

**ANNAMALAI**  **UNIVERSITY**  
**214 - B. Sc. Computer Science**

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
<b>SEMESTER - I</b>							
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
22UCSCC13	III	Core Course -I : Fundamentals of Computers	5	4	25	75	100
22UCSCC14		Core Course – II : Programming in C	5	4	25	75	100
22UCSCP15		Core Practical – I : Programming in C Lab	3	2	40	60	100
		Allied Course - I : Mathematics – I/ Mathematical foundations-I	5	4	25	75	100
22UENV18	IV	Environmental Studies	2	2	25	75	100
<b>Total</b>			<b>30</b>	<b>22</b>			<b>700</b>
<b>SEMESTER - II</b>							
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
22UCSCC23	III	Core Course – III : Programming with C++	5	4	25	75	100
22UCSCP24		Core Practical – II : Programming with C++ Lab	3	2	40	60	100
		Allied Course - I : Paper -2 : Mathematics II/ Mathematical Foundations-II	4	3	25	75	100
22UCSCE26		Internal Elective – I	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	1	1	25	75	100
22UNMSD01		Language Proficiency for Employability: EFFECTIVE ENGLISH	2	2	25	75	100
<b>Total</b>			<b>30</b>	<b>22</b>			<b>900</b>

Course Code	Part	Study Components & Course Title	Hours /Week	Credit	Maximum Marks		
					CIA	ESE	Total
<b>SEMESTER – III</b>							
22UTAML31	I	Language Course - II : Tamil – III	5	3	25	75	100
22UENGL32	II	English Course - II English Through Literature-I	5	3	25	75	100
22UCSCC33	III	Core Course – IV : Programming in Java	4	4	25	75	100
22UCSCP34		Core Practical – III : Programming in Java Lab	2	2	40	60	100
		Allied Course - II : Physics –I (or) Statistics-I	4	3	25	75	100
		Allied Practical-I Physics – I / Statistics –I	2	-	-	-	-
22UCSCE36		Internal Elective – II : 1. Electronic Commerce 2. Computer Graphics 3. Web Services	4	3	25	75	100
	IV	Non-Major Elective – I : (To be chosen from other Departments)	2	2	25	75	100
22UNMSD02		Fundamentals of Coding and Cloud	2	2	25	75	100
<b>Total</b>			<b>30</b>	<b>22</b>			<b>800</b>
<b>SEMESTER – IV</b>							
22UTAML41	I	Language Course - II : Tamil - IV	5	3	25	75	100
22UENGL42	II	English Course - II : English Through Literature-II	5	3	25	75	100
22UCSCC43	III	Core Course – V : Python Programming	4	4	25	75	100
22UCSCP44		Core Practical – IV : Python Programming Lab	2	2	40	60	100
		Allied Course – II : Physics –II (or) Statistics-II	4	3	25	75	100
		Allied Course - II : Allied Practical – I Physics Lab/Statistics Lab	3	2	40	60	100
	IV	Non-Major Elective – II : (To be chosen from other Departments)	2	2	25	75	100
22UCSCS48		Skill Based Subject – II : Software Engineering	3	2	25	75	100
22UNMSD02		Digital Skills for Employability: Microsoft Office Essentials	2	2	25	75	100
<b>Total</b>			<b>30</b>	<b>23</b>			<b>900</b>

<b>SEMESTER – V</b>							
22UCSCC51	I II III	Core Course – VI :Data Communication Networks	4	3	25	75	100
22UCSCC52		Core Course – VII :Computer System Architecture	4	3	25	75	100
22UCSCC53		Core Course – VIII :Web Technology	4	4	25	75	100
22UCSCC54		Core Course – IX : Relational Database Management System	4	4	25	75	100
22UCSCP55		Core Practical – V :Web Technology Lab	3	2	40	60	100
22UCSCP56		Core Practical – VI : Relational Database Management System Lab	3	2	40	60	100
22UCSCE58		Internal Elective – III : 1. Data Mining and Warehousing 2. Software Project Management 3. Microprocessor and its applications	3	3	25	75	100
22UCSCS59		IV	Skill Based Subject – III :Multimedia& Its Applications	3	2	25	75
22UGENS57	Gender Studies		2	1	25	75	100
		<b>Total</b>	<b>30</b>	<b>24</b>			<b>900</b>
<b>SEMESTER – VI</b>							
22UCSCC61	III	Core Course – X :Operating System	5	4	25	75	100
22UCSCC62		Core Course – XI: Dotnet Programming	5	4	25	75	100
22UCSCC63		Core Course – XII :IOT and Its Applications	4	3	25	75	100
22UCSCC64		Core Course – XIII : Mobile computing	4	4	25	75	100
22UCSCP65		Core Practical – VII :Linux Operating System Lab	3	2	40	60	100
22UCSCP66		Core Practical – VIII :DOT NET Programming Lab	3	2	40	60	100
22UCSCE68		Internal Elective – IV : 1. Network Security 2. OOAD and UML 3. Cloud Computing	3	3	25	75	100
22UCSCS69	IV	Skill Based Subject – IV : Android Programming	3	2	25	75	100
22UEXTA67	V	Extension Activities	-	1	100	-	100
22UNMSD03		Emerging Technology for Employability: Machine Learning / Android App Development / Cyber Security	-	2	25	75	100
		<b>Total</b>	<b>30</b>	<b>27</b>			<b>1000</b>
		<b>Grand Total</b>	<b>180</b>	<b>140</b>			<b>5200</b>

**Internal Elective Courses**

22UCSCE26-1	Internal Elective – I	Digital Logic Fundamentals
22UCSCE26-2		Fundamental of Algorithms
22UCSCE26-3		System Software
22UCSCE36-1	Internal Elective – II	Electronic Commerce
22UCSCE36-2		Computer Graphics
22UCSCE36-3		Web Services
22UCSCE58-1	Internal Elective - III	Data Mining and Warehousing
22UCSCE58-2		Software Project Management
22UCSCE58-3		Microprocessor and its applications
22UCSCE68-1	Internal Elective – IV	Network Security
22UCSCE68-2		OOAD and UML
22UCSCE68-3		Cloud Computing

**Allied Courses**

22UMATA01	Semester I	Theory	Mathematics-I (OR)
22UMAF01			Mathematical Foundations I
22UMATA02	Semester II	Theory	Mathematics-II (OR)
22UMAF02			Mathematical Foundations II
22UPHYA01	Semester III	Theory	Physics-I (OR)
22USTAA01			Statistics-I
22UPHYA02	Semester IV	Theory	Physics-II (OR)
22USTAA02			Statistics-II
22UPHY01		Practical	Physics Lab (OR)
22USTAP01			Statistics Lab

**Allied Courses offered by Computer Science Department to Other Departments**

22UCSCA01	Theory	Basics of Computers
22UCSCA02	Theory	Web Technology
22UCSCAP1	Practical	Web Technology Lab
22UCSCA04	Theory	Management Information System

**Non-Major Elective Courses (NME)**

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

22UCSCN37	Fundamentals of Information Technology
22UCSCN47	Internet Technology

<b>SEMESTER: I PART-III</b>	<b>22UCSCC13: FUNDAMENTALS OF COMPUTERS</b>	<b>CREDIT:4 HOURS: 5/W</b>
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**COURSE OBJECTIVES**

- 1) An understanding of basic concepts of computer science.
- 2) An introduction to the fundamentals of hardware, software and programming.
- 3) To understand the concept of Number System.
- 4) To know the types of memory for storage purpose.
- 5) To understand the types of input devices to feed the data for action.

**Unit I: Introduction to Computer****Hours:10**

Introduction – Types of computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.

**Unit II: Number System****Hours:15**

Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD - Bits, Bytes, Words – Octal – Hexadecimal Number System.

**Unit III: Anatomy of Digital Computer****Hours:10**

Functions and Components of Computer – Central Processing Unit – Control Unit – Arithmetic – Logic Unit – Memory – Registers – Addresses. Memory Units: RAM, ROM, PROM, EPROM, EEPROM, and Flash Memory.

**Unit IV: Input Devices****Hours:10**

Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse pad – Trackball – joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of monitor – Printers.

**Unit V: Computer Software****Hours: 15**

Introduction – Operating System – Utilities – Compiler and Interpreters – Word Processor – Spreadsheets – Presentation Graphics – DBMS – Programming Languages: Machine Language – Assembly Language – High level language – Types of HighLevel Languages. Data Processing: Data VS Information – File Processing – Sequential File Processing – Direct Access file Processing.

**COURSE OUTCOMES**

- 1) Explain the needs of hardware and software required for a computation task.
- 2) Can have the knowledge about the generations of computers.
- 3) Understand the concept of output device.
- 4) Having the skill about the various types of languages.
- 5) Understand the concept of file processing.

**Text Books**

- 1) Alexis Leon and Mathews Leon, – Fundamentals of Computer Science and Communication Engineering || , Leon Tech world, 1998.

**Supplementary Readings**

- 1) B Ram and Sanjay Kumar, –Computer Fundamentals||, 5th Edition, New Age International Publishers, 2014.
- 2) Pradeep K Sinha, Priti Sinha, –Computer Fundamentals||, BPB Publications, 2004.  
Anita Goel, –Computer Fundamentals||, 1st Edition, Pearson Education India, 2010.
- 3) Anita Goel, Computer Fundamentals, Pearson Publication.

**OUTCOME MAPPING**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: I PART-III</b>	<b>22UCSCC14: PROGRAMMING IN C</b>	<b>CREDIT: 4 HOURS: 5/W</b>
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### **COURSE OBJECTIVES**

- 1) To Provide complete knowledge of C language
- 2) Students will be able to develop logics which will help them to create programs, applications in C
- 3) By learning the basic programming constructs they can easily switch over to any other language in future.
- 4) To understand the concept of function types
- 5) To acquire knowledge about pointers.

#### **Unit I : Overview of C**

**Hours: 15**

History of C – Importance of C – Basic Structure of C Programs – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant – overflow and underflow of data – Operators and Expressions: Arithmetic, relational, logical, assignment operators – increment and decrement operators, conditional operators, bitwise operators, special operators – Arithmetic Expressions- Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical functions.

#### **Unit II: Managing I/O Operations**

**Hours:10**

Reading and Writing a Character – Formatted Input, Output – Decision Making & Branching: if statement - if else statement - nesting of if else statements - else if ladder – switch statement – the ?: operator – goto statement – the while statement – do statement – the for statement – jumps in loops.

#### **Unit III: Arrays**

**Hours:10**

One-Dimensional Arrays – Declaration, Initialization – Two Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. Strings: Declaration, Initialization of string variables – reading and writing strings – string handling functions

#### **Unit IV: User-defined functions**

**Hours: 10**

Need – multi-function programs – elements of user defined functions – definition – return values and their types – function calls, declaration, category – all types of arguments and return values – nesting of functions – recursion – passing arrays, strings to functions – scope visibility and life time of variables. Structures and Unions: Defining a structure – declaring a structure variable – accessing structure members – initialization – copying and comparing – operation on individual members – array of structures – arrays within structures – structures within structures – structures and functions – unions – size of structures – bit fields

**Unit V: Pointers****Hours: 15**

Understanding Pointers, Accessing the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer increments and scale factors – pointers and character strings – pointers as function arguments – pointers and structures. Files: Defining, opening, closing a file – IO Operations on files – Error handling during IO operations – command line arguments.

**COURSE OUTCOMES**

- 1) To understand the concepts of data types and operators
- 2) To analyze the usages of the various programming constructs and functions
- 3) To interpret the importance of arrays and pointers
- 4) To identify the purpose of structures, unions, macros and bit fields
- 5) To develop programs using dynamic memory allocation and data file operations

**Text Books**

- 1) E.Balagurusamy, Programming in ANSI C, 7 the Edition, Tata McGraw Hill Pub, 2017.

**Supplementary Readings**

- 1) Ashok N.Kamthane, Programming with ANSI and Turbo C, Pearson Education, 2006.
- 2) Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.
- 3) T.Prabhu, C Programming Made Easy, Kanthimathi Publications.

**OUTCOME MAPPING**

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

**1-LOW 2- MODERATE 3-HIGH**



<b>SEMESTER: I PART-III</b>	<b>22UCSCP15: PROGRAMMING IN C LAB</b>	<b>CREDIT: 2 HOURS: 3/W</b>
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**COURSE OBJECTIVES**

- 1) To Develop Programs In C Using Basic Constructs.
- 2) Familiarize The Different Control And Decision Making Statements In “C”
- 3) Build Programs Using Arrays And Strings.
- 4) Provide Knowledge On Working With Files And Functions.
- 5) To Understand The Concepts Of Structures.

**LIST OF PROGRAMS****HOURS:45**

- 1) C Program Swap Numbers in Cyclic Order Using Call by Reference
- 2) C Program to Remove all Characters in a String Except Alphabets
- 3) C Program to Sort Elements in Lexicographical Order (Dictionary order)
- 4) C Program to Calculate Standard Deviation of 10 numbers stored in an array.
- 5) C Program to Add Two Matrices Using Multi-dimensional Arrays.
- 6) C Program to Find Largest Number Using Dynamic Memory Allocation
- 7) C Program To Convert Binary Number To Decimal
- 8) C Program to Add Two Distances (in inch-feet system) using Structures
- 9) C Program to Check Whether a Number can be Expressed as Sum of Two Prime Numbers.
- 10) C Program to Make a Simple Calculator Using switch...case.
- 11) C Program to Display (i) Fibonacci Sequence (ii) Factorial of a given number.
- 12) C Program to find odd or even numbers using files.

**COURSE OUTCOMES**

- 1) Demonstrate knowledge on C programming constructs.
- 2) Study all the Basic Statements in C Programming.
- 3) Practice the usage of branching and looping statements.
- 4) Apply string functions and arrays usage.
- 5) Analysis the use of files and structures.

**OUTCOME MAPPING**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER -I ALLIED- I</b>	<b>22UMATA01: MATHEMATICS – I</b>	<b>CREDIT- 4 HRS/WK – 5</b>
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### **COURSE OBJECTIVES**

To acquire knowledge on finding roots of the Transcendental and Algebraic equations by Numerical methods, applications of matrices and Numerical methods for solving Simultaneous Linear equations. To understand the Computations of Eigen values ,Eigen vectors, differential calculus ,the evaluation of double and Triple integrals for finding Area and Volume.

### **UNIT-I: SOLUTIONS OF TRANSCENDENTAL AND ALGEBRAIC EQUATIONS**

Iteration method, Bisection method, Newton's method - Regula Falsi method, Horner's method (without proof) (Simple problems only)

### **Unit-II: SOLUTIONS OF SIMULTANEOUS EQUATIONS**

Gauss Elimination method- Gauss Jordan method-Gauss Seidel Iterative method-Gauss Jacobi method (Restricted to three variables only) (Simple problems only)

### **UNIT-III: MATRICES**

Characteristic equation of a square matrix- Eigen values and eigen vectors – Cayley – Hamilton theorem [without proof] – Verification and computation of inverse matrix-

### **UNIT-IV: DIFFERENTIAL CALCULUS**

n-th derivatives – Leibnitz theorem [without proof] and applications – Jacobians- Curvature and radius of curvature in Cartesian co-ordinates and polar co-ordinates.

### **UNIT-V: APPLICATION OF INTEGRATION**

Evaluation of double, triple integrals – Simple applications to area, volume and centroid.

