MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

B.Sc. COMPUTER SCIENCE

UNDER CBCS
(2021-2022 ONWARDS)

DEPARTMENT OF COMPUTER SCIENCE

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL
DEPARTMENT OF COMPUTER SCIENCE
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.SC COMPUTER SCIENCE

1. About the Programme

BSc Computer Science is a 3-year undergraduate program that deals with the subjects and topics related to Computer Science, Computer Application, and its services. The main aim of this program is to create quality professionals and research fellows who can work in every sector of the world by implementing the technology of Computer Systems and Software.

This degree can lead them to profiles like computer scientist or an information systems manager or a networking specialist. It ensures efficient management of the available computer facilities, handle smooth functioning of the local area and wide area networking, implement cyber security systems, maintain software and hardware system upgradation, and manage system designing and technical analysis for the organisation.

It has been specifically designed for aspirants looking for a career in computers. The course covers all aspects of computers right from the basic fundamentals of computers to database systems & advanced courses like Cloud Computing, Artificial Intelligence, Internet of Things etc.

2. Program Educational Objectives [PEOs]

PEO1: To enrich knowledge in the core areas of computer science

PEO2: To provide opportunities for acquiring in depth knowledge on tools and techniques of advanced computing systems

PEO3: To enable career and entrepreneurial opportunities in IT sector among graduates

PEO4: To inculcate team spirit for handling complex problems in data analysis and research work

PEO5: To realize the impact of computing systems in societal development

3. Eligibility

The procedure for B.Sc. Computer Science admission is mostly done on the basis of merit. The basic B.Sc. Computer Science eligibility is a minimum aggregate of 50% in Class 12 with Mathematics compulsory subject.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	10	25	10	25
External	30	75	30	75

  - **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
  - **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average

40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

Programme Outcomes

On successful completion of the Programme, the student will be able to

PO1: Understand the basic and advanced concepts involved in real world computing systems

PO2: Apply the algorithmic principles and computer fundamentals for computer based systems

PO3: Analyze, formulate and solve the problems in different domains using computing techniques

PO4: Understand the impact of computing systems for societal development

PO5: Collaborate with team members in developing projects and to accomplish a common objective

Programme Specific Outcomes

The students at the time of graduation will be able to

PSO1: Impart the fundamental principles and methods of Computer Science in a wide range of applications

PSO2: Apply domain knowledge and problem solving skills to solve real time problems

PSO3: Ensure career opportunities and empower good employability skills in IT sector

PSO4: Identify and utilize the tools and techniques in the design and development of Software products

B.Sc. COMPUTER SCIENCE CURRICULUM
(Under Choice Based Credit System)
With Effect from 2021

Course Code	Title of the Course	Credits	Hours		CIS	EIS	Total
			L	P			
FIRST SEMESTER							
U21LTA11	TAMIL I	3	6	0	25	75	100
U21LEN11	ENGLISH I	3	6	0	25	75	100
U21CST11	**Core-1**: Programming in C	4	5	0	25	75	100
U21CSP11	**Core-2**: Programming in C Lab	4	0	6	25	75	100
U21CSA11	**Allied – 1**: Discrete Mathematics	4	5	0	25	75	100
U21EVS11	Environmental Studies	2	2	0	25	75	100
U21PEPS11	Professional English for Physical Sciences – I	4	6	0	25	75	100
	Total	**24**	**36**		**-**	**-**	**700**
SECOND SEMESTER							
U21LTA22	TAMIL II	3	6	0	25	75	100
U21LEN22	ENGLISH II	3	6	0	25	75	100
U21CST21	**Core-3**: Fundamentals of Data Structures	4	5	0	25	75	100
U21CSP22	**Core-4**: Data Structures using C Lab	4	0	5	25	75	100
U21CSA22	**Allied-2**: Digital Principles & Computer Organization	4	5	0	25	75	100
U21VAE21	Value Education	3	3	0	25	75	100
U21PEPS22	Professional English for Physical Sciences – II	4	6	0	25	75	100
	Total	**25**	**36**		**-**	**-**	**700**
THIRD SEMESTER							
U21LTA33	TAMIL III	3	6	0	25	75	100
U21LEN33	ENGLISH III	3	6	0	25	75	100
U21CST31	**Core-5**: Object Oriented Programming with Java	4	5	0	25	75	100
U21CSA33	**Allied-3**: Statistical Methods	4	5	0	25	75	100
U21CSE311/ U21CSE312	**Elective I**: Object Oriented Programming using Java Lab / Graphics using C++ Lab	3	0	4	25	75	100
U21MSS31	**SBE-1**: Managerial Skills	2	2	0	25	75	100
NME I	NME – I: Web Designing with HTML	2	2	0	25	75	100
U21PEPS33	Professional English For Physical Science - III	4	6	0	25	75	100

