an application using exception handling.
12. PL/SQL procedure for an application using Procedures.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	3	1	2	2	2
CO3	2	3	3	3	2
CO4	3	3	2	3	2
CO5	2	2	1	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:III	22UBCAP56: OPERATING SYSTEM LAB	CREDIT:2 HOURS:3/W

COURSE OBJECTIVES

1. Knowledge pertaining to process system call.
2. Explore knowledge in various scheduling algorithms.
3. Explore knowledge in Semaphores.
4. Impact knowledge in memory management concepts.
5. Explore knowledge in various page replacement and disk scheduling algorithms.

LIST OF EXPERIMENTS

1. Implementing Process System Calls.
2. Implementing FCFS scheduling algorithm.
3. Implementing SJF scheduling algorithm.
4. Implement the Priority scheduling algorithm.
5. Implement Round Robin Scheduling Algorithm.
6. Implement producer consumer using Semaphores.
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement pipe processing.
9. Implement first fit, best fit algorithm for memory management.
10. Implement page replacement algorithms.
11. Implement disk scheduling algorithms.
12. Shell Programming.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	2	2	1	2	1
CO3	3	1	2	2	2
CO4	2	3	3	3	2
CO5	2	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:III	INTERNAL ELECTIVE-III 22UBCAE58-1: OBJECT ORIENTED ANALYSIS & DESIGN	CREDIT:3 HOURS:3/W

COURSE OBJECTIVES

1. To learn the basics of object oriented analysis and design skills.
2. Knowledge about the UML and use case modeling.
3. Learn various modeling techniques.
4. Enable to know classes and its functionalities.
5. To learn about various structural patterns.

UNIT I : OBJECT MODEL **Hours: 9**

Complexity - Structure and Attributes of Complex Systems - Designing Complex Systems - Foundations of Object Models - Elements of an Object Model - Unified Software Development Process.

UNIT II: UML AND USE CASE MODELING **Hours:9**

Introduction - UML Views - Classification of UML Diagrams - Use Case Diagrams: Modeling Requirements - Components - Use Case Identification and Description - Use-Case Relationships.

UNIT III: BEHAVIORAL MODELING **Hours:9**

Activity Diagram: Components – Construction. State Diagram: Components – Construction. Sequence Diagrams - Collaboration Diagrams - Timing Diagrams.

UNIT IV: CLASSES AND OBJECTS **Hours:9**

UML Class Diagrams - Conceptual classes and description classes – Associations – Attributes - Conceptual class Hierarchies - Aggregation and Composition- Identification of analysis and design classes.

UNIT V: STRUCTURAL DIAGRAMS AND PATTERNS **Hours: 9**

Package Diagram - Component Diagram - Deployment Diagram - Design Patterns MVC

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Knowledge in object model.
2. Knowledge in UML concepts.
3. Knowledge pertaining in various behavioral modeling.
4. Knowledge in class, objects and implementation.
5. Knowledge in structural diagrams.

Text Books

1. Booch G, Maksimchuk RA, Engel M W, Young B J, Conallen J, Houston K A , 2007, Addison-Wesley,. 3rd Edition"Object Oriented Analysis and Design with Applications".
2. Booch G, Rumbaugh J, Jacobson I , 2005, Addison Wesley, 2nd Edition
3. "The Unified Modeling Language User Guide".

Supplementary Readings

1. Bahrami A, 2007, McGraw Hill, "Object Oriented System Development - International Edition",
2. Simon Bennett, Steve Mc Robb, Ray Farmer , 2010, , Mc-Graw Hill Education , 4th Edition "Object Oriented Systems Analysis and Design Using UML".
3. Craig Larman, 2005, Pearson Education , 3rd Edition,"Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	3	3	2	3	2
CO3	1	2	2	2	1
CO4	1	3	3	1	3
CO5	1	3	2	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V	INTERNAL ELECTIVE - III	CREDIT:3
PART:III	22UBCAE58-2: CRYPTOGRAPHY	HOURS:3/W

COURSE OBJECTIVES

1. Enable students to understand various Security Concepts.
2. To know about various cryptographic operations.
3. Knowledge about public key cryptography.
4. Understand the various Authentication schemes.
5. To know about security protocols.