### **COURSE OUTCOMES**

On successful completion of the course, the students will be able to

- 1) Attain knowledge on finding Approximate root for polynomial equations using Numerical methods.
- 2) Develop the skills of finding solutions of Simultaneous Linear equations.
- 3) Adopt techniques in solving problems involving Matrices
- 4) Provide skills on finding curvature and radius of curvature in Cartesian and polar co-ordinates.
- 5) Understand the applications of double and Triple integration in real life situation.

**Text Books**

- 1) A.Singaravelu “Numerical Methods”Meenakshi Publications  
Unit-I: Chapter 2  
Unit-II: Chapter 2
- 2) P. Duraipandian and Dr. S. Udayabaskaran. 1997, “Allied Mathematics” , Vol I & II.  
Chennai: Muhil Publishers.  
Unit-III: Sec(1.1.1,1.1.2,1.2,1.4.3),  
Unit-IV: Sec(2.7,4.1,4.1.1,4.2),  
Unit-V: Chap:3(3.4,3.4.1,3.5,3.5.1,3.5.2,3.6)

**Supplementary Readings**

- 1) P. Balasubramanian and K. G. Subramanian. 1997, “Ancillary Mathematics”, Vol I & II.  
New Delhi: Tata McGraw Hill.
- 2) S.P.Rajagopalan and R.Sattanathan(2005), “Allied Mathematics”, Vol I & II. New Delhi:  
Vikas Publications.
- 3) P. R. Vittal (2003), “Allied Mathematics”,Chennai: Marghan Publications.

**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

<b>SEMESTER -I ALLIED- I</b>	<b>22UMAF01: MATHEMATICAL FOUNDATIONS – I</b>	<b>HRS/WK – 5 CREDIT – 4</b>
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### **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,**

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

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

<b>SEMESTER - II PART-III</b>	<b>22UCSCC23:PROGRAMMING WITH C++</b>	<b>HRS/WK – 5 CREDIT – 4</b>
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### **COURSE OBJECTIVES**

This course enables the students to know about:

1. Object Oriented concepts,C++ language features.
2. Classes, Objects,Inheritance, and Polymorphism.
3. Functions, Constructors, Streams and Files.

#### **UNIT I:**

**(15Hrs)**

Principles of object oriented programming: Basic concepts of object oriented programming – Benefits of OOPs – Applications of OOPs – Beginning with C++: C++ introduction – Applications of C++ – C++ statements – Structure of C++ program. Tokens, Expressions and Control structures: Tokens – Keywords – Identifiers – Constants – Operators in C++ - Manipulators – Expressions and their types – Basic and user defined data types – operators in C++ – Operator overloading – Operator precedence – Control structures.

#### **UNIT II :**

**(10Hrs)**

Functions in C++: The main functions – Function prototyping – Call by reference – Return by reference – Inline functions– Default arguments - Function overloading – Friend & Virtual Functions – Math Library functions. Classes and Objects: Specifying a class– Defining member function– Nesting of member functions– Private member functions– Arrays within a class – Static data members – Static member functions – Array of objects – Objects as function arguments – Friendly functions – Returning objects - Pointers to members.

#### **UNIT III :**

**(10Hrs)**

Constructors and Destructors: Constructors – Parameterized constructors – Multiple constructors in a class – Constructors with default arguments – Copy constructors – Dynamic constructors – Destructors. Operator overloading: Defining – Overloading Unary, Binary operators – Manipulation of strings using operators - Type conversions.

#### **UNIT IV:**

**(10Hrs)**

Inheritance: Defining derived classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract classes – Constructors in Derived Classes. Pointers, Virtual functions and Polymorphism: Pointers – Pointers to Objects, this Pointer – Virtual functions.Exception handling: Basics – Exception handling mechanism – Throwing and catching exception.

**UNIT V :****(15Hrs)**

Managing console I/O operations: C++ streams – C++ stream classes – Unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators. Working with files: classes for file stream operations – opening and closing a file – Detecting End – of - File – File Modes – File pointers and manipulation - Sequential I/O operations – Random access - Error handling during file operations, Command-line arguments.

**COURSE OUTCOMES**

- 1) Able to understand OOPs concept, C++ language features.
- 2) Able to understand and apply the concepts of Classes & Objects, friend function, constructors and destructors in program design.
- 3) Able to design & implement various forms of inheritance, and String classes.
- 4) Able to apply and analyze operator overloading, and runtime polymorphism.
- 5) Able to analyze and explore various Stream classes, I/O operations and Exception handling.

**Text Books**

- 1) E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill Publications, 8th Edition, 2020.

**Supplementary Readings**

- 1) Bjarne Stroustrup, The C++ Programming Language, Pearson Education, 4th Edition, 2014.
- 2) Rajesh K. Shukla, Object Oriented Programming in C++, Wiley India Pvt. Ltd., 1st edition, 2008.
- 3) Robert Lafore, Object Oriented Programming in C++, Galgotia Publications Pvt. Ltd., 4th edition, 2001.
- 4) Tony Gaddis, Judy Walfers, and Godfrey Muganda, Starting Out with C++: Early Objects, Addison-Wesley publication, 8th Edition, 2013.

**OUTCOME MAPPING**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER -II PART-III</b>	<b>22UCSCP24: PROGRAMMING WITH C++ LAB</b>	<b>HRS/WK – 3 CREDIT – 2</b>
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### COURSE OBJECTIVES

The objectives of the course are to have students :

- 1) Identify and practice the object-oriented programming concepts and techniques,
- 2) Practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

### LIST OF PROGRAMS

**HOURS: 45**

- 1) Write a C++ program to find sum of digits of a given number.
- 2) Write a C++ program to demonstrate the use of Constructors.
- 3) Write a C++ program to perform Overloading of a Binary Operator.
- 4) Write an OOP Program to demonstrate the importance of Multilevel inheritance.
- 5) Write an OOP program to demonstrate the Function overloading.
- 6) Write a C++ program to find the sum of the given variables using Function with Default arguments.
- 7) Write a C++ program to demonstrate the use array of Objects.
- 8) Write a C++ program to handle the Exceptions.
- 9) Write a C++ program to perform Formatted console operations.
- 10) Write a C++ program to copy the content of one Text file into another text file.

### COURSE OUTCOMES

#### Ability to:

- 1) Creating simple programs using classes and objects in C++.
- 2) Implement Object Oriented Programming Concepts in C++.
- 3) Develop applications using stream I/O and file I/O.
- 4) Implement simple graphical user interfaces.
- 5) Implement Object Oriented Programs using templates and exceptional handling concepts.

### OUTCOME MAPPING

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

1-LOW 2- MODERATE 3-HIGH



<b>SEMESTER -II ALLIED- I</b>	<b>22UMATA02: MATHEMATICS – II</b>	<b>HRS/WK – 4 CREDIT – 3</b>
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### **COURSE OBJECTIVES**

To expand trigonometric functions, solving partial differential equations and learn about vector differentiation and integration, also too familiar with physical interpretation of divergence and curl of a vector. Learning Finite differences and applications of Interpolations in real life situations.

### **UNIT-I:TRIGONOMETRY**

Expansions of  $\sin^n \theta$ ,  $\cos^n \theta$ ,  $\sin n\theta$ ,  $\cos n\theta$ ,  $\tan n\theta$  – Expansions of  $\sin\theta$ ,  $\cos\theta$ ,  $\tan\theta$  in terms of  $\theta$  – Hyperbolic and inverse hyperbolic functions – Logarithms of complex numbers.

Unit-I: Chap: 6 (6.1,6.1.1-6.1.3,6.2,6.2.1-6.2.3,6.3,6.4)

### **UNIT-II: PARTIAL DIFFERENTIAL EQUATIONS**

Formation-complete integrals and general integrals-Four standard types-Lagranges equations.

Unit-II: Chap:6 (6.1,6.1.1,6.2,6.3,6.4).

### **UNIT-III: VECTOR DIFFRENTIATION**

Vector functions- Derivative of a vector function- Scalar and vector point functions- Gradient of a scalar point function- Gradient- Directional derivatives –Unit vector normal to a surface – angle between the surfaces-divergence, curl.

Unit-IIISec(8.1,8.1.1,8.2,8.3,8.3.1,8.3.2,8.4,8.4.1,8.4.2,8.4.3,8.4.4).

### **UNIT-IV: VECTOR INTEGRATION**

Green's theorem in the plane- Gauss divergence theorem- Stoke's theorem [without proofs].

Unit-IV:Sec(8.6.1, - 8.6.3).

### **UNIT-V: FINITE DIFFERENCES**

Operator E, Relation between  $\Delta$ ,  $\nabla$  and E – Interpolation – Newton – Gregory forward & backward formulae for interpolation-Lagrange's interpolation formula for unequal intervals(without proof) .

Unit-V:Sec(5.1,5.2).

### **COURSE OUTCOMES**

On successful completion of the course, the students will be able to

- 1) Attain knowledge on finding the expansions of trigonometric functions and concept of hyperbolic and inverse hyperbolic functions.
- 2) Provide a basic knowledge of Partial Differential equations and develops knowledge on handle practical problems.
- 3) Adopt techniques in solving problems involving vector and scalar functions
- 4) Provide skills on finding derivatives and gradients on vector differentiation and Integration.
- 5) Understand the applications of differentiation and integration in real life situation.

**Text Books**

- 1) P. Duraipandian and S. Udayabaskaran(1997), “Allied Mathematics”, Vol I & II. Chennai: Muhil Publishers.  
 Unit-I: Chap: 6 (6.1,6.1.1-6.1.3,6.2,6.2.1-6.2.3,6.3,6.4), Vol I,  
 Unit-II: Chap:6 (6.1,6.1.1,6.2,6.3,6.4), Vol II,  
 Unit-III:Sec(8.1,8.1.1,8.2,8.3,8.3.1,8.3.2,8.4,8.4.1,8.4.2,8.4.3,8.4.4),Vol I,  
 Unit-IV:Sec(8.6.1, - 8.6.3), Vol I,  
 Unit-V:Sec(5.1,5.2), Vol II.

**Supplementary Readings**

- 1) P. Balasubramanian and K. G. Subramanian. 1997, “Ancillary Mathematics”, Vol I & II. New Delhi: Tata McGraw Hill.
- 2) S.P.Rajagopalan and R.Sattanathan(2005), “Allied Mathematics”, Vol I & II. New Delhi: Vikas Publications.
- 3) P. R. Vittal (2003), “Allied Mathematics”, Chennai: Marghan Publications.
- 4) P.Kandhasamy, K. Thilagavathy (2003), “Allied Mathematics” Vol I & II, New Delhi: Tata McGraw Hill.

**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**

<b>SEMESTER -II ALLIED- I</b>	<b>22UMAF02: MATHEMATICAL FOUNDATIONS – II</b>	<b>HRS/WK – 4 CREDIT – 3</b>
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### **COURSE OBJECTIVES**

To know about Operations on Matrices, types of Matrices, Rank of matrix, Inverse of Matrix, Methods to solve Simultaneous Linear equations, Test for consistency, Matrix of linear transformations, Characteristic roots and vectors, Types of Integration with applications to Area and Volume, Analytical Geometry 3D Planes and Straight Lines.

### **UNIT-I: MATRICES**

Multiplication of matrices, 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, Rank of a matrix, Solution of Simultaneous Linear equations by (i) Cramer's rule. (ii) Matrix Inversion Method.

### **UNIT-II: MATRICES**

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, Matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

### **UNIT-III : INTEGRATION**

Simple problems, Integration of rational functions involving algebraic expressions of the form

$$\frac{1}{ax^2 + bx + c}, \frac{1}{\sqrt{ax^2 + bx + c}}, \frac{px + q}{ax^2 + bx + c}, \frac{px + q}{\sqrt{ax^2 + bx + c}}, \frac{\sqrt{px + q}}{\sqrt{ax^2 + bx + c}}$$

Integration using simple substitutions, Integration involving trigonometric functions of the form

$$\frac{1}{a + b \cos x}, \frac{1}{a^2 \sin^2 x + b^2 \cos^2 x}$$

Integration by parts.

### **UNIT-IV : INTEGRATION**

Properties of definite integrals, Reduction formulae for

$$\int x^n e^{ax} dx, \int \sin^n x dx, \int \cos^n x dx, \int x^m (1-x)^n dx$$

applications of Integration for (i) Area under plane curves, (ii) Volume of solid of revolution.

### **UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION**

Planes, straight lines.

**COURSE OUTCOMES**

On successful completion of the course, the students will be able to

- 1) Understand different types of matrix operators
- 2) Know the concept of Consistency and Inconsistency of linear equations
- 3) Solve different forms of Integration
- 4) Find the Area and volume using integration for real world problems.
- 5) Know the concept of Planes, straight lines

**Text Books**

- 1) P.R.Vittal, Mathematical Foundations - Margham Publication, Chennai.

**Supplementary Readings**

- 1) U. Rizwan, Mathematical Foundations - SciTech, Chennai
- 2) V.Sundaram& Others, Mathematical Foundations - A.P.Publication, sirkali.
- 3) P.Duraipandian& Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
- 4) Manicavachagom Pillay & Natarajan. Analytical Geometry part II - Three Dimension - S.Viswanathan (printers & publication) Pvt 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

<b>YEAR-I SEMESTER -II PART-III</b>	<b>22UCSCE26-1: DIGITAL LOGIC FUNDAMENTALS</b>	<b>HRS/WK – 3 CREDIT – 3</b>
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**COURSE OBJECTIVES**

To Understand the basic concepts of Digital Circuits and Logic design of Computers.

**Unit-I: Number Systems****HOURS:9**

Digital Computers and Digital Systems - Binary Numbers – Number Base Conversions – Octal and Hexadecimal Numbers – Complements – Signed Binary Numbers – Binary Codes – Binary Storage and Registers – Binary Logic.

**Unit-II: Boolean Algebra and Logic Gates****HOURS:9**

Axiomatic Definition of Boolean algebra - Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Other Logic operations – Digital Logic Gates – Integrated Circuits.

**Unit-III: Simplification of Boolean Functions****HOURS:9**

The Map Method – Two and Three Variable Maps – Product of Sums Simplification - NAND and NOR Implementation - Other Two-Level Implementations - Don't Care Conditions - The Tabulation Method - Determination of Prime Implicants - Selection of Prime Implicants.

**Unit-IV: Combinational Logic****HOURS:9**

Design Procedure – Adders – Subtractors – Code Conversion – Analysis Procedure – Multilevel NAND Circuits – Multilevel NOR Circuits – Exclusive OR Functions.

**UNIT-V: Sequential Circuits****HOURS:9**

Flip Flops – Triggering of Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Flip-Flop Excitation Tables – Design Procedure – Design of Counters.

**COURSE OUTCOMES**

- 1) To Learn the basic design of Computers, Number Systems and Binary Codes.
- 2) To understand the Boolean algebra and the Logic Gates Operations.
- 3) To Learn and practice the K-Map Simplifications.
- 4) To study the Design Procedure of Adders, Subtractors and Multilevel Circuits.
- 5) To understand Flipflops, its types and the design of Counters.

**Text Books**

- 1) M. Morris Mano, Digital Logic and Computer Design - PHI, 2<sup>nd</sup> Edition -2006.