	Total	**25**	**36**		**-**	**-**	**700**
		FOURTH SEMESTER					
U21LTA44	TAMIL IV	3	6	0	25	75	100
U21LEN44	ENGLISH IV	3	6	0	25	75	100
U21CST41	**Core-6**: Web Technology	4	4	0	25	75	100
U21CSP44	**Core-7**: Web Technology Lab	4	0	4	25	75	100
U21CSA44	**Allied-4:** Fundamentals of Computer Algorithms	4	4	0	25	75	100
U21CSE421 / U21CSE422	**Elective II** **1.** System Software 2. PHP with MySQL	3	3	0	25	75	100
U21CSS42	**SBE II –** Computer Skills for Office Management	2	0	2	25	75	100
NME II	**NME – II**: Photo Designing Tools	2	2	0	25	75	100
U21PEPS44	Professional English IV	4	6	0	25	75	100
	Total	**29**	**37**		**-**	**-**	**800**
		FIFTH SEMESTER					
U21CST51	**Core-8**: Relational Database Management System	4	5	0	25	75	100
U21CST52	**Core-9**: Operating System Concepts	4	5	0	25	75	100
U21CST53	**Core-10**: Computer Networks	4	5	0	25	75	100
U21CST54	**Core-11:** Computer Graphics	4	5	0	25	75	100
U21CSP55	**Core-12**: Relational Database Base Management Systems Lab	4	0	5	25	75	100
U21CSE531 U21CSE532	**Elective III** 1.Multimedia & Applications 2. Cloud Computing	3	3	0	25	75	100
U21CSS53	**SBE III -**Operating System Lab	2	0	2	25	75	100
	Total	**25**	**30**		**-**	**-**	**700**
		SIXTH SEMESTER					
U21CST61	**Core-13**: Software Engineering	4	5	0	25	75	100
U21CST62	**Core-14**: Mobile Application Development	4	5	0	25	75	100
U21CST63	**Core-15**: Artificial Intelligence	4	5	0	25	75	100
U21CSP66	**Core-16**: Mobile Application Development Lab	4	0	5	25	75	100
U21CSR61	**Core-17**: Project	4	0	5	25	75	100
U21CSE641/ U21CSE642	**Elective IV** 1.Internet of Things 2.R Programming	3	3	0	25	75	100
U21CSS64	**SBE IV** – Image Processing Lab	2	2	0	25	75	100

U21EAS61	Extension Activities	3	0	0	100	0	100
	Total	**28**	**30**		-	-	**800**
	Grand Total	**156**	**205**				**4400**

Non-Major Elective (NME)

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

Non-Major Electives (NME) offered by Computer Science Department

Course Code	Title of the Course
U21CSN31	NME I: Web Designing using HTML
U21CSN42	NME II: Photo Designing Tools

ADDITIONAL CREDIT COURSES

COURSE CODE	COURSE	SEMESTER	CREDITS
U21CSO31	Online Course	III	2
U21CSI41	Internship	IV	2
U21CSV51	Quantitative Aptitude - Value Added Course	V	2

SEMESTER I

CODE	U21CST11	PROGRAMMING IN C	L	T	P	C
CORE - I			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand and develop well-structured programs using C language.
2. To learn the implementation of data structures through C language.
3. To deal with efficient memory allocation & input/output methods.
4. To improve the Problem-solving skills through computer programming.

UNIT I - INTRODUCTION

Overview of C: Introduction - character set - C tokens - keyword & identifiers –constants – variables - data types – Declarations of variables – Arithmetic, Relational, Logical, Assignment, conditional, Bit wise, special, increment and decrement operators - Arithmetic expressions - Evaluation of expression - Operator Precedence & Associativity -Mathematical functions - Reading & writing a character - Formatted input and output.

UNIT II – DECISION MAKING

Decision Statements: If, if else, switch, break, continue – the ? Operator - The GOTO statement. – Loop Control Statements: Introduction – for, nested for loops – while, do-while statements – Arrays: One-dimensional - Two dimensional - Multidimensional arrays.