UNIT I: COMPUTER SECURITY CONCEPTS **Hours: 9**

The OSI Security Architecture - Security Attacks - Security Services - Security Mechanisms - A Model for Network Security - Number Theory Concepts: Fermat's and Euler's Theorems, Euclidean Algorithm - Classical Encryption Techniques

UNIT II: SYMMETRIC CIPHERS **Hours: 9**

Block Ciphers and Stream Ciphers - Random Bit Generation and Stream Ciphers: Principles of Pseudorandom Number Generation - Pseudorandom Number Generators: Linear Congruential Generators - Block Cipher Modes - Data Encryption Standard.

UNIT III: PUBLIC-KEY CRYPTOGRAPHY **Hours: 9**

Principles of Public Key Cryptosystems - The RSA Algorithm - Diffie-Hellman Key Exchange - Elliptic Curve Cryptography.

UNIT IV: CRYPTOGRAPHIC HASH FUNCTIONS **Hours: 9**

Secure Hash Algorithm (SHA) - Message Authentication Codes - Message Authentication Requirements - Message Authentication Functions - Digital Signatures - Digital Signature Standard (DSS) - Blockchain: The growth of block chain technology - Types, Consensus, and Mining Task - Platforms.

UNIT V: ROLE OF CRYPTOGRAPHY IN SECURITY PROTOCOLS **Hours: 9**

Network and Internet Security Protocols: Transport-Level Security - Secure Sockets Layer (SSL) - Email Security: Pretty Good Privacy (PGP) - Firewalls: Characteristics and Types.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Knowledge in security concepts.
2. Explore knowledge in chipper and Data Encryption Standard.
3. Pertaining Knowledge in Public Key Cryptosystems and RSA.
4. Knowledge in hash algorithms.
5. Knowledge in Security concepts and protocols.

Text Books

1. Hans, Knebl, Helmut, Delfs ,2015, Springer- Verlag , 3rd Edition "Introduction To Cryptography Principles And Applications", Berlin Heidelberg.
2. William Stallings , 2017, , Prentice Hall of India, Pearson Education , 7th Edition, "Cryptography and Network Security: Principles and Practice", New Delhi.

Supplementary Readings

1. Behrouz A Forouzan , 2015, Tata McGraw Hill Ltd, 3rd Edition, "Cryptography and Network Security", New Delhi.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	2	2
CO2	2	3	3	3	2
CO3	2	3	3	3	2
CO4	3	3	2	3	2
CO5	2	2	1	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V	INTERNAL ELECTIVE - III	CREDIT:3
PART:III	22UBCAE58-3: NETWORK SECURITY	HOURS:3/W

COURSE OBJECTIVES

1. To enable knowledge in basics of network fundamentals.
2. Enable students to understand various Security Concepts.
3. To know about security structure and models.
4. Knowledge about VPN.
5. Understand the various concepts about WAP architecture.

UNIT I: SECURITY PRINCIPLES AND POLICY **Hours:9**

Need for network security – Management principles – Security principles – Network Management – Security attacks – Qualities of good network – Security policies and guidelines – Information Policy – Security Policy – Physical Security – Security Procedures – Building a security plan – Implementing a security policy.

UNIT II: NETWORK SECURITY **Hours:9**

Fundamental concepts – Threats – Assets – Vulnerability – Safeguards and attack – Identification and Authentication – Access Control – A model for network Security – Malicious Software – Firewalls – Network Security Tools.

UNIT III: SECURITY INFRASTRUCTURE **Hours:9**

Infrastructure Components – Goals of security Infrastructure – Design Guidelines – Security Models – Hardware and Software Security: Virtual Private Networks – Kerberos – Public Key Infrastructure – Software Security.

UNIT IV: INTRUSION DETECTION SYSTEMS **Hours:9**

Infrastructure of IDS – Classification of IDS – Host-Based IDS – Network based IDS – Anomaly Vs Signature detection – Intrusion Detection Tools.