**Supplementary Readings**

- 1) Louis Neshelsky, Introduction to Digital Technology , John Wiley & Sons, Third Edition, 1983.
- 2) Dr. K. Meena, Principles of Digital Electronics, PHI Learning Private Limited, New Delhi – 1<sup>st</sup> Edition-2009.
- 3) Norman Balabanian, Bradley Carlson,“ Digital Logic Design Principles”- John Wiley & Sons, Inc 1 Edition 1996.

**OUTCOME MAPPING**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER -II PART-III</b>	<b>22UCSCE26-2: FUNDAMENTALS OF ALGORITHMS</b>	<b>HRS/WK – 3 CREDIT – 3</b>
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### **COURSE OBJECTIVES**

- 1) To know how to analyze the performance of algorithms.
- 2) To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- 3) To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, and backtracking.

#### **Unit I:**

**( 9 Hrs)**

Introduction to algorithm, reason for the analysis algorithms, Goal, Running time analysis, Compare Algorithms, Rate of Growth, Commonly Used Rate of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega- $\Omega$  Notation, Theta- $\Theta$  Notation, Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Amortized analysis.

#### **Unit II:**

**( 9 Hrs)**

Recursion and Back tracking: Recursion – importance – Format of a Recursive function – Recursion and Memory – Recursion versus Iteration – Algorithms for Recursion – Backtracking – Algorithms for Back tracking.

Tree algorithms: Tree – Binary tree – Types and properties of binary tree – Binary tree traversals – Threaded Binary tree traversals – Binary search trees – Balanced Binary search trees – AVL Trees.

#### **Unit III:**

**( 9 Hrs)**

Graph Algorithms: Introduction - Applications of Graphs - Graph Representation - Graph Traversals - Topological Sort - Shortest Path Algorithms - Minimal Spanning Tree.

Sorting algorithms: Sorting – importance – Classification of Algorithms – Bubble sort – Selection sort – Insertion sort – Merge sort – Heap sort – Quick sort – External sorting.

#### **Unit IV:**

**( 9 Hrs)**

Searching: Importance – types – Unordered linear search – Ordered linear search – Binary search – comparing basic searching algorithms – String searching algorithms.

Greedy Algorithms: Introduction, Greedy Strategy, Elements of Greedy Algorithms, Advantages and disadvantages of Greedy Method, Greedy Applications, Understanding Greedy Technique.

**Unit V:****( 9 Hrs)**

Divide and Conquer Algorithms: Introduction - Divide and Conquer Strategy - Divide and Conquer Visualization - Understanding Divide and Conquer - Advantages of Divide and Conquer - Disadvantages of Divide and Conquer - Divide and Conquer Applications.

Dynamic Programming: Introduction - Dynamic Programming Strategy - Properties of Dynamic Programming Strategy - Problems which can be solved using Dynamic Programming - Dynamic Programming Approaches - Examples of Dynamic Programming Algorithms - Understanding Dynamic Programming - Longest Common Subsequence.

**COURSE OUTCOMES**

- 1) To learn the method of analysing algorithms.
- 2) To understand Recursion and backtracking principles.
- 3) To gain knowledge on the tree and graph algorithms.
- 4) To understand the sorting and searching algorithms.
- 5) To learning the working principles of Greedy, Divide-and-Conquer and Dynamic programming algorithms.

**Text books**

- 1) Narasimha Karumanchi, Data Structures and Algorithms Made Easy: Data Structure and Algorithmic Puzzles, CareerMonk Publications, 2017.

**Supplementary Readings**

- 1) Cormen, Thomas H, and Thomas H. Cormen. Introduction to Algorithms. Cambridge, Mass: MIT Press, 2001.
- 2) Aho, Ullman & Hopcroft, Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman. Data Structures and Algorithmus. Addison-Wesley, 2009.
- 3) Ellis Horowitz and Sartaj Sahni, Fundamentals of Computer Algorithms, Computer Science Press, 2007.

**OUTCOME MAPPING**

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

**1-LOW 2- MODERATE 3-HIGH**



<b>SEMESTER: II</b> <b>PART: III</b>	<b>22UCSCE26-3: SYSTEM SOFTWARE</b>	<b>CREDIT: 3</b> <b>HOURS: 3/W</b>
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**COURSE OBJECTIVES**

- 1) To understand the relationship between system software and machine architecture.
- 2) To know the design and implementation of assemblers
- 3) To know the design and implementation of linkers and loaders.
- 4) To have an understanding of macroprocessors.
- 5) To have an understanding of system software tools.

**Unit I INTRODUCTION****Hours: 8**

System software and machine architecture – The Simplified Instructional Computer (SIC) – The SIC/XE Machine Architecture – SIC Programming Examples.

**Unit II ASSEMBLERS****Hours: 10**

Basic assembler functions : A simple SIC assembler – Assembler algorithm and data structures, Machine dependent assembler features : Instruction formats and addressing modes – Program relocation, Machine independent assembler features : Literals – Symbol-defining statements – Expressions, One pass assemblers and Multi pass assemblers, Implementation example : MASM assembler.

**Unit III LOADERS AND LINKERS****Hours: 9**

Basic loader functions : Design of an Absolute Loader – A Simple Bootstrap Loader, Machine dependent loader features : Relocation – Program Linking – Algorithm and Data Structures for Linking Loader, Machine-independent loader features: Automatic Library Search – Loader Options, Loader design options : Linkage Editors – Dynamic Linking – Bootstrap Loaders, Implementation example : MSDOS linker.

**Unit IV MACRO PROCESSORS****Hours: 9**

Basic macro processor functions : Macro Definition and Expansion – Macro Processor Algorithm and data structures, Machine-independent macro processor features : Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters, Macro within Macro, Implementation example : MASM Macro Processor – ANSI C Macro language.

**Unit V SYSTEM SOFTWARE TOOLS****Hours: 9**

Text editors : Overview of the Editing Process - User Interface – Editor Structure, Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

**COURSE OUTCOMES**

- 1) Understand the relationship between system software and machine architecture.
- 2) Know the design and implementation of assemblers
- 3) Know the design and implementation of linkers and loaders.
- 4) Understanding of macroprocessors and its implementation.
- 5) Understanding of system software tools

**Text Books**

- 1) Leland L. Beck (2006). System Software – An Introduction to Systems Programming (3<sup>rd</sup> Edition). Pearson Education Asia.

**Supplementary Readings**

- 1) D. M. Dhamdhere (2000). Systems Programming and Operating Systems (2nd Revised Edition). Tata McGraw-Hill.
- 2) John J. Donovan (2000). Systems Programming. Tata McGraw-Hill Edition.
- 3) John R. Levine (2000). Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers.

**OUTCOME MAPPING**

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

**1-LOW 2- MODERATE 3-HIGH**

<b>SEMESTER:III</b> <b>PART:III</b>	<b>22UCSCC33 : PROGRAMMING IN JAVA</b>	<b>CREDIT:4</b> <b>HOURS: 4/W</b>
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**COURSE OBJECTIVES**

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3. Be aware of the important topics and principles of software development.
4. Have the ability to write a computer program to solve specified problems.
5. Be able to use the Java SDK environment to create, debug and run simple Java programs.

**Unit I :****Hours: 12**

Data Types, Variables and Arrays: Primary types – Integers – Floating point types – Characters – Booleans – A Closer Look at Literals – Variables – Type Conversion and Casting – Automatic type Promotion in Expressions - One Dimensional Arrays– Multi Dimensional Arrays. Operators: Arithmetic Operators – Bitwise operators – Relational Operators – Boolean Logical Operators – Assignment Operator – Conditional Operator – Operator Precedence- Using parentheses.

**Unit II:****Hours:12**

Introducing Classes: Class Fundamentals – Declaring objects- Assigning object Reference variables- Introducing Methods- Constructors-Garbage collection – Finalize() Method A Closer Look at Methods and classes: Overloading Methods-Using objects as parametersArgument passing –Returning objects- Recursion-Introducing Access control – understanding static –Introducing final – Nested and Inner classes- String class- Using command line arguments. Inheritance: Inheritance Basics –Using super- creating Multilevel Hierarchy - Method overriding –Dynamic Method Dispatch –Using Abstract class –Using final with inheritance-The object class.

**Unit III:****Hours:12**

Packages and interfaces: Packages –Access Protection – Importing packages-Interfaces. Exception Handling: Introduction- Exception Types – Uncaught Exceptions- Using try and catch – Multiple catch clauses –Nested try statements- throw – throws-finally. Multithreaded programming : Java Thread Model –Main Thread –Creating a Thread –Creating Multiple Threads – Using is Alive() and join() –Thread priorities

**Unit IV:****Hours:12**

The Applet class: Applet Basics – Applet Architecture –Applet Skeleton- Applet Display method –Requesting Repainting – HTML APPLET tag- Passing Parameters to Applet. Event Handling: Event Handling Mechanisms –Delegation Event Model –Event classes(The Action Event ,Item Event , Key Event, Mouse Event) – Sources of Events - Event Listener Interfaces(Action Listener, Item Listener, Key Listener, Mouse Listener).

**Unit V:****Hours: 12**

Introducing the AWT: AWT Classes – Window fundamentals – working with Frame Windows –working with Graphics– Working with color – Working with Fonts. Using AWT Controls: Controls Fundamentals – Labels – Using Buttons –Applying check Boxes – Check Box group – Choice Controls – Using a Text field – Using a Text Area – Understanding Layout Managers [Flow Layout Only ] – Menu Bars and Menus.

**COURSE OUTCOMES**

1. Competence on the development of small to medium sized application programs that demonstrate professionally acceptable coding.
2. Demonstrate the concept of object oriented programming through Java.
3. Apply the concept of Inheritance, Modularity, Concurrency, Exceptions handling and data persistence to develop java program.
4. Develop java programs for applets and graphics programming.
5. Understand the fundamental concepts of AWT controls, layouts and events.

**Text Books**

1. Herbert Schildt, “Java - The Complete Reference”, Ninth Edition, McGrawHill Education, 2014

**Supplementary Readings**

1. E. Balagurusamy, “Programming with Java”, Tata McGraw-Hill Education India, 2014
2. Sachin Malhotra & Saurabh Choudhary, “Programming in JAVA”, 2nd Ed, Oxford Press
3. Sagayaraj, Denis, Karthik and Gajalakshmi, “JAVA Programming for Core and Advanced Learners”, 2018

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER:III</b> <b>PART:III</b>	<b>22UCSCP34: PROGRAMMING IN JAVA LAB</b>	<b>CREDIT:2</b> <b>HOURS:4/W</b>
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### **COURSE OBJECTIVES**

1. The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training.
2. To practice the Object, Class, inheritance and recursion concepts in Java programming.
3. To implement and gain knowledge in packages, interfaces, exception and thread handling.
4. To write programs to implement graphics, applets and event handling.
5. To implement AWT classes and windows fundamentals.

### **PRACTICAL EXERCISES:**

**HOURS:60**

1. Write a program to extract a portion of a character string and print the extracted string.
2. Write a program to sort the given names in alphabetical order.
3. Write a program to add two matrices.
4. Write a program to prepare a marksheet using class and objects.
5. Write a program to find the area of a rectangle using constructor.
6. Write a program to find out the factorial of a given number using recursion.
7. Write a program to illustrate the concept of multiple inheritance.
8. Write a program to implement user defined packages and interfaces.
9. Write a program to implement the concept of exception handling.
10. Write a program to implement the concept of multithreading.
11. Write an applet to draw several shapes using graphics.
12. Write an applet to implement event handling.
13. Write an applet program to display a message with different colors, size and fonts.
14. Write a program to implement a calculator using AWT controls.
15. Write a program to display an analog clock using Graphics.

### **COURSE OUTCOMES**

1. Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding.
2. Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, inheritance.
3. Construct Java programs using Multithreaded Programming and Exception Handling.
4. Understand the implementation of Graphics and Applets.
5. Implementation of AWT controls, layouts and windows fundamentals.

**Text Books**

1. E. Balagurusamy, Programming with Java – A Primer, , TMH. ,5th Edition.
2. Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10th Edition, 2018.

**Supplementary Readings**

1. Patrick Naughton & Hebert Schildt, The Complete Reference Java 2, 3rd Edition, TMH.
2. John R. Hubbard, Programming with Java,2nd Edition, TMH.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER:III</b> <b>PART:III</b>	<b>22UCSCE36-1: ELECTRONIC COMMERCE</b>	<b>CREDIT:3</b> <b>HOURS:4/W</b>
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## **COURSE OBJECTIVES**

**The objective of this course is to:**

1. Discuss fundamentals of e-commerce, types and applications.
2. Evaluate the role of the major types of information systems in a business environment and their relationship to each other
3. Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business
4. Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.
5. Learn strategies for e-commerce, Mobile Commerce, Wireless Application Protocol, WAP technology and Mobile Information devices.

### **Unit I: INTRODUCTION**

**9 HOURS**

Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Impact of E-commerce on business, E-Commerce Models.

### **Unit II: NETWORK INFRASTRUCTURE FOR E- COMMERCE**

**9 HOURS**

Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.

### **Unit III: WEB SECURITY**

**9 HOURS**

Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

### **Unit IV: ENCRYPTION**

**9 HOURS**

Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.

### **UNIT V: ELECTRONIC PAYMENTS**

**9 HOURS**

Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking.EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.

**COURSE OUTCOMES:****At the end of the course student will be able to:**

1. Understand the basic concepts and technologies used in the field of management information systems
2. Understand the processes of developing and implementing information systems
3. Be aware of the ethical, social, and security issues of information systems and
4. Develop an understanding of how various information systems work together to accomplish the information objectives of an organization
5. Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation

**TEXT BOOKS**

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.

**REFERENCE BOOKS**

1. Pete Lohsin , John Vacca "Electronic Commerce", New Age International
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education
4. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMHTurban, "Electronic Commerce 2004: A Managerial Perspective", Pearson Education

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH



<b>SEMESTER:III</b> <b>PART:III</b>	<b>22UCSCE36-2 : COMPUTER GRAPHICS</b>	<b>CREDIT:3</b> <b>HOURS:4/W</b>
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**LEARNING OBJECTIVES:**

1. To understand the fundamentals about Computer Graphics.
2. To familiar with Scanners and I/O devices.
3. To be exposed to 2D and 3D Transformations and clipping.

**Unit I:****(9Hrs)**

Overview of graphics Systems: Video Display Device – Refresh Cathode-Ray tubes Raster – Scan Displays Random – Scan Displays – Color CRT Monitors –Direct view Storage tubes Flat – Panel Displays Three – Dimensional Viewing Devices. Stereoscopic and Virtual – Reality Systems.

**Unit II:****(9Hrs)**

Raster – Scan Systems Video Controller – Random – Scan Systems Video Controller – Random-Scan Systems – Input device – Keyboard Mouse – Trackball and Space ball . Joysticks – Data Glove – Digitizers- Image Scanners – Touch Panels – Light pens. Voice Systems – Hard-Copy Devices – Line Drawing Algorithms DDA Algorithms – Circle generating Algorithm Properties of Ellipses.

**Unit III:****(9Hrs)**

Two Dimensional Geometric Transformation: Basic Transformations - Translation – Rotation – Scaling – Matrix Representations and Homogeneous Coordinates – Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations – Clipping Operations – Point Clipping – Line Clipping – Curve Clipping – Text Clipping – Exterior Clipping.

**Unit IV:****(9Hrs)**

Three Dimensional Concepts: Three Dimensional Display method – Parallel projection – Depth cueing - visible line and surface – Three Dimensional Geometric and modelling Transformations: Translation – Rotation - Scaling – Composite Transformations. Three Dimensional Viewing: Viewing pipeline – Viewing Coordinates – Projections – Parallel Projections – Perspective Projections.