UNIT III – STRING HANDLING

Character string handling - Declaring and initializing string variables – Reading strings from terminal - Writing strings to screen - String handling functions - User-defined functions: Need for user defined functions – Types of functions - calling a function category of functions - no arguments and no return values – Arguments but no return values-Arguments with return values– Recursion - functions with arrays - functions with arrays -The scope and lifetime of variables in functions

UNIT IV - STRUCTURES

Structure: Definition- Structure initialization - Comparison of structure variables -Arrays of structures - Arrays within structures - Structures within structures – unions. Pointers: understanding pointers - accessing the address of a variable - declaring and initializing pointers - accessing a variable through its pointers - pointer expressions – pointers and arrays - pointers and character strings - pointers and functions - pointers and structures.

UNIT V – FILE MANAGEMENT

File Management in C: defining and opening a file - closing file - I/O operations on files - error handling during I/O operations - Random access to files - command line arguments. Dynamic memory allocation: Introduction- dynamic memory allocation –MALLOC – CALLOC – REALLOC - The pre-processor

TEXT BOOK

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

REFERENCE BOOKS

1. Byron Gottfried - Programming with C - Tata McGraw Hill, 3rd Edition, 2013.
2. V.Rajaraman - Computer Programming in C - Prentice Hall of India Pvt. Ltd,1st Edition, 2004.
3. Smarajit Ghosh - Programming in C - Prentice Hall of India Pvt. Ltd.,1st Edition, 2004
4. Yashwvant Kanetkar - Let us C - BPB Publications, 13th Edition, 2014.

Webliography

1.www.tutorialspoint.com
2.www.fresh2fresh.com
3.www.cprogramming.com
4. www.spoken-tutorial.org

COURSE OUTCOMES:

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

CO1: Apply the syntax and semantics of C language – K3
CO2: Utilize the concept of functions and arrays in solving real world problems – K3
CO3: Demonstrate structures, union and pre-processing techniques in C - K1
CO4: Design real world problems using pointers and file concept - K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	S	M	S	S	M
CO2	S	S	M	S	M	S	S	M	S
CO3	S	S	S	M	M	S	S	M	S
CO4	S	S	S	M	M	S	S	M	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

CODE	U21CSP11	PROGRAMMING IN C LAB	L	T	P	C
CORE - II			-	-	6	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. Imbibe the in-depth practical experience in 'C' programming.
2. To impart knowledge on basic concepts in C
3. To make them familiar with Structure and Files in C
4. To develop C programs for real world problems

LIST OF PROGRAMS

1. Finding the Largest and Smallest of three numbers using if, if-else.
2. Checking for an Armstrong number using if, if-else
3. Solving Quadratic equations using switch statement
4. Finding the area of different shapes using switch statement.
5. Ascending and descending order of numbers using arrays.(Largest and smallest numbers)
6. Sorting of names in alphabetical order.
7. Program to search the given element by using linear search.
8. Matrix operations i) Addition ii) Subtraction iii) Multiplication iv) Transpose
9. Finding factorial of a number Using Recursive function
10. Generating Fibonacci series Using Recursive function
11. String manipulations using string functions

i) String length ii) String comparison iii) String copy

12. String manipulations without using string functions

i) String length ii) String comparison iii) String copy

13. Palindrome checking Using function
14. Counting characters, words and lines Using function
15. Generate salary slip of employees using structures.
16. Program to generate student mark list using array of structures
17. Programs for file handling (Sequential, Random)

COURSE OUTCOMES

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

CO1: Develop and execute programs using Operators and control Structures – K2
CO2: Develop programs in C to solve any kind of real world problem - K2
CO3: Apply the programming concepts of C in the standalone applications. - K3
CO4: Have a depth understanding in C program features – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	M	M	M	M	M	M
CO2	S	S	S	S	S	S	S	S	S
CO3	S	M	M	S	S	S	S	M	S
CO4	S	S	S	M	M	M	S	S	M

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

CODE	U21CSA11	DISCRETE MATHEMATICS	L	T	P	C
ALLIED - I			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand the problem solving method.
2. To Understand the concept of logical implications and equivalences
3. To learn about the importance of groups and its properties
4. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

UNIT I - SET

Review of theory of sets – Relations – Equivalence Relations – partial Order – Function – Binary Operations.

UNIT II – LOGIC CONNECTIVES

Logic – Introduction – connectives – Truth Table – Tautology – Implications – Equivalences.

UNIT III - GROUPS

Groups – Definitions & Examples – Elementary – Properties –Equivalent definitions of a group- Sub Groups – Cosets and Lagrange's Theorem.

UNIT IV - MATRIX

Matrices – Special type of Matrices – operations – Inverse of a Matrices – Elementary Transformation – Rank of Matrix – Simultaneous Linear Equation – Eigen values and Eigen vectors – Cayley Hamilton theorem.