UNIT V: WIRELESS SECURITY **Hours: 9**

WAP – WAP Security – Security issues with WTLS – Wireless LAN - Wireless LAN Security.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Knowledge in security principles and policy.
2. Explore knowledge in Access controls and malicious software.
3. Pertaining Knowledge in Security infrastructure.
4. Knowledge in IDS.

Text Books

1. Brijendra Singh, 2012, PHI , 3rd Edition "Network Security and Management", New Delhi.

Supplementary Readings

1 Charles P. Pfleeger, Shari Pfleeger, 2011, Pearson , 4th Edition, “Security in Computing”.
2. Atul Kahate , 2013, Tata McGraw Hill Ltd," 3rd Edition, “ Cryptography and Network Security".
3. Whitman, Mattord, Holden, 2009, Cengage Learning,”Firewalls and Network Security”.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	2	2	1	2	1
CO3	2	3	3	3	2
CO4	3	1	2	2	2
CO5	2	3	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:V PART:IV	SKILL BASED SUBJECT - III 22UBCAS59: DATA COMMUNICATION NETWORKS	CREDIT:2 HOURS: 3/W

COURSE OBJECTIVES

1. To equip students to basics of Data Communication and prepare them for better computer networking.
2. Enable to know data link layer and wireless concepts.
3. Knowledge about network layer and its functions.
4. Impact knowledge about transport layer and USD.
5. To learn about application layer.

UNIT I: INTRODUCTION **Hours:9**

Introductory Concepts - Network hardware - Network software – Network Architecture - Physical layer - Guided transmission media -Cable television.

UNIT II: DATA LINK LAYER **Hours:9**

Design issues - Channel allocation problem - Multiple access protocols -Ethernet-WirelessLAN-802.11 architecture.

UNIT III: NETWORK LAYER **Hours:9**

Design issues, Routing Algorithms, Shortest path routing, Flooding, Broadcast & Multicast routing congestion, Control & internetworking.

UNIT IV: TRANSPORT LAYER **Hours:9**

Transport service - Elements of transport protocols - User Datagram Protocol - Transmission Control Protocol.

UNIT V: APPLICATION LAYER **Hours:9**

DNS - Electronic mail - World Wide Web - Multimedia - Network security.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explore knowledge in network architecture
2. Inhibit knowledge in Wireless protocols.
3. Explore functions of network layer.
4. Explore various protocols in transport layer.
5. Explore knowledge in DNS and network security.

Text Books

1. 1.Andrew S. Tanenbaum, Prentice Hall," Computer Networks".

Supplementary Readings

1. William Stallings, 2001, Pearson Education,Sixth Edition," Data & Computer Communications".
2. Fred Halsall, 1995, AddisonWessley,"Data Communications, Computer Networks and Open Systems".
3. Behrouz A Forouzan,2002, McGraw Hill , Second Edition, "Data Communications and Networks".
4. Black, Prentice Hall," Data Network", India.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	2	3	3	3	2
CO3	3	1	2	2	2
CO4	3	3	2	3	2
CO5	2	2	1	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	22UBCAC61 : PHP PROGRAMMING	CREDIT: 4 HOURS: 4/W

COURSE OBJECTIVES

1. To understand the basic concepts of PHP and its essentials.
2. Understand how to create functions, web pages and how to implement PHP programs.
3. To learn how to implement PHP programs using object oriented programming concepts.
4. Explain Files, databases, session, cookies and File transfer Protocols.
5. Helps in implementing some features of AJAX in PHP programming.

UNIT I : INTRODUCTION TO PHP **Hours:10**

Essentials of PHP - Operators and Flow Control - Strings and Arrays.

UNIT II: FUNCTIONS AND WEB PAGES **Hours:10**

Creating Functions - Reading Data in Web Pages - PHP Browser - Handling Power.

UNIT III: ADVANCED OBJECT ORIENTED PROGRAMMING **Hours:10**

Object-Oriented Programming –Advanced Object-Oriented Programming.