**Unit V:****(9Hrs)**

Visible Surface Detection Methods : Classification Visible Surface Detection Algorithms – Back Face Detection – Depth – Buffer Method – A-Buffer Method – Scan line method – Depth sorting method – BSP tree method – Area Subdivision Method.

**COURSE OUTCOMES:**

1. Remember the basic concepts of Graphics system.
2. Understanding scanner systems and I/O Devices.
3. Apply 2D Transformations.
4. Evaluate 3D Transformations.
5. Implement the Visual surface techniques.

**Text book:**

1. Donald D. Hearn & M. Pauline Baker “Computer Graphics, C version” 2nd Edition, Pearson Education, New Delhi, 2005.

**Reference books:**

1. S. Harrington “Computer Graphics- A Programming Approach”, McGraw Hill Publication, New Delhi, 1994.
2. W.M.Newman and RF Sproull, “Principle of Interactive Computer Graphics”, McGraw Hill Publication, New Delhi, 1995.
3. Zhigang Xiang, Roy A Plastock, “Computer Graphics”, Schaums Outline, Tata McGraw Hill, 2007.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER:III</b>	<b>22UCSCE36-3 : WEB SERVICES</b>	<b>CREDIT:3</b>
<b>PART:III</b>		<b>HOURS:4/W</b>

**COURSE OBJECTIVES:**

- 1.To Understand Web Services and implementation model for SOA
- 2.To Understand the SOA, its Principles and Benefits
- 3.To Understand XML concepts
- 4.To Understand paradigms needed for testing Web Services
- 5.To explore different Test Strategies for SOA-based applications

**UNIT 1****HOURS : 9**

Evolution and Emergence of Web Services – Evolution of distributed computing. Coredistributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM,MOM, Challenges in Distributed Computing, Introduction to Web Services – The definition ofweb services, basic operational model of web services, tools and technologies enabling webservices, benefits and challenges of using web services.

**UNIT 2****HOURS: 9**

Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services.

**UNIT 3****HOURS:9**

Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation andtransformation. SOAP : Simple Object Access Protocol, Inter-application communicationand wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA,Reliable messaging,

**UNIT 4****HOURS:9**

Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

**UNIT 5****HOURS:9**

Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model,Interfaces, UDDI Implementation.

**COURSE OUTCOMES:**

1. Understand the principlesof SOA
2. Efficiently use market leading environment tools to create and consume web services
3. Identify and select the appropriate framework components in creation of webservice Solution
4. Apply OOP principles to creation of webservice solutions.
5. Understand and implement UDDI data model.

**Text Books**

1. Michael P, Web Services & SOA Principles and Technology, Second Edition.
2. R. Nagappan, R. Skoczylas, R.P. Sriganesh, Developing Java Web Services, Wiley India.
3. S. Chatterjee, J. Webber ,Developing Enterprise Web Services, Pearson Education.

**References**

1. F.P.Coyle,XML, Web Services, and the Data Revolution, Pearson Education.
2. S. Graham and others ,Building web Services with Java, 2nd Edition, Pearson Education.
3. D.A. Chappell & T. Jewell ,Java Web Services, O'Reilly, SPD.
4. McGovern, et al., "Java web Services Architecture", Morgan Kaufmann Publishers, 2005.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: III PART: III ALLIED THEORY: II</b>	<b>22UPHYA01: PHYSICS - I</b>	<b>CREDIT: 3 HOURS: 4/W</b>
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**COURSE OBJECTIVES**

1. To understand the concept of elasticity and strength of solid materials, viscous properties of liquids and surface tension.
2. To acquire knowledge on centre of gravity, state of equilibrium and stability of floating.
3. To study the heat capacity, conduction, convection, and radiation
4. To understand conversion of heat into mechanical work.
5. To know the phenomena of light such as interference, diffraction, polarization, and their applications

**UNIT I : Properties of matter****12 Hours**

Elasticity: Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending and uniform bending.

Viscosity: Turbulent and streamline flow - Viscous force – Coefficient of viscosity of a liquid –Poiseuille's formula.

Surface Tension: Surface Tension – Surface Tension and interfacial surface tension by the method of drops.

**UNIT II : Mechanics****12 Hours**

Centre of Gravity – solid hemisphere – Hollow hemisphere – solid cone – solid tetrahedron.

States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example - Stability of Floating bodies – Metacenter – Determination of Metacentric height of a ship.

**UNIT III :Heat****12 Hours**

Specific heat capacity of solids and liquids – Dulong and Petit's law – Newton's law of cooling – Specific heat capacity of a liquid by cooling - Heat conduction – coefficient of thermal conductivity by Lee's disc method – Convection- Land and sea breeze- Black body radiation – Wien's distribution law, Rayleigh Jeans law, Wien's displacement law – Planck's radiation law – Stefan's law of radiation

**UNIT IV: Thermodynamics****12 Hours**

Laws of thermodynamics(zeroth, first and second) – isothermal and adiabatic processes - Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Third law of Thermodynamics-Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas – change in entropy when ice is converted into steam.

**UNIT V: Optics****12 Hours**

Interference – conditions for interference maxima and minima – Air wedge –thickness of a thin wire – Newton’s rings – determination of wavelength using Newton’s rings.

Diffraction – Difference between Fresnel and Fraunhofer diffractions – Theory of transmission grating – normal incidence.

Polarization - optical activity – Biot’s law –Specific rotatory power – determination of specific rotatory power using Laurent’s half shade polarimeter.

**COURSE OUTCOMES**

Students studying this course would understand the following:

1. Fundamentals of elasticity, theory of bending, flow of liquids and viscous forces and surface tension
2. centre of gravity of bodies of different shapes, equilibrium of states and forces involved in stability of floating.
3. transmission of heat by the process of conduction, convection, and radiation.
4. various laws involved in heat transformation, thermodynamics, and the concept of entropy
5. the phenomena like interference diffraction, and polarization, optical activity of liquids and its uses

**Text Books**

1. Brijlal and Subramanyam M, (1983), *Properties of matter*, Eurasia Publishing co., III Edition
2. Brijlal & Subramanyam M, (2005), *Heat and Thermodynamics*, S.Chand & Co, 16<sup>th</sup> Edition
3. Subramanyam M & Brijlal, (2004), *A Textbook of Optics*, S. Chand and co., New Delhi, 22<sup>nd</sup> Edition

**Supplementary Readings**

1. Mathur D S, (1976), *Element of properties of matter*, S. Chand & Company Ltd, 10<sup>th</sup> Edition
2. Mathur D S, (2014) *Heat and Thermodynamics*, Sultan Chand & Sons, 5<sup>th</sup> Edition.
3. Murugesan R, (2008), *Optics and Spectroscopy*, S. Chand and co., New Delhi

**OUTCOME MAPPING**

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

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

<b>SEMESTER: III</b> <b>PART: III</b> <b>ALLIED THEORY: II</b>	<b>22USTAA01: STATISTICS-I</b>	<b>CREDIT: 3</b> <b>HOURS: 4/W</b>
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## OBJECTIVE

To understand and computing statistical Methods by which to develop the programmingSkills.

### UNIT-I

Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data - Diagrammatic and Graphical representation of data - Graphical determination of Quartiles ,Deciles and Percentiles.

### UNIT-II

Measures of location : Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.

### UNIT-III

Measures of dispersion : Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures.

### UNIT-IV

Measures of Skewness Karl Pearson's, Bowley's, and kelly's and co-efficient of Skewness and kurtosis based on moments.

### UNIT-V

Correlation - Karl Pearson - Spearman's Rank correlation – concurrent deviation methods.

Regression Analysis: Simple Regression Equations.

### BOOKS FOR REFERENCE:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
3. Elements of Statistics - Mode . E.B. - Prentice Hall
4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

**SKILL BASED SUBJECT - I**

<b>SEMESTER: III</b> <b>PART-IV</b>	<b>22UCSCS38 : FUNDAMENTALS OF DATA STRUCTURES</b>	<b>CREDIT:2</b> <b>HOURS:3/W</b>
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**LEARNING OBJECTIVES**

1. Understand the basic concept of algorithms.
2. To introduce the various data structures and their implementations.
3. Evaluate the performance of various sorting algorithms.
4. Understanding the stack and queues
5. Evaluate the trees and sorting methods.

**Unit I : Introduction of algorithms****Hours: 9**

Analyzing algorithms, Arrays : Representation of Arrays, Implementation of Stacks and queues, Application of Stack: Evaluation of Expression - Infix to postfix Conversion - Multiple stacks and Queues, Sparse Matrices.

**Unit II: Linked list****Hours: 9**

Singly Linked list - Linked stacks and queues - polynomial addition - More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction.

**Unit III: Trees****Hours:9**

Basic Terminology - Binary Trees - Binary Tree representations - Binary trees - Traversal - More on Binary Trees - Threaded Binary trees - counting Binary trees. Graphs: Terminology and Representations - Traversals, connected components and spanning Trees, Single Source Shortest path problem.

**Unit IV: Symbol Tables****Hours:9**

Static Tree Tables - Dynamic Tree Tables - Hash Tables Hashing Functions - overflow Handling. External sorting : Storage Devices -sorting with Disks : K-way merging - sorting with tape.

**Unit V: Internal sorting****Hours: 9**

Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files: Files, Queries and sequential organizations - Index Techniques - File organization.

**COURSE OUTCOMES:**

1. Understand basic data structures such as arrays, linked lists, stacks and queues
1. Describe the hash function and concepts of collision and its resolution methods
2. Solve problem involving graphs, trees and heaps
3. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data
4. Demonstrate advantages and disadvantages of specific algorithms and data structures.

**Text Book :**

1. Ellis Horowitz, Sartaj Shani, Fundamentals of Data Structures, Galgotia publication.



**Supplementary Readings :**

1. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J.Augenstein ,Data structures Using C, Kindersley (India) Pvt. Ltd.,
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman ,Data structure and Algorithms, , Pearson Education Pvt. Ltd.,
3. Seymour Lipschutz , Data Structures ,Tata McGraw-Hill – 2006

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

**SEMESTER – IV**

<b>SEMESTER: IV</b> <b>PART: III</b>	<b>22UCSCC43 : PYTHON PROGRAMMING</b>	<b>CREDIT: 4</b> <b>HOURS: 4/W</b>
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**COURSE OBJECTIVES**

1. Describe the core syntax and semantics of Python programming language.
2. Discover the need for working with the strings and functions.
3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4. Understand the usage of Files and Graphics.
5. Understand the usage of sets and Dictionaries, Recursive Functions.

**Unit I : Introduction and Basics of Python****Hours: 15**

Computer algorithms-The process of computational problem-solving Python programming language - Literals - Variables and Identifiers - Operators – Expressions- Operator Precedence, Operator Associativity - Data types - Age in Seconds Program.

**Unit II: Control Structure and Lists****Hours: 15**

Control Structures: Boolean Expressions - Selection Control - If Statement, Indentation in Python, Multi-Way Selection, Iterative Control- While Statement, Infinite loops, Definite vs. Indefinite Loops, Boolean Flags and Indefinite Loops. Lists: List Structures - Lists in Python - Iterating over lists in Python- More on Python Lists - Tuples.

**Unit III: Functions, Objects and Graphics****Hours:15**

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope- Software Objects: What is an Object? Object References- Turtle Graphics – Turtle attributes.

**Unit IV: Modules, Files, String and Dictionaries and Sets****Hours: 15**

Modular Design: Modules - Top-Down Design - Python Modules-Text Files: Opening, reading and writing text files - String Processing - Exception Handling- Dictionary type in Python - Set Data type.

**Unit V: Object oriented Programming and Recursion****Hours: 15**

Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Recursion: Fundamental Concepts - Recursive Functions - Recursive Problem Solving - Iteration vs. Recursion - Towers of Hanoi problem.

**COURSE OUTCOMES**

1. To Understand the principles of Python and acquire skills in programming in python
2. To develop the emerging applications of relevant field using Python
3. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
4. Able to develop simple turtle graphics programs in Python
5. To Understand the Files, Exception handling, object Oriented programming principles in Python.

**Text Books**

1. Charles Dierbach (2015). Introduction to Computer Science using Python - A computational Problem solving Focus. Wiley India Edition.

**Supplementary Readings**

1. Mark Lutz (2018). Learning Python Powerful Object-Oriented Programming (5th Edition). ,O'Reilly Media.
2. 2.Timothy A. Budd (2011). Exploring Python (1st Edition), Tata McGraw Hill Education Private Limited.
3. 3.Sheetal Taneja & Naveen Kumar (2017). Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications. India. Pearson.
4. 4.Ch Satyanarayana M Radhika Mani, B N Jagadesh (2018). Python programming. India. Universities Press.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: IV</b> <b>PART: III</b>	<b>22UCSCP44 : PYTHON PROGRAMMING LAB</b>	<b>CREDIT: 2</b> <b>HOURS: 2/W</b>
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**COURSE OBJECTIVES**

1. To implement the python programming features in practical applications.
2. To write, test, and debug simple Python programs.
3. To implement Python programs with conditionals and loops.
4. Use functions for structuring Python programs.
5. Represent compound data using Python lists, tuples, sets, dictionaries, turtles, Files and modules.

**LIST OF EXERCISES:****HOURS :45**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:
4. Grade A: Percentage  $\geq 80$  Grade B: Percentage  $\geq 70$  and  $< 80$
5. Grade C: Percentage  $\geq 60$  and  $< 70$  Grade D: Percentage  $\geq 40$  and  $< 60$
6. Fail: Percentage  $< 40$
7. Program to display the first 'n' terms of Fibonacci series.
8. Write a Python program to count the number of even and odd numbers from list of N numbers.
9. Create a Turtle graphics window with specific size.
10. Write a Python program using function that accepts a string and calculate the number of upper-case letters and lower-case letters.
11. Python program to reverse a given string and check whether the give string is palindrome or not.
12. Write a program to find sum of all items in a dictionary.
13. Read a file content and copy only the contents at odd and even lines into separate new files.
14. Program to find factorial of the given number using recursive function.
15. Write a Python program for Towers of Hanoi using recursion.

**COURSE OUTCOME:**

1. Understand the numeric or real-life application problems and solve them.
2. Apply a solution clearly and accurately in a program using Python.
3. Apply the best features available in Python to solve the situational problems.
4. Understand the concept of file handling in Python.
5. Apply the recursive methods in Python.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: IV PART: III ALLIED : II</b>	<b>22UPHYA02: PHYSICS II</b>	<b>CREDIT: 3 HOURS: 4</b>
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**COURSE OBJECTIVES**

1. To understand the concept and laws of electrostatics, working of capacitors.
2. To acquire knowledge on current electricity, electromagnetic induction and resonance circuits.
3. To understand the atom models, X-rays and nuclear properties and reactions.
4. To study fundamentals of solid-state electronics diodes and transistors.
5. To know the number system, logic gates and basic digital circuits.

**UNIT I: Electrostatics****12 Hours**

Coulomb's inverse square law – Gauss law and its applications (Intensity at a point due to a charged sphere & cylinder) – Electric potential – Electric potential due to a point charge – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges - Capacitors in series and parallel – Types of capacitors.