UNIT V – POSETS AND LATTICES

Partial Ordering – Posets – Representation of finite posets by diagrams (Hasse Diagram) - Lattices – Properties – Sub Lattices -Distributive Lattices–Modular Lattices- Boolean Algebra.

TEXT BOOKS

S.Arumugam & Thangapandi Issac - Modern Algebra - Scitech Publications (India) PvtLtd ., 2015.

REFERENCE BOOKS:

1. Oscar Levin, Discrete Mathematics – An Open Introduction, 3rd Edition 2015
2. Arumugam S, Satya S.K. Jayanty - Modern Algebra - Scitech Publications (India) Pvt .Ltd, 2003

COURSE OUTCOMES:

After successful completion of the course, student shall be able to:

CO1: Understand the complexity of computational problems – K2

CO2: Think about the design of formal language which would be able to address any real time problem – K1

CO3: Improve the working flow of computational models – K2.

CO4: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra –

K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	M
CO2	S	S	S	M	M	S	M	M	S
CO3	S	S	S	M	M	S	M	M	S
CO4	S	S	S	S	M	M	M	M	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

SEMESTER – II

Course Code	U21CST21	FUNDAMENTALS OF DATA STRUCTURES	L	T	P	C
CORE III			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand about the operations of Stack & Queue.
2. To understand about Tree & its traversal techniques.
3. To Understand about Graphs and its components.
4. The student can get the In-depth Knowledge in dealing with Data and its Structures.

UNIT I - ARRAYS

ARRAY: Axiomatization – Ordered Lists – Sparse Matrices – Representation of Arrays.

UNIT II – STACKS AND QUEUES

STACKS AND QUEUES: Fundamentals – Amazing Problem – Evaluation of expressions – Multiple Stack and Queues.

UNIT III – LINKED LIST

LINKED LIST: Singly Linked List, Linked Stacks and Queues – The Storage Pool - Polynomial Addition – Doubly Linked list and Dynamic Storage Management – Garbage Collection and Compaction.

UNIT IV - TREES

TREES: Basic Terminology – Binary Trees – Binary Tree Representations – Binary Trees Traversal – More on Binary Trees – Threaded Binary trees –Binary Trees Representation of Trees

UNIT V - GRAPHS

GRAPHS: Terminology and Representations: Introduction – Definitions and Terminology – Graph representations – Traversal, connected components and Spanning Trees.

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TEXT BOOK

1. Ellis Horowitz Sartaj Sahni - Fundamentals of Data Structure - Galgotia Publications, 1998.
2. Seymour Lipschutz-, Data Structures with C -Schaum's Outline Series, 2017

REFERENCE BOOKS

1. Sartaj Sahni - Data Structures, Algorithms and Applications in C++ - McGraw Hill 1998.
2. A.Chitra, P.T.Rajan - Data Structures - Vijay Nicol Imprints Pvt Ltd, Mc,Graw Hill Education of India Pvt. Ltd., 2006.

COURSE OUTCOMES:

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

CO1: Describe the basics of Ordered Lists and Representation of Arrays – K1
CO2: Apply the knowledge of Linked list for solving problem in the real world. – K3
CO3: Demonstrate the usage of Binary trees and Representation of Trees – K2
CO4: Illustrate the performance of Graphs representation and spanning Trees – K4

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	S	M	S	M
CO2	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S
CO4	S	M	M	S	M	M	M	M	M

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSP22	DATA STRUCTURES USING C LAB	L	T	P	C
CORE - IV			-	-	5	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To impart knowledge on Data Structures
2. To implement and differentiate single and double linked list
3. To illustrate stack to convert infix to postfix.
4. To develop programs for De queue and Dictionary

LAB EXERCISES

1. Program using array based stack push (), pop (), stack_Full() and stack_Empty() functions.
2. Program to evaluate the given postfix expression using the stack
3. Program that uses stack operations to convert a given infix expression into its postfix equivalent
4. Program to add two polynomials using linked list.
5. Program to find Union of two single Linked Lists.
6. Program to Create a singly linked list of integers.
7. Program to Delete a given integer from the above linked list.
8. Program to Display the contents of the above list after deletion.
9. Program to eliminate duplicates from Linked List
10. Program to implement all the functions of a dictionary (ADT) using hashing
11. Program to implement a double ended queue ADT an array, using a doubly linked list.
12. Program that uses functions to perform the following:
13. Program to Create a doubly linked list of elements.
14. Program to Delete a given element from the above doubly linked list.
15. Program to Display the contents of the above list after deletion.