UNIT IV: INTRODUCTION TO SESSIONS AND COOKIES **Hours:10**

File Handling –Working with Databases – Sessions, Cookies, and FTP

UNIT V: INTRODUCTION TO AJAX SERVER **Hours:10**

Ajax – Advanced Ajax – Drawing Images on the Server.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the PHP fundamentals and problem solving
2. Understand the basic concepts of web page creations.
3. Describe the reason why different tags are used in PHP programs.
4. Demonstrate the concepts of Session and Cookies.
5. Develop the PHP program using AJAX server.

Text Books (In API Style)

1. Steven HolZner, 2020, “The PHP Complete Reference”, McGraw Hill Education, New York

Supplementary Readings

1. Vikram Vaswani , 2009 , “PHP: A Beginner's Guide” , McGraw Hill Education, New york.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	3	3	2
CO2	3	1	3	3	2
CO3	2	2	2	3	2
CO4	3	3	1	2	1
CO5	3	3	1	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	22UBCAC62 : ASP.NET	CREDIT: 4 HOURS: 4/W

COURSE OBJECTIVES

1. To understand the basic concepts of .NET framework and its controls.
2. Understand how to form and how to implement validation control in .NET programs.
3. To learn how to implement ADO .NET programs using Database Connections.
4. Explain databases, Grid controls using the web forms.
5. Helps in implementing some features of XML in Application programming.

UNIT I : ASP.NET BASICS **Hours:15**

Introduction to ASP.NET: .NET Framework (CLR, CLI, BCL), ASP.NET Basics, ASP.NET Page Structure, Page Life Cycle. Controls: HTML Server Controls, Web Server Controls, Web User Controls, Validation Controls, Custom Web Controls.

UNIT II: FORM **Hours:15**

Form validation: Client side validation, Server side validation, Validation Controls: Required Field Comparison Range, Calendar Control, Ad rotator Control, Internet Explorer Control. State Management: View State, Control State, Hidden Fields, Cookies, Query Strings, Application State, Session State.

UNIT III: ADO.NET **Hours:15**

Architecture of ADO. NET, Connected and Disconnected Database, Create Database, Create connection Using ADO.NET Object model, Connection Class, Command Class, Data Adapter Class, Dataset Class, Display data on data bound controls and Data Grid.

UNIT IV: DATABASE ACCESSING **Hours:15**

Database accessing on Web Applications: Data Binding Concept with web, Creating Data Grid, Binding standard web server controls, Display data on web form using Data Bound Controls.

UNIT V: XML **Hours:15**

Writing Datasets to XML, Reading datasets with XML. WEB services: Remote method call using XML, SOAP, Web service description language, Building and Consuming a web service, Web Application deployment.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the .NET fundamentals and its structures.
2. Understand the basic concepts of Form creations.
3. Describe the reason why database connections are used in .NET programs.
4. Demonstrate the concepts of Databases and grid controls.
5. Develop the .NET program using XML and web services.

Text Books (In API Style)

1. Devin Rader , Farhan Muhammad, Scott Hanselman , 2004, " Professional ASP.NET 1.1"

Supplementary Readings

1. Esposito PHI "Introducing Microsoft ASP .NET 2.0".
2. BipinJoshi, Donny Mack, Fabio Claudio Ferracchiati, Jan D Narkiewiez Wrox "Professional ADO.NET"
3. Richard Leineker Person Education ,Special Edition "ASP.NET".
4. Matthew MacDonald TMH ,"The Complete Reference ASP.NET".
5. Black Book DreamTech,"ASP.NET".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	1	3	3	2
CO5	1	3	2	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	22UBCAC63 : CLOUD COMPUTING	CREDIT: 3 HOURS: 3/W

COURSE OBJECTIVES

1. To understand the basic concepts of cloud and its storage.
2. Understand the types of cloud and its services
3. To learn how to implement cloud architecture using cloud commUNITy.
4. Explain the concepts of Map Reduce and Hadoop and its architecture.
5. Helps in implementing some features of security of cloud and its applications.