**UNIT II: Current Electricity and Electromagnetism****12 Hours**

Resistance in series and parallel connections – Kirchoff's laws – Wheatstone's network – condition for balance – Carey-Foster's bridge – measurement of specific resistance – determination of temperature coefficient of resistance

Electromagnetic Induction – Faraday's law – Lenz law – Self Inductance – Mutual Inductance – Coefficient of Coupling.

A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit – impedance – resonant frequency – sharpness of resonance.

**UNIT III : Atomic and Nuclear Physics****12 Hours**

Bohr's atom model – radius and energy – Atomic excitation – Ionization potential – Frank and Hertz Method - Vector atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits – X-rays – Production – properties – Derivation of Bragg's law – uses in industrial and medical fields – Nucleus – Nuclear properties – Mass defect – Binding energy - Radioisotopes – Uses of radioisotopes – Nuclear fission and Nuclear fusion.

**UNIT IV : Analog Electronics****12 Hours**

Semiconductor – PN junction diode – Bridge rectifier – Zener diode – Regulated power supply.

Transistor – Working of a transistor – CE Configuration – Transistor Characteristics (CE mode) – CE amplifier – feedback – Hartley oscillator – Colpitts oscillator.

**UNIT V : Digital Electronics****12 Hours**

Number system – Decimal – Binary – Octal and Hexadecimal system – Number Conversion(decimal to binary, decimal to hexadecimal and vice versa) - Binary addition, subtraction.

Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder – Laws and theorems of Boolean's algebra – De Morgan's theorems.

**COURSE OUTCOMES**

Students studying Allied Physics-II would have learnt the following:

1. Electric intensity, potential and capacitor principle and its types.
2. laws used in electrical circuits, specific resistance measurement and laws of electro magnetic induction.
3. various atom models, nuclear models, fission and fusion reactions.
4. solid state electronic devices diode and transistor, their characteristics and applications.
5. the number systems, conversion between them and logic gates and digital circuits.

**Text Books**

1. BrijLal & Subramanyam, (2005), *Electricity and Magnetism*, Ratan Prakashan Mandir Publishers.
2. Murugesan R, (2001),*Electricity and Magnetism*, S. Chand&co.
3. Murugesan R, (1998),*Modern Physics*, S. Chand& co.
4. Theraja B L, (2003),*Basic Electronics*, S.Chand&co.
5. Sedha R S, (2004) *A Textbook of Digital Electronics*, S.Chand & co, First edition,

**Supplementary Readings**

1. Narayanamurthi, (1988) *Electricity and Magnetism*, The National Publishing Co, First edition,.
2. Vasudeva,D.N. *Electricity and Magnetism*, (Twelfth revised edition)
3. Rajam J B, (1990),*Atomic Physics*, S. Chand & Company Limited, New Delhi, First edition,.
4. Srivastava B N, (2005) *Basic Nuclear Physics*, Pragati Prakashan, Meerut.
5. Albert Paul Malvino, (2002),*Digital principles and Applications*, McGraw-Hill International Editions, New York.

**OUTCOME MAPPING**

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

**CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH**



<b>SEMESTER: IV</b> <b>PART: III</b> <b>ALLIED PRACTICAL – I</b>	<b>22UPHYP01: PHYSICS PRACTICAL – I</b>	<b>CREDIT: 2</b> <b>HOURS: 3</b>
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### COURSE OBJECTIVES

1. To know the method of determining elastic properties of solids
2. To learn the experimental method to determine surface tension and viscous properties of liquids
3. To acquire knowledge of measurement of optical properties of solid
4. To acquire knowledge to measure the size of very small objects.
5. To gain knowledge of finding thermal properties of liquids
6. To obtain the electrical properties of a conductor and to perform experiments to study the semiconductor devices and digital circuits.

### LIST OF EXPERIMENTS (Any 12 Experiments to be done)

1. Non-Uniform bending – Pin and Microscope.
2. Uniform bending-scale and Telescope.
3. Rigidity modulus – Torsional oscillation method.
4. Coefficient of viscosity of liquid – Variable Pressure head (burette) Method
5. Surface tension and Interfacial Surface tension by Drop weight Method.
6. Specific heat capacity of liquid – Newton’s law of cooling Method.
7. Thermal conductivity of a bad conductor – Lee’s disc Method.
8. Spectrometer – Refractive index of a solid prism.
9. Spectrometer – Grating – minimum deviation method.
10. Air wedge – Thickness of the given thin wire.
11. Newton’s Rings – ‘R’ determination.
12. Meter bridge – Specific resistance.
13. Carey Foster’s Bridge – Resistance Determination.
14. Potentiometer – low range voltmeter.
15. Characteristics of a PN junction diode – Forward resistance and knee voltage.
16. Characteristics of a Zener diode - Breakdown voltage.
17. Basic logic gates – AND, OR and NOT gates using discrete components.
18. Study of basic logic AND, OR and NOT gates – Integrated circuits (IC)
19. Verification of NAND and NOR as Universal gates.
20. Verification of De Morgan’s theorem.

### COURSE OUTCOMES

After Completion of the Allied Physics Practical course the student would be conversant in measuring the 1)elastic properties 2) surface tension 3)viscous 4) thermal 5) electrical 6)optical properties and 7)acquired knowledge of semiconductor diodes and digital gates.

### Text Books

1. Somasundaram S (2012), *Practical Physics*, Apsara Publications, Tiruchirapalli.
2. Sasikumar R (2011) *Practical Physics*, PHI Learning Pvt. Ltd, New Delhi.

3. Arora CL, *B.Sc. Practical Physics*, S.Chand & Co. limited.

### Supplementary Readings

1. Srinivasan S, *A TextBook of Practical Physics*, S.Sultan Chand Publications.
2. Ouseph C.C, U.J. Rao (30 May 2009) *Practical Physics and Electronics* Viswanathan, Printers& Publishers Pvt Ltd..Chand and co., New Delhi, 6<sup>th</sup> Edition.
3. Murugesan R, (2005) *Allied Physics I & II*, S. Chand & Co. First Edition.
4. Thangaraj K, Jayaraman D *Allied Physics*, Popular Book Department, Chennai.
5. Mathur D S, (1999) *Elements of Properties of Matter*, S. Chand & Co.

### OUTCOME MAPPING

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

**CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH**

<b>SEMESTER: IV</b> <b>PART: III</b> <b>ALLIED THEORY: II</b>	<b>22USTAA02: STATISTICS-II</b>	<b>CREDIT: 3</b> <b>HOURS: 4</b>
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**OBJECTIVE**

To understand and computing statistical Methods by which to develop the programming Skills.

**UNIT-I**

Curve fitting by the methods of least squares -

$Y = a x + b$ ,  $Y = a x^2 + b x + c$ ,  $Y = a x^b$ ,  $Y = a e^{bx}$  and  $Y = ab^x$

**UNIT-II**

Sample Space - events - probability - Addition and Multiplication Theorem - conditional probability - Baye's Theorem. Mathematical expectation Addition and Multiplication theorem, Chebychev's Inequality.

**UNIT-III**

Standard distributions - Binomial, Poisson, Normal distribution and fitting of these distributions.

**UNIT-IV**

Test of Significance- small sample and large sample test based on mean, S.D. correlation and proportion - confidence interval.

**UNIT-V**

Analysis of variance - One and Two way classifications - Basic principle of design of Experiments - Randomisation, Replication and Local control - C.R.D., R.B.D. and L.S.D.

**BOOKS FOR REFERENCE:**

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
3. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
4. Elements of Statistics - Mode . E.B. - Prentice Hall

<b>SEMESTER: IV</b> <b>PART: III</b> <b>ALLIED PRACTICAL : I</b>	<b>22USTAP01: STATISTICS LAB</b>	<b>CREDIT: 2</b> <b>HOURS: 3</b>
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**LIST OF EXPERIMENTS**

1. Formation of uni-variate and bi-variate frequency distribution
2. Diagrams and Graphs
3. Measures of Location
4. Measures of Dispersion
5. Skewness and Kurtosis
6. Correlation and Regression
7. Curve Fitting :  $y = ax+b$ ,  $y=ax^2+bx+c$ ,  $y=ax^b$ ,  $y=ae^{bx}$
8. Fitting of distributions - Binomial, Poisson, Normal
9. Test of significance small sample and large sample tests
10. Analysis of Variance: one way classification, Two way classification and Design of Experiments - C.R.D, R.B.D & L.S.D

**BOOKS FOR REFERENCE:**

1. Statistical Methods by S.P. Gupta, Sultan chand & Sons
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

**NOTE:**

Use of Scientific Calculator shall be permitted for Practical Examination.  
Statistical Table may be provided to the students at the Examination Hall.

**SKILL BASED SUBJECT - II**

<b>SEMESTER: IV</b> <b>PART: IV</b>	<b>22UCSCS48: SOFTWARE ENGINEERING</b>	<b>CREDIT: 2</b> <b>HOURS: 3/W</b>
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**LEARNING OBJECTIVES:**

1. To introduce the software development life cycle models.
2. To introduce concepts related to Requirements engineering, modelling.
3. To provide an insight into design engineering.
4. To understand user interface design and quality assurance.
5. To know the testing strategies.

**Unit- I:****(9Hrs)**

Nature of Software – Changing nature of Software - Software Process –Software development myths - Process Models: Waterfall model – Incremental Process models – Evolutionary Process models – Concurrent models – Component-based development – Aspect-oriented Software development – Unified process – Personal and Team process models – Agility – Agile process – Extreme programming – Agile process models – Characteristics of a Software engineer – Software team – Team structure – Agile teams.

**Unit – II:****(9Hrs)**

Requirements Engineering: Requirements Engineering - Establishing the Groundwork – Eliciting requirements – Developing Use cases – Building the Analysis Model – Negotiating Requirements –Requirements Monitoring – Validating Requirements – Requirements Modelling: Scenario-Based Methods – Requirements analysis – Scenario-based modelling – UML models - Class-Based Methods – Creating a behaviour model – Patterns for requirements modelling – Requirements modelling for Web and Mobile apps.

**Unit – III:****(9Hrs)**

Design Engineering: Design Process – Design concepts – The Design Model: Data Design Elements- Architectural Design Elements – Interface Design Elements – Component-level design Elements – Deployment-Level Design Elements. Component-Level Design: Component – Designing Class-Based Components- Conducting Component-level Design. Component-Level Design for Mobile Apps – Component-based development.

**Unit – IV:****(9Hrs)**

User interface design: Golden rules – User interface analysis and design – Interface analysis – Steps – WebApp and Mobile interface design – Design evaluation. Quality management: Quality – Software quality – Dilemma – Achieving Software quality. Review techniques: Cost impact of Software defects – Defect application and removal – Review metrics and their use – Informal reviews – Formal technical reviews. Software quality assurance: Issues – Elements – SQA process and product characteristics – Tasks, goals, and metrics – Software reliability.

**Unit – V:****(9Hrs)**

Software Testing Strategies: Strategic approach to Software Testing – Test strategies for Conventional software – Object-oriented software - Validation Testing - System Testing. Testing conventional applications: Software testing fundamentals - White Box Testing – Basic Path testing – Control structure testing - Black Box Testing – Model based testing. Software configuration management basics and SCM process.

**COURSE OUTCOME:**

**On completion of the course, the students will be able to:**

1. Illustrate the concepts of software processes and software process models.
2. Describe the scenario-based and class-based models of software systems.
3. Apply design concepts and frame conceptual models for a given project.
4. Calculate effort estimation using COCOMO model.
5. Explain the testing strategies for ensuring software quality and agile development process.

**Text book:**

1. Roger S.Pressman and Bruce R. Maxim, “Software Engineering- A Practitioner’s Approach”, 8th Edition, McGraw-Hill International, 2019.

**Reference books:**

1. Ian Sommerville, “Software Engineering”, 10th Edition, Pearson Education, 2016.
2. Pankaj Jalote, “An Integrated Approach to Software Engineering”, 3rd Edition, Narosa Publishing House Pvt. Ltd., Reprint 2014.
3. Rajib Mall, “Fundamentals of Software Engineering”, Prentice hall of India, 4<sup>th</sup> edition, 2014.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	2	3	2
CO3	3	3	2	2	2
CO4	3	2	3	3	2
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1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER - V PART-III</b>	<b>22UCSCC51 : DATA COMMUNICATION NETWORKS</b>	<b>CREDIT – 3 HOURS: 4/W</b>
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**OBJECTIVE:**

1. To learn the Network concepts in Computers and its methods to communicate the data.
2. To Study the OSI Model and practice the layers
3. To Understand the importance of Physical Layers and Media.
4. To Study the Guided and Unguided media with concepts of Switching.
5. To learn the Error detection & Correction Codes and solve the problems.

**Unit-I: Data Communications****HOURS: 12**

Components of Data Communication - Data Representation – Networks: Network Criteria - Physical Structures - Network Models - Categories of Networks - The Internet: A Brief History - The Internet Today - Protocols and Standards: Protocols – Standards - Standards Organizations - Internet Standards.

**Unit-II: Layered Models****HOURS:12**

Layered Tasks - Sender, Receiver, and Carrier – Hierarchy - The OSI Model: Layered Architecture - Peer-to-Peer Processes – Encapsulation - Layers in the OSI Model: Physical Layer - Data Link Layer - Network Layer - Transport Layer - Session Layer - Presentation Layer - Application Layer.

**Unit-III: Physical Layer and Media****HOURS:12**

Analog and Digital Data - Analog and Digital Signals - Periodic and Nonperiodic Signals - Periodic Analog Signals: Sine Wave – Phase – Wavelength - Time and Frequency Domains - Composite Signals – Bandwidth - Digital Signals: Bit Rate - Bit Length - Digital Signal as a Composite Analog Signal - Transmission of Digital Signals. Analog-To-Digital Conversion - Pulse Code Modulation (PCM) - Delta Modulation (DM)- Transmission Modes-Parallel Transmission-Serial Transmission-Digital-To-Analog Conversion

**Unit-IV: Transmission Media****HOURS:12**

Guided Media: Twisted-Pair Cable-Coaxial Cable-Fiber-Optic Cable-Unguided Media: Wireless- Radio Waves-Microwaves-Infrared. Switching: Circuit-Switched Networks - Three Phases – Efficiency – Delay - Circuit-Switched Technology in Telephone Networks - Datagram Networks - Routing Table

**UNIT-V: Error Detection and Correction****HOURS:12**

Types of Errors – Redundancy - Detection Versus Correction - Forward Error Correction Versus Retransmission - Modular Arithmetic - Block Coding: Error Detection - Error Correction - Hamming Distance - Minimum Hamming Distance - Linear Block Codes: Minimum Distance for Linear Block Codes - Cyclic Codes: Cyclic Redundancy Check - Cyclic Code Analysis - Advantages of Cyclic Codes – Checksum.

**COURSE OUTCOME:**

1. Learn the basic of Computer Networks and Internet.
2. Describe the OSI Model and practice the layers
3. Understanding the importance of Physical Layers and Media.
4. Describing Study the Guided and Unguided media with concepts of Switching.
5. Understanding the Error detection & Correction Codes and solve the problems.

**Text Books:**

1. Behrouz A. Forouzan ,Data Communications and Networking, Fourth Edition ,2007

**Reference Books:**

1. William Stallings ,“Data and Computer Communication”, 7<sup>th</sup>Edition, Pearson Education, 2006.
2. Wayne Tomasi ,Introduction to Data Communications and Networking.
3. Pearson Prentice Hall, 2005

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH



<b>SEMESTER:V</b> <b>PART: III</b>	<b>22UCSCC52 : COMPUTER SYSTEM ARCHITECTURE</b>	<b>CREDIT: 3</b> <b>HOURS: 4/W</b>
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**LEARNING OBJECTIVES:**

1. To learn functions of digital circuits and data representation.
2. To understand basic computer, memory organization and design.
3. To gain knowledge on CPU, Memory, Pipeline, Vector and Multi-Processors.