UNIT I : UNDERSTANDING CLOUD COMPUTING Hours: 15

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICE Hours: 15

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III: CLOUD COMPUTING FOR EVERYON Hours: 15

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events.

UNIT IV: PROGRAMMING MODEL Hours:15

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD Hours: 15

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the cloud fundamentals and its architectures.
2. Understand the basic concepts of cloud types and its services.
3. Describe the reason why the usage of cloud and its security.
4. Demonstrate the concepts of MapReduce, Hadoop and google services.
5. Develop the Cloud applications using Google services.

Text Books (In API Style)

1. Michael Miller, 2009, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, USA.

Supplementary Readings

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, , 2012, Morgan Kaufmann Publishers "Distributed & Cloud Computing, From Parallel Processing to the Internet of Things", ,USA.
2. John W.Rittinghouse and James F.Ransome, 2010, CRC Press "Cloud Computing: Implementation, Management, and Security".
3. Toby Velte, Anthony Velte, Robert Elsenpeter,2009,TMH, "Cloud Computing, A Practical Approach".
4. Kumar Saurabh, 2011, Wiley India, "Cloud Computing – insights into New-Era Infrastructure".
5. George Reese, O'Reilly , "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" .

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	3	1	3
CO2	1	3	2	3	1
CO3	3	1	2	2	1
CO4	3	1	3	3	2
CO5	3	1	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	22UBCAC64 : DATA MINING	CREDIT: 3 HOURS: 3/W

COURSE OBJECTIVES

1. To understand about the basics of Data Mining and Data.
2. To understand about the methods of Data Warehousing
3. To understand about the techniques of Data Mining.
4. To understand about the importance of Cluster and outlier detection
5. To improve the student's knowledge with recent trends and tools

UNIT I : DATA MINING BASICS **Hours:12**

What is Data Mining– Kinds of Data – Kinds of patterns – Technologies used for Data Mining– Major Issues in Data Mining– Data –Data Objects and Attribute types– Data Visualization– Measuring Data Similarity and Dissimilarity

UNIT II: DATA PROCESSING **Hours:12**

overview– Data Cleaning– Data Integration– Data Reduction– Data Transformation and Data Discretization

UNITIII: PATTERNSAND CLASSIFICATION **Hours:12**

Patterns– Basic concepts– Pattern Evaluation Methods–Pattern Mining: Pattern Mining in Multilevel– Multidimensional space–Constraint–Based Frequent Pattern Mining– Mining High Dimensional - Data Classification–Decision tree Induction– Bayes Classification methods– Rule based Classification.

UNIT IV: CLUSTERING AND OUTLIER DETECTION **Hours:12**

Cluster Analysis– Partitioning Methods – Hierarchical Methods – Density – Based Methods– Grid – Based Methods – Evaluation of Clustering– Clustering High – Dimensional Data–Clustering Graph and Network Data – Clustering with Constraints – Web Mining – Spatial Mining. Outlier Detection – Outliers and Outliers Analysis – Outlier Detection Methods.

UNIT V: DATA WARE HOUSING & OLAP **Hours:12**

Data Warehouse– Basic concepts–Data Warehouse Modelling: Data Cube and OLAP– Data Warehouse Design and Usage– Data Warehouse Implementation– Data Generalization by Attribute–Oriented Induction– Data Cube Technology– Data Cube Computation Methods– Exploring Cube Technology–Multidimensional Data Analysis in cube space

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the data fundamentals and its mining technologies.
2. Understand the basic concepts of data warehouse and its methods.
3. Describe the patterns and its techniques, classification methods.
4. Demonstrate the concepts of Clustering and outlier approaches.
5. Develop the recent trends and its Tools.

Text Books

1. PaulrajPonnaiah ,2001, Wiley Publishers,"Data Warehousing Fundamentals".
2. Jiawei Han MichelineKamber, 2006, Morgan Kaufman Publishers "Data Mining: Concepts and Techniques".
3. G.K. Gupta , 2011, PHI Private limited, 2nd Edition,"Introduction to Data mining with case studies", , New Delhi.