**Unit – I:****(12Hours)**

Digital Logic Circuits: Combinational Circuits – Flip-Flops. Data Representation: Data Types – Complements – Fixed and Floating Point Representation – Other Binary Codes – Error Detection Codes.

**Unit – II:****(12Hours)**

Register Transfer and Microoperations: Register Transfer Language – Register Transfer – Arithmetic Microoperations – Logic Microoperations – Shift Microoperations – Arithmetic Logic Shift Unit. Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input/Output and Interrupt.

**Unit – III:****(12Hours)**

Central Processing Unit : General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer.

**Unit – IV:****(12Hours)**

Computer Arithmetic: Addition and Subtraction - Multiplication Algorithms – Division Algorithms. Pipeline and Vector Processing: Parallel processing – Pipelining – Arithmetic pipeline – Instruction pipeline – Vector Processing – Array Processor.

**Unit – V:****(12Hours)**

Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management Hardware. Multiprocessors: Characteristics of Multiprocessors – Interconnection Structures – Interprocessor Arbitration.

**COURSE OUTCOME:**

1. Gain knowledge on Digital circuits and Data representation.
2. Analyze some of the design issues in terms of speed, technology, cost, performance.
3. Understand the architecture and functionality of central processing unit.
4. Exemplify in a better way the I/O and memory organization.

- Learn the concepts of parallel processing, pipelining and interprocessor communication.

**Text Book:**

- M. Morris Mano ,“Computer System Architecture” ,Pearson Publications, Revised 3rd Edition, 2017.

**Reference Books:**

- William Stallings, Computer Organization and Architecture, 10th edition, Pearson Publications, 2016.
- Bharat Bhushan Agarwal, Sumit Prakash Tayal ,Computer Architecture & Parallel Processing”, First Edition, Laxmi Publication Pvt. Ltd., 2009.
- Rao, “Computer System Architecture”, PHI Learning Pvt. Ltd., 2008.
- Rajaraman &Radhakrishnan ,“Computer Organization and Architecture”, PHI Learning Pvt. Ltd., 2007.
- Kain, “Advanced Computer Architecture: A System Design Approach”, PHI Learning Pvt. Ltd., 2002.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: V</b> <b>PART-III</b>	<b>22UCSCC53 : WEB TECHNOLOGY</b>	<b>CREDIT: 4</b> <b>HOURS:4/W</b>
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### LEARNING OBJECTIVES

1. To understand the fundamental concepts and role of Web Technology.
2. To learn the Process of CSS.
3. To understand the web pages.
4. To gain insight on script objects.
5. To Know Java Script libraries.

#### Unit I : Structuring Documents for the Web

**Hours: 12**

Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages

#### Unit II: Tables

**Hours:12**

Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using Element, Nested Framesets, Inline or Floating Frames with <iframes>

#### Unit III: Cascading Style Sheets

**Hours:12**

Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues

#### Unit IV: Java Script

**Hours:12**

How to Add Script to Your Pages, Variables and Data Types – Statements and Operators, Control Structures, Conditional Statements, Loop Statements – Functions - Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes.

#### Unit V: Working with Java Script

**Hours: 12**

Practical Tips for Writing Scripts, JavaScript Objects: Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Events, Event Handlers, Forms – Validations, Form Enhancements, JavaScript Libraries.

**COURSE OUTCOME:**

1. Understand the structure of the documents in Web.
2. Remember and understand the table handling tags.
3. Understand and organize CSS.
4. Implement scripts in web page.
5. Evaluate script objects.

**Text Books :**

1. Jon Duckett, Beginning HTML, XHTML, CSS and Java script , Wiley Publishing.

**Supplementary Readings :**

1. Chris Bates, Web ProgrammingI, 3d Edition ,Wiley Publishing.
2. M. Srinivasan, Web Technology: Theory and Practicel, Pearson Publication
3. G. Ramanan; J. Albunskuba;S.Moovendhan, Web Technology,, Charulatha Publications Private Limited

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER:V</b> <b>PART:III</b>	<b>22UCSCC54 : RELATIONAL DATABASE MANAGEMENT SYSTEM</b>	<b>CREDIT:4</b> <b>HOURS:4/W</b>
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### **COURSE OBJECTIVES**

1. Gain a good understanding of the architecture and functioning of Database Management Systems as well as associated tools and techniques.
2. Understand and apply the principles of data modelling using Entity Relationship and develop a good database design.
3. Understand the use of Structured Query Language (SQL) and its syntax.
4. Apply Normalization techniques to normalize a database.
5. Understand the need of transaction processing and learn techniques for controlling the consequences of concurrent data access.

#### **Unit I :Introduction:**

**Hours: 12**

Database-System Applications- Purpose of Database Systems - View of Data -- Database Languages - Relational Databases - Database Design -Data Storage and Querying Transaction Management -Data Mining and Analysis - Database Architecture - Database Users and Administrators - History of Database Systems.

#### **Unit II: Relational Model:**

**Hours:12**

Structure of Relational Databases -Database Schema - Keys - Schema Diagrams- Relational Query Languages - Relational OperationsFundamentalRelationalAlgebra Operations Additional Relational-Algebra Operations- Extended Relational-Algebra Operations - Null Values - Modification of the Database.

#### **Unit III: SQL:**

**Hours:12**

Overview of the SQL Query - Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - Set Operations - Null Values Aggregate Functions - Nested Subqueries - Modification of the Database -Join Expressions - Views - Transactions - Integrity Constraints - SQL Data Types and Schemas - Authorization

#### **Unit IV: Relational Languages:**

**Hours:12**

The Tuple Relational Calculus - The Domain Relational Calculus Database Design and the E-R Model: Overview of the Design Process - The EntityRelationship Model - Reduction to Relational Schemas - Entity-Relationship Design Issues - Extended E-R Features - Alternative Notations for Modeling Data - Other Aspects of Database Design.

#### **Unit V: Relational Database Design:**

**Hours: 12**

Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Decomposition Using Functional Dependencies - Decomposition Using Multivalued Dependencies-More Normal Forms - Database-Design Process.

**COURSE OUTCOME:**

1. Describe the fundamental elements of relational database management systems.
2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios
4. Improve the database design by normalization.
5. Study the core concepts of DBMS.

**Text Books**

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth edition, McGraw-Hill-2010.
2. E-Book : Bill Pribyl, Steven Feuerstein, "Oracle PL/SQL Programming", O'Reilly Media, Inc., 6 th Edition, February 2014.

**Supplementary Readings**

1. ElmasriNavrate ,Fundamentals of Database Systems, Pearson Education.
2. C.J.Date ,Introduction to Database Systems, Pearson Education.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: V PART-III</b>	<b>22UCSCP55 : WEB TECHNOLOGY LAB</b>	<b>CREDIT: 2 HOURS: 3/W</b>
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**COURSE OBJECTIVES**

1. To impart Practical Training in Control panel tools.
2. Familiarize with HTML Tags.
3. Build programs using Java script.
4. Provide knowledge on working with events and methods

**LIST OF PROGRAMS****HOURS:45**

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and display the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function).
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
  - (a)The first multiple choice list, displays the Major dishes available.
  - (b)The second multiple choice list, displays the Starters available.
  - (c)The single choice list, displays the Soft drinks available

**COURSE OUTCOME:**

1. Study all the Basic tools.
2. Practice the usage of web page creation and useable objects.
3. Apply various effects on webpage.
4. Analysis the use of java script and html code.
5. Understand the user-defined functions and implement in Java script.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH



<b>SEMESTER:V PART:III</b>	<b>22UCSCP56: RELATIONAL DATABASE MANAGEMENT SYSTEM LAB</b>	<b>CREDIT:2 HOURS:3/W</b>
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**COURSE OBJECTIVES**

1. To have a glimpse on the basic sql operations.
2. To develop various sql queries.
3. To understand the aggregate operations.
4. To have competence in joins.
5. To have knowledge about views.

**PRACTICAL EXERCISES:****HOURS:45**

1. Create a table and perform the following basic mysql operations a) Set the primary key b) Alter the structure of the table c) Insert values d) Delete values based on constraints e) Display values using various forms of select clause f) Drop the table.
2. Develop sql queries to implement the following set operations a) Union b) Union all c) Intersect d) Intersect all.
3. Develop sql queries to implement the following aggregate functions a) Sum b) Count c) Average d) Maximum e) Minimum f) Group by clause & having clause.
4. Develop sql queries to implement following join operations a) Natural join b) Inner join c) Outer join-left outer, right outer, full outer d) Using join conditions.
5. Develop sql queries to implement nested subqueries a) Set membership (int, not int) b) Set comparison (some, all) c) Empty relation (exists, not exists) d) Check for existence of Duplicate tuples(unique, not unique).
6. Develop sql queries to create a views and expand it.
7. Develop sql queries to implement a) String operations using % b) String operations using '\_' c) Sort the element using asc,desc [\*create necessary relations with requires attribute].
  - i. Consider the following database for a banking enterprise  
 BRANCH(branch-name:string, branch-city:string, assets:real)  
 ACCOUNT(accno:int, branch-name:string, balance:real)  
 DEPOSITOR(customer-name:string, accno:int) CUSTOMER(customer-name:string, customer-street:string, customercity:string) LOAN(loan-number:int, branch-name:string, amount:real)  
 BORROWER(customer-name:string, loan-number:int)
  - ii. Create the above tables by properly specifying the primary keys and the foreign keys
  - iii. Enter at least five tuples for each relation
  - iv. Find all the customers who have at least two accounts at the Main branch.

- v. Find all the customers who have an account at all the branches located in a specific city.
- vi. Demonstrate how you delete all account tuples at every branch located in a specific city.

**COURSE OUTCOME:**

1. Students get practical knowledge on designing and creating relational database systems.
2. Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
3. Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
4. Students will be able to design and implement database applications on their own.
5. Will be able to create views.

**Text Books**

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth edition, McGraw-Hill-2010.
2. Bill Pribyl, Steven Feuerstein, E-Book : “Oracle PL/SQL Programming”, O’Reilly Media, Inc., 6 th Edition, February 2014.

**Supplementary Readings**

1. ElmasriNavrate ,Fundamentals of Database Systems, Pearson Education.
2. C.J.Date, Introduction to Database Systems, Pearson Education.

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1-LOW 2- MODERATE 3-HIGH

**INTERNAL ELECTIVE - III**

<b>SEMESTER:V</b>	<b>22UCSCE58-1 : DATA MINING AND WAREHOUSING</b>	<b>CREDIT:3</b>
<b>PART:III</b>		<b>HOURS:3/W</b>

**LEARNING OBJECTIVES:**

1. To introduce data mining principles and techniques.
2. To introduce the concepts of Data Warehousing, difference between database and data warehousing.
3. To describe and demonstrate basic data mining algorithms, methods, tools,
4. To describe ETL Model and the Star Schema to design a Data Warehouse.

**Unit I:****( 9 Hrs)**

Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Pre-processing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data 35 Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation

**Unit II:****( 9 Hrs)**

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining,mining Single-Dimensional Boolean Association rules from Transactional Databases- Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases

**Unit III:****( 9 Hrs)**

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon, Density Based Methods-DBSCAN, OPTICS, Grid Based Methods- STING, CLIQUE, Model Based Method -Statistical Approach, Neural Network approach, Outlier Analysis

**Unit IV:****( 9 Hrs)**

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

**Unit V:****( 9 Hrs)**

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

**COURSE OUTCOMES:**

1. To understand the fundamentals of Data mining.
2. To perform Association rule mining in large dataset.
3. To learn the classification and prediction techniques.
4. To gain knowledge on Data warehousing fundamentals.
5. To understand how to use Data warehousing tools.

**Text books:**

1. H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2008.
2. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, Pearson Education, 2019.

**Reference books:**

1. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques", Elsevier, 2012.
2. Mallach, "Data Warehousing System", McGraw-Hill, 2000.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data mining and OLAP", Tata McGraw-Hill, 2004.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER:V</b>	<b>22UCSCE58-2: SOFTWARE PROJECT MANAGEMENT</b>	<b>CREDIT:3</b>
<b>PART: III</b>		<b>HOURS:3/W</b>

### **COURSE OBJECTIVES**

1. Define and highlight importance of software project management.
2. Describe the software project management activities.
3. Train software project managers and other individuals involved in software project.
4. To ensure the concepts on Planning and tracking.
5. Oversight in the implementation of the software project management process.

#### **Unit I : Introduction and Software Project Planning**

**Hours: 9**

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

#### **Unit II: Project Organization and Scheduling**

**Hours:9**

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

#### **Unit III: Project Monitoring and Control**

**Hours:9**

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: 23 Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walk through, Code Reviews, Pair Programming.

#### **Unit IV: Software Quality Assurance and Testing**

**Hours:9**

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities,

#### **Unit V: Project Management**

**Hours: 9**

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown

Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis,

### **COURSE OUTCOMES**

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources.
4. The application of proper testing tools.
5. Knowledge about Risk Management Process.

### **Text Books**

1. Clifford F. Gray and Erik W. Larson, "Project Management: The Managerial Process with MS" –Mc Graw Hill.

### **Supplementary Readings**

1. M. Cotterell, Software Project Management –Tata McGraw-Hill Publication.
2. Royce, Software Project Management –Pearson Education
3. Kieron Conway, Software Project Management –Dreamtech Press
4. S. A. Kelkar, Software Project Management –PHI Publication.

### **PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	2	3	2	2	3
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CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: V</b> <b>PART - III</b>	<b>22UCSCE58-3 : MICROPROCESSOR AND ITS APPLICATIONS</b>	<b>CREDIT:3</b> <b>HOURS:3/W</b>
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**LEARNING OBJECTIVES**

1. To acquire skill about the microprocessors evaluation.
2. To understand the 8085 instructions set.
3. To know about complements.
4. To understand the types of convertors.
5. To utilize the microprocessor in various applications.

**Unit I : Evaluation of Microprocessors****9 Hours**

Single Chip Microcomputer Microprocessor Applications – Programming Digital Computers – Memory – Buses – Memory addressing capacity and CPU – Microcomputers – Processor Architecture – Intel 8085 – Instruction Cycle – Timing diagram.

**Unit II : Instruction set of Intel 8085****9 Hours**

Instruction and Data Formats – Addressing Modes – Status flags – Intel 8085 Instructions – Programming of Microprocessors – Assembly language – Assemblers – Stacks and Subroutines – MACRO – Microprogramming.

**Unit III : Assembly language Programming****9 Hours**

Simple examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array – Arranging a series of numbers – Sum of a series of Numbers – Multiplication – Division – Multibyte Addition and Subtraction.

**Unit IV : Peripheral Devices and Interfacing****9 Hours**

Address Space Partitioning – Memory and I/O Interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing memory and I/O devices – I/O ports – Programmable peripheral Interface – Programmable Counter / Interval Timer – A/D Converter and D/A Converter.

**Unit V : Microprocessor Applications****9 Hours**

Delay Subroutines – Interfacing of 7 Segment Displays – Frequency measurement – Temperature measurement and Control – Water Level Indicator – Microprocessor based Traffic Control.

**COURSE OUTCOME:**

1. To acquire the basic Knowledge of Microprocessor.
2. To explore the programming knowledge using 8085.
3. Get skill about Peripheral Devices and Interfacing.
4. To understand the concept of Microprocessor Applications.
5. Become familiar with Microprocessor based Traffic Control.

**Text Book:**

1. Badri Ram , Fundamentals of Microprocessors and Microcomputers , Fourth Revised and Enlarged Edition, Dhanpat Rai and Sons, 1993.

**Supplementary Readings**

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085 / 8080A, Wiley Eastern , 1990
2. Douglas V. Hall, " Microprocessors and Interfacing", , Tata Mcgraw Hill, 1999
3. Barry B. Brey, "The Intel Microprocessors – 8086/8088, 80186, 286, 386, 486, Pentium Pro Processor", Prentice Hall of India Pvt. Ltd., 1998

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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1-LOW 2- MODERATE 3-HIGH



**SKILL BASED SUBJECT – III**

<b>SEMESTER:V</b> <b>PART:IV</b>	<b>22UCSCS59: MULTIMEDIA AND ITS APPLICATIONS</b>	<b>CREDIT:2</b> <b>HOURS:3/W</b>
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**COURSE OBJECTIVES**

1. To understand the standards available for different audio, video and text applications.
2. To learn various multimedia authoring systems in multimedia production team.
3. To learn the concepts of multimedia like text, speech, image and video processing in today's standards.
4. To have exposure to multimedia animation.
5. To gain knowledge on designing a multimedia project.

**Unit I :****Hours:9**

Multimedia Definition - Use of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

**Unit II:****Hours:9**

Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

**Unit III:****Hours:9**

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

**Unit IV:****Hours:9**

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems NeedsMultimedia Production Team.

**Unit V:****Hours: 9**

Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.

**Course Outcomes**

1. Understand about various latest interactive multimedia devices.
2. The basic concepts about images and image formats.
3. Analyze data compression techniques, image compression techniques like JPEG, video compression techniques like MPEG.
4. The basic concepts of multimedia animation.
5. Adds an essence of multimedia design.

**Text Books**

1. Tay Vaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGrawHill, 2001.
2. State Integrated Board of Studies – Computer Science UG 52.

**Supplementary Readings**

1. Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.
2. V.K.Jain, Introduction to Multimedia and its Applications, Khanna Book Publishing Company Pvt. Ltd.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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1-LOW 2- MODERATE 3-HIGH

**SEMESTER – VI**

<b>SEMESTER: VI</b> <b>PART: III</b>	<b>22UCSCC61 : OPERATING SYSTEM</b>	<b>CREDIT: 4</b> <b>HOURS: 5/W</b>
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**COURSE OBJECTIVES**

1. To understand the fundamental concepts and role of Operating System.
2. To learn the Process Management and Scheduling Algorithms
3. To understand the Memory Management policies
4. To gain insight on I/O and File management techniques

**Unit I : Introduction and Processes****Hours:12**

Introduction: Views – Storage Structure – Computer System Architecture – OS Structure – Operations - Services – Interface- System Calls- System Structure - System Design and Implementation. Process Management: Process - Process Scheduling - Inter-process Communication.

**Unit II: Process Management****Hours: 16**

Process Synchronization: Critical- Section Problem - Synchronization Hardware - Semaphores - Classical Problems of Synchronization - Monitors. CPU Scheduling: CPU Schedulers - Scheduling Criteria - Scheduling Algorithms. Deadlocks: Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Avoidance - Detection - Recovery.

**Unit III: Memory Management****Hours: 16**

Memory Management: Hardware - Address Binding – Address Space - Dynamic Loading and Linking – Swapping – Contiguous Allocation - Segmentation - Paging – Structure of the Page Table. Virtual Memory Management: Demand Paging - Page Replacement Algorithms - Thrashing.

**Unit IV: Storage Management****Hours: 16**

Mass-Storage Structure: Overview of Mass-Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling. File System: File Concept -. Access Methods - Directory and Disk Structure - Protection - File System Structures - Allocation Methods - Free Space Management.

**Unit V: I/O Systems, Protection and Security****Hours: 15**

I/O Systems: Overview - I/O Hardware - Application I/O Interface - Kernel I/O Subsystem - Transforming I/O Requests to Hardware Operations - Performance. System Protection: Goals – Principles, Domain - Access matrix. System Security: The Security Problem - Threats – User Authentication.

**COURSE OUTCOMES**

1. Understand the structure and functions of Operating System
2. Compare the performance of Scheduling Algorithms at CPU and Disk
3. Analyze resource memory management techniques
4. Examine the storage management Techniques
5. Study the fundamental concepts of I/O systems, system protection and security.

**Text Books**

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne (2018). Operating System Concepts (9th Edition). India. Wiley India Pvt. Ltd.

**Supplementary Readings**

1. William Stallings (2018). Operating Systems: Internals and Design Principles (9th Edition). Pearson.
2. Andrew S. Tanenbaum, Herbert Bos (2014). Modern Operating Systems (4<sup>th</sup> Edition). Pearson.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	3	3	2	2	3
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CO4	3	2	3	3	2
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: VI</b> <b>PART-III</b>	<b>22UCSCC62 : DOTNET PROGRAMMING</b>	<b>CREDIT:4</b> <b>HOURS:5/W</b>
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### LEARNING OBJECTIVES

1. To enable students to learn IDE of Microsoft visual studio .Net
2. To understand the functioning of various controls
3. To gain skills on Graphical User Interface Controls and Databases
4. To Learn data access mechanism provided .net.
5. To Create a web application using .net.

#### Unit I : Building ASP.NET pages

**Hours: 15**

ASP.NET and the .NET framework – understanding ASP.NET controls – understanding ASP.NET pages – installing the ASP.NET framework.

#### Unit II: Using validation controls

**Hours:15**

Overview of the validation controls – using the RequiredFieldValidator, RangeValidator, CompareValidator, CustomValidator, RegularExpressionValidator, ValidationSummary - Using richcontrols : Accepting File Uploads – Displaying a calendar displaying advertisements – displaying different page views.

#### Unit III: Performing data access

**Hours:15**

using DataBound controls – using DataSource controls – using programmatic DataBinding – understanding templates and DataBinding Expressions - Using the SqlDataSource control: Creating database connections – executing database commands – using ASP.NET parameters with the SqlDataSource Control – programmatically executing SqlDataSource commands – catching database data with the SqlDataSource control.

#### Unit IV: Using Grid View control

**Hours:15**

GridView control fundamentals – using fields with the GridView control – working with GridView control Events – Extending the GridView control - Using Repeater and DataListcontrols : Using the repeater control – using the DataList Control.

#### Unit V: Security

**Hours: 15**

overview of the login controls- Using the login Name Control – Using the Change Password Control – Using the Password Recovery Control - Maintaining application state : using browser cookies – using session state - Building custom controls : overview of custom control building : Building Fully Rendered Controls , Building Composite Controls, Building Hybrid Controls.

### COURSE OUTCOMES

1. Illustrate the usage of validation Controls, Ad Rotator Control
2. Display required output using controls
3. Illustration of file uploading methods
4. Interpret interactive design using web forms
5. Develop real time applications using database

**Text Books :**

1. Stephen Walther, "ASP.NET 4.0 unleashed " – Pearson Education, 2016

**Reference Books:**

1. Stephen C. Perry, Atul Kahate, Stephen Walther, Joseph Mayo, "Essentials of .NET and related technologies", Pearson Education.
2. Stephen C. Perry, "Core C# and & .Net", Prentice Hall.
3. Esposito , "Introducing Microsoft ASP.NET 2.0" ,PHI.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	2	3	2	2	3
CO2	3	2	2	3	2
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1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER:VI</b> <b>PART:III</b>	<b>22UCSCC63 : IOT AND ITS APPLICATIONS</b>	<b>CREDIT:3</b> <b>HOURS:4/W</b>
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**COURSE OBJECTIVES**

1. To learn the concepts of IoT and its protocols.
2. To learn how to analysis the data in IoT.
3. To develop IoT infrastructure for popular applications.
4. To introduce the Python Scripting Language which is used in many IoT devices
5. To report about the IoT privacy, security and vulnerabilities solution.

**Unit I :****Hours: 12**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates . Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

**Unit II:****Hours:12**

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for Basics of IoT System Management with NETCOZF, YANG

**Unit III:****Hours:12**

Introduction to Python – Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages – JSON, XML, HTTPLib, URLLib, SMTPLib

**Unit IV:****Hours:12**

IoT Physical Devices and Endpoints – Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

**Unit V:****Hours: 12**

IOT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

**COURSE OUTCOMES**

1. To understand the fundamentals of Internet of Things.
2. To know the basics of communication protocols and the designing principles of Web connectivity.
3. To gain the knowledge of Internet connectivity principles.
4. Designing and develop smart city in IoT.
5. Analyzing and evaluate the data received through sensors in IOT.

**Text Books**

1. ArshdeepBahga, Vijay Madiseti, Internet of Things-A hands on approach,Universities Press,2015.

**Supplementary Readings**

1. Shriram K.Vasudevan,AbhishekS.Nagarajan, Internet of Things, 2<sup>nd</sup> edition, Wiley.
2. Sudip Misra, Arjit Roy, Introduction to IOT, Paperback Edn.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	2	3	2	2	3
CO2	3	2	2	3	2
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1-LOW 2- MODERATE 3-HIGH



<b>SEMESTER: VI</b> <b>PART: III</b>	<b>22UCSCC64 : MOBILE COMPUTING</b>	<b>CREDIT: 4</b> <b>HOURS: 4/W</b>
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**COURSE OBJECTIVES**

1. To understand the fundamental concepts and role of mobile computing.
2. To learn the Media Access control and Telecommunication system.
3. To understand the basic concepts of satellite and broadcasting systems.
4. To gain knowledge about wireless LAN.
5. To learn functionality of network and transport layer in mobile computing.

**Unit I : Wireless Communication Fundamentals****Hours:12**

Introduction : Applications – History of wireless communication, Wireless Transmission : Frequencies – signals – antennas – signal propagation – Multiplexing – modulation – spread spectrum – cellular systems.

**Unit II: Media Access Control and Telecommunication Systems****Hours: 12**

MAC : Motivation – SDMA – FDMA – TDMA – CDMA, Telecommunication systems : GSM : Services - System Architecture- Radio Interface – Protocols – Localization and Calling – Handover – Security.

**Unit III: Satellite Systems****Hours:12**

Applications – Basics – Routing – localization – Handover, Broadcast Systems : Cyclic repetition of data – Digital Audio Broadcasting - Digital Video Broadcasting.

**Unit IV: Wireless LAN****Hours: 12**

Infra-red Vs Radio Transmission – Infrastructure and Ad-Hoc Network – IEEE 802.11: System Architecture – Protocol Architecture – Physical Layer – MAC Layer – MAC Management – Bluetooth: User Scenarios - Architecture – Security - Profiles.

**Unit V: Network and Transport Layer****Hours: 12**

Mobile IP : Goals Assumptions and Requirements – Entities and Terminologies – IP Packet Delivery – Agent discovery – Registration – Routing – DSDV – DSR – Classical TCP improvements.

**COURSE OUTCOME:**

1. Understand the fundamental concepts and role of mobile computing.
2. Know the Media Access Control management and GSM and Bluetooth concepts.
3. Attain the knowledge in satellite systems, audio and video broadcasting systems.
4. Understand the wireless LAN and Bluetooth concepts and functionalities.
5. Know the functionalities of network and transport layer.

**Text Books**

1. Jochen Schiller (2003). *Mobile Communications* (2nd Edition). Pearson Education

**Supplementary Readings**

1. William Stallings (2009). *Wireless Communications and Networks* (2nd Edition). India. Pearson Education.
2. Kaveh Pahlavan, Prasanth Krishnamoorthy (2003). *Principles of Wireless Networks: A Unified Approach*. India. Prentice Hall.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	3	3	2	2	3
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CO4	3	2	3	3	2
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: VI</b> <b>PART: III</b>	<b>22UCSCP65 : LINUX OPERATING SYSTEM LAB</b>	<b>CREDIT: 2</b> <b>HOURS: 3/W</b>
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**Course Objectives**

1. To learn Process management and scheduling.
2. To understand the concepts and implementation of memory management policies.
3. To understand the various issues in Inter Process Communication.

**LIST OF EXERCISES:****HOURS:45**

1. Implement Basic I/O programming.
2. Implement Shortest Job First Algorithm in CPU Scheduling.
3. Implement First Come First Served Algorithm in CPU Scheduling.
4. Implement Round Robin and Priority Scheduling Algorithms in CPU Scheduling.
5. Implement reader/writer problem using semaphore.
6. Implement Banker's algorithm for Deadlock avoidance.
7. Implement First in First Out Algorithm for page replacement.
8. Implement Least Recently Used Algorithm for page replacement.
9. Implement first fit, best fit and worst fit algorithm for memory management.
10. Program for Inter-process Communication.

**Course Outcomes**

1. Understand the process management policies and scheduling process by CPU.
2. Analyze the memory management and its allocation policies.
3. Implement page replacement algorithms
4. Evaluate the requirement for process synchronization.
5. Understand the main concepts of operating system.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: VI</b> <b>PART-III</b>	<b>22UCSCP66: DOTNET PROGRAMMING LAB</b>	<b>CREDIT: 2</b> <b>HOURS:3/W</b>
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**LEARNING OBJECTIVES**

1. To learn about basic features of ASP.NET and its controls.
2. To create an ASP.NET application using standard .NET Controls.
3. To gain knowledge about E-Mail registration.
4. To implement SQL connection.
5. To get skill about controls in ASP.NET

**LIST OF PROGRAMS****HOURS:45**

1. Design ASP.Net web form using Html Server Controls to enter job seeker's detail.
2. Write an ASP.Net application to retrieve form data and display it the client browser in a table format.
3. Apply appropriate validation techniques in E-Mail registration form using validation controls.
4. Create an application using Data grid control to access information's from table in SQL server.
5. Create an application using Data list control to access information's from table in SQL server and display the result in neat format.
6. Prepare employee pay slip using SQL connection.
7. Design a banking application for doing deposit, withdrawal and balance enquiry.
8. Demonstrate the file upload control usage.
9. Design a web page to display the advertisements using Ad Rotator Control.
10. Demonstrate the Data List Control.

**COURSE OUTCOMES:**

1. Learners will be able to design web applications using ASP.NET.
2. Learners will be able to use ASP.NET controls in web applications.
3. Learners will be able to create database driven ASP.NET web applications and web services.
4. Can Design various applications.
5. Having skills about Ad Rotator Control

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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1-LOW 2- MODERATE 3-HIGH

**INTERNAL ELECTIVE – IV**

<b>SEMESTER: VI</b> <b>PART: III</b>	<b>22UCSCE68-1: NETWORK SECURITY</b>	<b>CREDIT: 3</b> <b>HOURS: 3/W</b>
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**OBJECTIVES**

1. To learn the network security concepts: vulnerability, threat and attack
2. To understand symmetric and asymmetric encryption processes.
3. To learn about the various issues and treats of network security
4. Able to design security model to prevent, detect and recover from the attacks.