Supplementary Readings

1. Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy ,2007, the M.I.T. Press "Advances in Knowledge Discover and Data Mining".
2. Ralph Kimball, Margy Ross ,2002, John Wiley and Sons Inc. "The Data Warehouse Toolkit".
3. Alex Berson, Stephen Smith, Kurt Thearling, 2000, Tata McGraw Hill "Building Data Mining Applications for CRM".
4. Margaret Dunham, 2002 ,Prentice Hall, "Data Mining: Introductory and Advanced Topics".
5. Daniel T. Larose John ,2004, Wiley & Sons, "Discovering Knowledge in Data: An Introduction to Data Mining", New Jersey.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	3	3	2
CO2	3	1	3	3	2
CO3	1	3	3	1	3
CO4	1	3	2	3	1
CO5	3	1	2	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	22UBCAP65 : PHP PROGRAMMING LAB	CREDIT: 2 HOURS: 4/W

COURSE OBJECTIVES

To Impart Practical Training in PHP Programming Language

1. Write a program to find the factorial of a number.
2. Write a program using Conditional Statements.
3. Write a program to find the maximum value in a given multi dimensional array.
4. Write a program to find the GCD of two numbers using user-defined functions.
5. Design a simple web page to generate multiplication table for a given number.
6. Design a web page that should compute one's age on a given date.
7. Write a program to download a file from the server.
8. Write a program to store the current date and time in a COOKIE and display the 'Last Visited' date and time on the web page.
9. Write a program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.
10. Write a program to draw the human face.
11. Write a program to design a simple calculator.
12. Design an authentication web page in PHP with MySQL to check username and password.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	1	3	3	2
CO5	3	1	2	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	22UBCAP66 : ASP.NET LAB	CREDIT: 2 HOURS: 4/W

COURSE OBJECTIVE

To Impart Practical Training in ASP .NET programs.

LIST OF EXPERIMENTS

1. Implement a Job seeker using HTML server control.
2. Implement E-mail registration using Validation Controls
3. Write a Program to implement ad rotator control
4. Write a Program to implement state management techniques
5. Write a Program to implement view State and Session State.
6. Write a Program to displaying data with the grid view
7. Write a Program to implement ASP.Net Server Side Controls.
8. Write a Program to implement ASP.Net Master Pages, Themes and Skins.
9. Write a Program working with forms using ASP.Net
10. Write a Program working with pages using ASP.Net.
11. Write a Program to access data sources through ADO.NET
12. To develop a college portal.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	3	3	2
CO2	3	1	3	3	2
CO3	3	1	3	3	2
CO4	1	3	2	3	1
CO5	3	1	2	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	INTERNAL ELECTIVE -IV 22UBCAE68-1: DIGITAL IMAGE PROCESSING	CREDIT: 3 HOURS: 3/W

COURSE OBJECTIVES

1. To know the basics of Digital image and techniques.
2. To understand various Image enhancement ideas
3. To understand Image restoration techniques.
4. To understand degrees of image resolution and compression methods
5. To understand the concepts of image representation and recognition.

UNIT I : FUNDAMENTALS **Hours: 10**

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab– Pixels – Color models – Digital Image Processing in Multimedia.

UNIT II: IMAGE ENHANCEMENT **Hours: 10**

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters

UNIT III: IMAGE RESTORATION AND SEGMENTATION **Hours: 10**

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation– Active Contour Models .

UNIT IV: WAVELETS AND IMAGE COMPRESSION **Hours: 10**

Wavelets – Subband coding – Multi resolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive Compression Methods – Vector Quantization – Variable Length Coding – Bit–Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards

UNIT V: IMAGE REPRESENTATION AND RECOGNITION **Hours: 10**

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments – Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the fundamentals of images.
2. Understand the basic concepts of image enhancements.
3. Describe the concepts of image restoration and segmentation.
4. Demonstrate the concepts of Wavelets and compression methods.
5. Develop the pattern recognition and fuzzy systems.