**UNIT-I: INTRODUCTION****HOURS:9**

Services and Mechanism: Security Attacks, Security services-Classical Encryption techniques-Cipher Principles-Data Encryption Standard-Block Cipher Design Principles and modes of Operation-Evaluation criteria for AES- AES Cipher- Triple DES- Placement of Encryption function- Traffic Confidentiality.

**UNIT-II: PUBLIC KEY CRYPTOGRAPHY****HOURS:9**

Key Management- Diffie - Hellman Key Exchange-Elliptic Curve Architecture and Cryptography-Introduction to Number Theory- confidentiality using Symmetric . Encryption public Key Cryptography and RSA.

**UNIT-III: AUTHENTICATION AND HASH FUNCTION****HOURS:9**

Authentication requirements-Authentication functions-Message Authentication Codes – Hash functions-Security of Hash Functions and MACs-MD5 message algorithm-secure Hash Algorithm-RIPEMD-HMAC Digital Signatures-Authentication Protocols-Digital Signature Standard.

**UNIT-IV: NETWORK SECURITY****HOURS:9**

Authentication Applications: Kerberos-X.509 Authentication Service-Electronic Mail Security- PGP-S/MIME-IP Security, Network Security: Electronic mail security, IP Security, Network Management Security

**UNIT-V: SYSTEM LEVEL SECURITY****HOURS:9**

Intrusion detection-password management-Viruses and related Threats-Virus Counter measures -Firewall Design principles –Trusted Systems, SSL, SET, Intrusion Detection.

**COURSE OUTCOMES:**

1. Understand the design issues in Network Security
2. Understand the network security services and mechanisms
3. Evaluate authentication and hash algorithms.
4. Identify security threats, security services and mechanisms to counter them.
5. Design a security model to prevent, detect and recover from the attacks.

**TEXT BOOKS**

1. Williams Stallings ” Cryptography and Network Security-Principles and Practices”, prentice Hall of India, Third Edition, 2003.

**References:**

1. AtualKahate , Cryptography and Network Security, McGraw Hill.
2. Bruce Schenier , ”Applied Cryptography’, John Wiley & Sons Inc,2001.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

<b>SEMESTER: VI PART-III</b>	<b>22UCSCE68-2: OOAD AND UML</b>	<b>CREDIT: 3 HOURS: 3/W</b>
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**LEARNING OBJECTIVES :**

1. The main objective is the students become familiar with all phases of OOAD.
2. Master the main features of the UML.
3. Master the main concepts of Object Technologies and how to apply them at work and
4. develop the ability to analyze and solve challenging problem in various domains.
5. Learn the Object design Principles and understand how to apply them towards implementation.

**Unit I: ( 9Hrs)**

Introduction to UML: Importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

**Unit II: ( 9Hrs)**

Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

**Unit III: ( 9Hrs)**

Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

**Unit IV: ( 9Hrs)**

Basic Behavioural Modelling-I : Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams.

**Unit V: ( 9Hrs)**

Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

**COURSE OUTCOME:****After the completion of the course, students should be able to:**

1. Select the basic elements of modelling such as Things, Relationships and Diagrams depending on the views of UML Architecture and SDLC.
2. Apply basic and Advanced Structural Modelling Concepts for designing real time applications.
3. Design Class and Object Diagrams that represent Static Aspects of a Software System.

4. Analyze Dynamic Aspects of a Software System using Use Case, Interaction and Activity Diagrams.
5. Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioural aspects and Runtime environment of Software Systems.

**Text book :**

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language - User Guide", Pearson Education, 2010.

**References:**

1. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education, 2007.
2. Pascal Roques, "Modeling Software Systems Using UML2", WILEY-Dreamtech India Pvt. Ltd., 2004.
3. Atul Kahate, "Object Oriented Analysis & Design", Tata McGraw-Hill, 2004.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH



<b>SEMESTER: VI PART: III</b>	<b>22UCSCE68-3: CLOUD COMPUTING</b>	<b>CREDIT: 3 HOURS: 3/W</b>
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### **COURSE OBJECTIVES**

1. To understand the fundamental concepts and role of cloud computing.
2. To learn the Media Types and working method of cloud computing.
3. To understand the concepts of cloud computing architecture.
4. To gain knowledge about virtualization in cloud computing.
5. To learn storage, security and different applications such as Microsoft, Google and Amazon.

#### **Unit I Introduction**

**Hours: 9**

Introduction to Cloud Computing : Cloud Computing Basics – History of Cloud Computing – Importance of Cloud Computing in the Current Era – Characteristics of Cloud Computing, Move to Cloud Computing: Pros and Cons of Cloud Computing – Nature of the Cloud – Technologies in Cloud Computing – Migrating into the Cloud – – Types of Cloud – Working of Cloud Computing.

#### **Unit II Types and Working**

**Hours: 9**

Types of Cloud : Public and Private Cloud – Cloud Infrastructure – Cloud Application Architecture, Working of Cloud Computing: Trends in Computing – Cloud Service Models – Cloud Deployment Models – Risks in the Cloud – Cloud Computing and Services: Pros and Cons.

#### **Unit III Cloud Computing Architecture**

**Hours: 9**

Cloud Computing Technology : Cloud Lifecycle Model – Role of Cloud Modelling and Architecture – Reference Model for Cloud Computing, Cloud Architecture : Cloud Computing Logical Architecture – Developing Holistic Cloud Computing Reference Model – Cloud System Architecture, Cloud Modeling and Design : Model for Federated Cloud Computing – Cloud Ecosystem Model.

#### **Unit IV Virtualization**

**Hours: 9**

Foundation : Definition of Virtualization – Adopting Virtualization – Types of Virtualization – Virtualization Architecture and Software –Virtual Clustering – Virtualization Application – Pitfalls of Virtualization, Grid, Cloud and Virtualization : Virtualization in Grid – Virtualization in Cloud, Virtualization and Cloud Computing : Anatomy of Cloud Infrastructure – Virtual Infrastructures – CPU Virtualization – Network and Storage Virtualization.

#### **Unit V Data Storage and Cloud Computing, Security and Applications** Hours: 9

Data Storage – Cloud Storage – Cloud Computing Services : Cloud Services – Cloud Computing at Work, Cloud Computing and Security : Risks in Cloud Computing – Data Security in Cloud, Cloud Applications: Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services.

**COURSE OUTCOME:**

1. Understand the fundamental concepts of cloud computing.
2. Know the cloud computing types and working models.
3. Attain the knowledge in cloud computing architecture and reference models.
4. Understand the virtualization concepts in cloud computing.
5. Know the storage m security and different vendor's applications in cloud computing.

**Text Books**

1. A.Srinivasan and J.Suresh (2014). Cloud Computing – A Practical Approach for Learning and Implementation. Pearson India Publications.

**Supplementary Readings**

1. RajkumarBuyya, James Broberg, Andrzej (2011). Cloud Computing: Principles and Paradigms. Wiley India Publications.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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

1-LOW 2- MODERATE 3-HIGH

**SKILL BASED SUBJECT – IV**

<b>SEMESTER: VI</b> <b>PART: IV</b>	<b>22UCSCS69: ANDROID PROGRAMMING</b>	<b>CREDIT: 2</b> <b>HOURS: 3/W</b>
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**COURSE OBJECTIVES**

1. To develop competence and confidence in android programming.
2. To understand the entire Android Apps Development through Eclipse.
3. To learn about android framework
4. To understand the data storage, multimedia, location and mapping and sensor.
5. To enable the students to independently create Android Applications.

**Unit I Introduction****Hours: 9**

Installing the Android SDK and Prerequisites - Making an Android Project - Making an Android Virtual Device (AVD) - Running a Program on an AVD - Running a Program on an Android Device - Components of the SDK - The Ingredients of an Android Application.

**Unit II Application Environment****Hours: 9**

Getting Your Application into Users' Hands : Application Signing - Placing an Application for Distribution in the Android Market - Google Maps API Keys - Specifying API-Level Compatibility - Compatibility with Many Kinds of Screens, Eclipse for Android Software Development : Eclipse Concepts and Terminology - Eclipse Views and Perspectives - Java Coding in Eclipse - Eclipse and Android, The Android Framework in Java.

**Unit III Android Framework****Hours: 9**

Building a View : Android GUI Architecture - Assembling a Graphical Interface - Wiring Up the Controller - The Menu, Fragments and Multiplatform Support : Creating a Fragment -Fragment Life Cycle - Fragment Manager - Fragment Transactions - The Compatibility Package.

**Unit IV Graphics and Data Storage****Hours: 9**

Drawing 2D and 3D Graphics : Rolling Your Own Widgets – Bling , Handling and Persisting Data : Relational Database Overview - SQLite - The SQL Language - SQL and the Database-Centric Data Model for Android Applications - The Android Database Classes - Database Design for Android Applications - Using the Database API: MJAndroid.

**Unit V Multimedia, Location and Mapping, and Sensors****Hours: 9**

Multimedia : Audio and Video - Playing Audio and Video - Recording Audio and Video - Stored Media Content, Location and Mapping : Location-Based Services - Mapping - The Google Maps Activity - The MapView and MapActivity - Working with MapViews - MapView and MyLocationOverlay Initialization - Pausing and Resuming a MapActivity - Controlling the Map with Menu Buttons - Controlling the Map with the Keypad - Location Without Maps , Sensors and NFC.

**COURSE OUTCOME:**

1. Demonstrate the Understanding of fundamental of Android Programming.
2. Build their ability to develop software with reasonable complexity on mobile platform.
3. Discover the life cycles of Activities, Applications, framework and fragments.
4. Understand the data storage, multimedia, location and mapping and sensor.
5. Design the Android apps.

**Text Books (In API Style)**

1. Zigurd Mednieks, Laird Dornin, G. Blake Meike, and Masumi Nakamura (2011). Programming Android (1<sup>st</sup> Edition). O'Reilly Media, Inc.

**Supplementary Readings**

1. Rick Rogers, John Lombardo, ZigurdMednieks, and Blake Meike (2009). Android Application Development. (1<sup>st</sup> Edition). O'Reilly Media, Inc.
2. John Horton (2015). Android Programming for Beginners, Packt Publishing, Uk.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	2	2	2	2	2
CO2	2	3	2	2	2
CO3	2	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	3

1-LOW 2- MODERATE 3-HIGH

**NON-MAJOR ELECTIVE - I**  
**(OFFERED TO OTHER DEPARTMENTS)**

<b>SEMESTER: III</b>	<b>22UCSCN37: FUNDAMENTALS OF INFORMATION TECHNOLOGY</b>	<b>CREDIT:2</b>
<b>PART: IV</b>		<b>HOURS:2/W</b>

**Course Objectives**

1. To introduce IT in a simple language to all undergraduate students, regardless of their specialization.
2. Help them to pursue specialized programs leading to technical and professional careers.
3. Enhances certifications in the IT industry.
4. Introducing skills relating to IT basics, computer applications, programming.
5. A glimpse on various types of software.

**Unit I :Introduction to Computers:****Hours: 4**

Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.

**Unit II:Basic Computer Organization:****Hours:5**

Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

**Unit III: Storage Fundamentals:****Hours:5**

Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.

**Unit IV: Computer Arithmetic:****Hours:4**

Binary, Binary Arithmetic, Number System: Positional & Non Positional, Binary, Octal, Decimal, Hexadecimal, Converting from one number system to another , Converting from one number system to another , Converting from one number system to another.

**UnitV:****Hours: 6**

**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.

**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

**Course Outcomes**

1. Understand basic concepts and terminology of information technology.
2. Have a basic understanding of personal computers and their operations.
3. Be able to identify issues related to information security.
4. Knowledge of computers, their operations and applications.
5. Enhancing the concepts of operating system.

**Text Books**

1. P.K.Sinha,Priti Sinha,Computer Fundamentals, BPB Publications.

**Supplementary Readings**

1. V.Rajaraman,Fundamentals of Computers,Sixth edition,PHP.
2. Anita Goel,Computer Fundamentals, Pearson.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	2	3	2	2	3
CO2	2	2	2	3	2
CO3	2	3	2	2	2
CO4	3	2	3	3	2
CO5	2	2	3	2	2

**1-LOW 2- MODERATE 3-HIGH**

**NON-MAJOR ELECTIVE - II**  
**(OFFERED TO OTHER DEPARTMENTS)**

<b>SEMESTER: IV</b> <b>PART: IV</b>	<b>22UCSCN47: INTERNET TECHNOLOGY</b>	<b>CREDIT: 2</b> <b>HOURS: 2/W</b>
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**OBJECTIVES**

The subject aims to build the concepts regarding:

1. Fundamentals of Internet, Connectivity and its Resource Requirements.
2. To understand the Internet Technology and its applications
3. To Understand WWW and Web Browsers.
4. Mailing system and applications of Internet.
5. To Understand relay chat

**UNIT-I**

**Introduction to internet:** What is Internet? Evolution and History of Internet- Growth of Internet-Owners of Internet- Internet Services- How does the Internet Works?-Anatomy of Internet-Internet Addressing-Internet vs Intranet-Impact of Internet- Governance of Internet.

**UNIT-II**

**Internet Technology and Protocol:** ISO-OSI Reference Model-**Internet Connectivity:** Getting Connected- Different Types of Connections- Levels of Internet Connectivity- Internet Service Provider. **Internet Tools and Multimedia:** Current Trends on Internet-Multimedia and Animation.

**UNIT-III**

**WWW and Web Browser:** WWW-Evolution of Web-Basic Elements of WWW- Web Browsers- Search Engines- Search Criteria. **Web Publishing:** Web Publishing- Web Page Design.

**UNIT-IV**

**Email:** E-Mail Basics- E-Mail System-E-Mail Protocol-E-Mail Addresses- Structure of an E-Mail Message-E-Mail Clients&Servers-MailingList-E-MailSecurity.

**UNIT-V**

**Usenet and Internet Relay Chat:** What is Usenet?-Newsgroup Hierarchies- What is a Newsreader?- How do you Read Newsgroups?- Who Administers Usenet?- Common News reading Tasks- How to Read Articles from Network News?- Relationship between Netnews and E-Mail-What is IRC?-Channels-Nicknames- Microsoft NetMeeting. **Internet and Web Security:** Overview of Internet Security- Aspects and Need of Security-E-Mail Threats and Secure E-mail-Web Security and Privacy Concepts-Firewall.

**COURSE OUTCOMES:**

1. Students understand the Fundamentals of Internet, Connectivity and its Resource Requirements.
2. Students understand the Internet Technology and its applications
3. Students Understand the basis of WWW and Web Browsers.
4. Students learn how to Mailing system and applications of Internet.
5. Students Understand relay chat that is how to read e- contents.

**TEXTBOOK:**

1. *ISRD Group*. 2012. **Internet Technology and WebDesign**. [Fourth reprint]. Tata McGraw-HillEducationPrivateLimited., New Delhi.

**REFERENCE BOOKS:**

1. Deitel,H.M Dietel,P.J.andGoldbergA.B.2008.**Internet & Worldwide Web- How to Program**. [Third Edition].PHL,New Delhi.
2. Comdex.2000.**Teach yourself computers and the internet visually**. [First Edition]. IDGBookIndia(p)Ltd.
3. Ramachandran,T.M.Nambissan.2003.**An Overview of internet and web development**. [FirstEdition].T M-Dhruv Publications.

**PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE**

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CO1	2	3	2	2	2
CO2	3	2	2	3	2
CO3	3	3	3	2	3
CO4	2	2	3	3	2
CO5	2	2	3	2	2

**1-LOW 2- MODERATE 3-HIGH**