Text Books (In API Style)

1. Rafael C. Gonzalez, Richard E.Woods , 2009, Pearson Edition , Fourth edition, "Digital Image Processing".
2. Sonka, Hlavac, Boyle , 2009, Cengage Learning "Digital Image Processing and Computer Vision".
3. Anil Jain K, 2011, PHI Learning Pvt. Ltd, "Fundamentals of Digital Image Processing" .

Supplementary Readings

1. S. Sridhar , 2016, Oxford University Press; Second edition "Digital Image Processing".
2. Gonzalez &woods , 2016, Pearson Edition "Digital Image Processing", India.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	2	1
CO2	3	1	3	3	2
CO3	2	2	2	3	2
CO4	3	3	1	2	1
CO5	3	3	1	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI PART: III	INTERNAL ELECTIVE - IV 22UBCAE68-2: INFORMATION SECURITY	CREDIT: 3 HOURS: 3/W

COURSE OBJECTIVES

1. To understand the basic concepts of Information Security.
2. To understand the legal, ethical and professional issues in Information Security
3. To know about risk management
4. To understand the technological aspect of information security.
5. To understand the concepts of cryptography and hacking methods.

UNIT I : : INFORMATION SECURITY BASICS **Hours: 10**

Introduction –History – What is Information Security? – Critical Characteristics of Information – NSTISSC Security Model – Components of an Information System – Securing the Components – Balancing Security and Access – The SDLC – The Security SDLC.

UNIT II: SECURITY INVESTIGATION **Hours: 10**

Security – Business Needs – Threats – Attacks – Legal – Ethical and Professional Issues – Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations

UNIT III: SECURITY ANALYSIS **Hours: 10**

Risk Management – Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy –Quantitative versus Qualitative Risk Control Practices – Risk Management Discussion Points

UNIT IV: SECURITY MODELS **Hours: 10**

Logical Design – Blueprint for Security – Information Security Policy – Standards and Practices– ISO 17799/BS 7799– NIST Models– VISA International Security Model – Design of Security Architecture – Planning for Continuity – Security Physical Design – Firewalls –Security Technology – IDS – IPS – Honey Pots – Honey Nets – Padded cell Systems Scanning and Analysis Tools – Access Control Devices.

UNIT V: CRYPTOGRAPHY AND ETHICAL HACKING **Hours: 10**

Cipher methods – Cryptographic Algorithms and Tools – Attacks on Cryptosystems–Hacking – Effects of Hacking – Hacker – Types of Hacker– Ethical Hacker –Hacktivism– Networking & Computer Attacks – Malicious Software (Malware) – Protection Against Malware – Intruder Attacks on Networks and Computers – Wireless Hacking– Windows Hacking – Linux Hacking Session.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the fundamentals of security and its components.
2. Understand the basic concepts of Laws and ethics.
3. Describe the concepts of risk management and its strategy
4. Demonstrate the concepts of firewalls and its tools.
5. Develop the cryptographic algorithms and hacking methods.

Text Books (In API Style)

1. Michael E Whitman and Herbert J Mattord , 2003, Vikas Publishing House, 5th Edition "Principles of Information Security", New Delhi.
2. David Kim,MichaelG.Solomon , 2016, Jones & Bartlett Learning, 3rd Edition , "Fundamentals of Information Systems Security".
3. Patrick Engebretson , 2011, , Syngress Basics Series – Elsevier , , 2nd Edition "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy".
4. Michael T. Simpson, Kent Backman, James E. Corley , 2010, CENGAGE Learning second edition "Hands-On Ethical Hacking and Network Defense" .

Supplementary Readings

1. Micki Krause, Harold F. Tipton , 2004, CRC Press LLC , sixth Edition "Handbook of Information Security Management",.
2. Stuart McClure, Joel Scrambray, George Kurtz , 2003, Tata McGraw–Hill "Hacking Exposed" .
3. Matt Bishop , 2002, pearson Edition, 2ndEdition "Computer Security Art and Science" .

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	3	1	2	1
CO3	3	3	1	3	3
CO4	3	1	3	3	2
CO5	3	1	3	3	2

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:VI	INTERNAL ELECTIVE -IV	CREDIT: 3
PART: III	22UBCAE68-3: SOFTWARE PROJECT MANAGEMENT	HOURS: 3/W

COURSE OBJECTIVES

1. To understand the basic concepts of project and its development.
2. To understand the models and planning of project management.
3. To know about tasks and activities for project.
4. To understand the technological aspect of project management.
5. To understand the concepts of Quality assurance and configurations.

UNIT I : Introduction **Hours: 10**

Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.

UNIT II: Project models and planning **Hours:10**

Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project - Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.

UNIT III: Project Tasks **Hours: 10**

Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.

UNIT IV: Project Management **Hours: 10**

Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.

UNIT V: SQA & SCM **Hours: 10**

Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the fundamentals of project and its life cycle.
2. Understand the basic concepts of project planning and structures.
3. Describe the project task , activities and models
4. Demonstrate the project activities and scheduling.
5. Develop the quality guidelines and configuration principles.

Text Books (In API Style)

1. 1.Robert T. Futrell, Donald F. Shafer, Linda I. Safer,2002, Pearson Education "Quality Software Project Management", Asia .

Supplementary Readings

1. .Pankaj Jalote, 2002, Addison Wesley "Software Project Management in Practice". 2.Hughes, 2004, Tata McGraw Hill 2004, 3rd Edition "Software Project Management".

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	2	1
CO2	3	1	2	2	2
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SEMESTER:VI	SKILL BASED SUBJECT-IV	CREDIT: 2
PART: IV	22UBCAS69: BIG DATA ANALYTICS	HOURS: 3/W

COURSE OBJECTIVES

1. To explore the fundamental concepts of big data analytics
2. To learn to use various techniques for mining data stream.
3. To learn the Big data Business Perspective
4. To understand the applications using Map Reduce Concepts
5. To introduce programming tools HIVE in Hadoop echo system

UNIT I : INTRODUCTION TO BIG DATA Hours:10

Introduction to big data: Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent data analysis – Nature of Data –.Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – Volume, Velocity, Variety – Other Characteristics of Data – Need for Big Data–Analytic Processes and Tools.

UNIT II: MINING DATA STREAMS Hours: 10

Mining data streams: Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Decaying Window.

UNIT III: BIG DATA FROM DIFFERENT PERSPECTIVES Hours: 10

Big data from business Perspective: Introduction of big data–Characteristics of big data–Data in the warehouse and data in Hadoop– Importance of Big data– Big data Use cases– Patterns for Big data deployment.

UNIT IV: HADOOP AND MAP REDUCE Hours: 10

Hadoop: The Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop– Scaling Out–Hadoop Streaming– Design of HDFS–Java interfaces to HDFS Basics– Developing a Map Reduce Application–How MapReduce Works–Anatomy of a Map Reduce Job run–Failures–Job Scheduling–Shuffle and Sort – Task execution.

UNIT V:FRAMEWORKS Hours:10

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - IBM InfoSphereBigInsights and Streams.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the PHP fundamentals of Big Data.
2. Understand the basic concepts of Streams.
3. Describe the big data perspective and its importance.
4. Demonstrate the concepts of Hadoop and MapReduce
5. Develop the Framework using Pig and Hive.

Text Books (In API Style)

1. Michael Berthold, David J. Hand , 2007, Springer, “Intelligent Data Analysis”.
2. Tom White , 2012, Third Edition Oreilly Media, “Hadoop: The Definitive Guide “.

Supplementary Readings

1. SeemaAcharya, SubhasiniChellappan , 2015, Wiley “Big Data and Analytics".
2. AnandRajaraman and Jeffrey David Ullman , 2012, CUP “Mining of Massive Datasets”.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos , 2012, McGrawHill Publishing “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” .
4. Bill Franks , 2012, Wiley & Sons “Taming the Big Data Tidal Wave: Finding OpportUNITies in Huge Data Streams with Advanced Analytics”.
5. Glenn J. Myatt , 2007, Wiley & Sons, “Making Sense of Data”.

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