COURSE OUTCOMES:
Upon successful completion of the course the students will be able to
CO1: Apply the concepts to solve problems using C programming language - K3
CO2: Implement the basic data structures using C – K1
CO3: Solve real world problems using C programming language – K3
CO4: Recognize the importance of Data Structure features – K4

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S
CO2	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S
CO4	S	M	M	S	M	M	S	M	M

S – Strongly Correlating **M – Moderately Correlating**

COURSE CODE	U21CSA22	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	L	T	P	C
ALLIED II			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand the fundamentals of computer and its role in problem solving.
2. To acquire the concept of flow of control and program structures.
3. To learn the operation of latches, flip-flops, counters, registers and register transfers in the Computer organization.
4. To design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum number of gate delays or literals

UNIT I: NUMBER SYSTEM

Number Representation - Number System: Binary, Hexadecimal - Octal Codes - BCD - Excess-3 - Gray Code - ASCII - EBCDIC - Binary Arithmetic - 1's Complement - 2's Complement Representation - Error Detecting Codes - Hamming Codes. Introduction - Boolean Algebra - Demorgan's Theorem - Sum Of Product method - Product of Sum method - Karnaugh Map.

UNIT II: GATES

Introduction - Logic Gates – Universal Gates – Decoder – Encoder – Multiplexer – De-multiplexer - Half Adder - Full Adder - Half Subtractor - Full Subtractor. Flip-Flops - S-R Flip-flop - J-K Flip Flops.

UNIT III: INSTRUCTIONS

Introduction: Machine Language - Assembly language – Assembler - Programming Arithmetic & Logic Operations – Input - Output Programming. Basic Computer Organization and Design Instruction Codes - Computer Registers - Computer Instruction - Timing & Control Instruction Cycles-Memory Reference Instruction.

UNIT IV:

I/O Organization - Peripheral Devices - I/O Interface - Mode of Transfers - DMA.

UNIT V:

Memory Organization - Memory Hierarchy - Main Memory - Auxiliary Memory -Associative Memory - Cache Memory - Virtual Memory.

TEXT BOOKS:

1. Albert Paul Malvino& Donald P.Leach - Digital Principles and Applications - IV Edition, Tata McGraw Hill Company Limited, 2006.
2. Morris Mano - Computer System Architecture - Pearson Publication, Third Edition,1981.

REFERENCE BOOKS:

1. P. K. Sinha & Priti Sinha - Computer Fundamentals - BPB Publications, 2007.
2. Dr. Anita Goel - Computer Fundamentals- Pearson Education, 2010.
3. Alexis Leon - Fundamentals of Information Technology - Vikas Publication, 2009
4. P.S.Manoharan - Digital Principles & System Design –-Revised Edition-Charulatha Publication,

2017.

COURSE OUTCOMES:

Upon successful completion of the course the students will be able to

CO1: Understand the hardware and software types and components of the computer – K2
CO2: Recognize the problem-solving fundamental key points. – K1
CO3: Sketch out the representation of numbers and codes in the computer – K1.
CO4: Know the digital computers internal components and the execution of the instructions – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	M	M	S	M
CO2	S	M	M	S	M	M	M	M	M
CO3	S	M	M	S	M	M	M	M	M
CO4	S	S	S	S	M	S	M	M	S

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

SEMESTER: III

COURSE CODE	U21CST31	OBJECT ORIENTED PROGRAMMING WITH JAVA	L	T	P	C
CORE - V			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand K3: Apply K4: Analyze				

OBJECTIVES:

1. To understand the object-oriented paradigm in the Java programming language.
2. To know about the Package and Interfaces.
3. To Understand about Applets.
4. To write Java application programs using proper program structure

UNIT I - Introduction

Fundamentals of Object Oriented Programming - Basic Concepts of Object-Oriented Programming – Benefits of OOP –Applications of OOP. Java Evolution – overview of Java Language

UNIT II - Basics

Constants, Variables and Data types. Operators and Expressions – Decision Making and Branching

UNIT III - Looping

Decision Making and Looping - Classes, Objects and Methods – Arrays, Strings and Vectors. Interfaces: Multiple Inheritance

UNIT IV - Packages

Packages: Putting classes together – Multithreaded Programming – Managing errors and Exception.

UNIT V - Applets

Applet Programming – Graphics Programming – Introduction to AWT packages – Introduction to Swings - Managing Input Output in Files in Java.

TEXT BOOK

E.Balagurusamy - Programming with Java, Sixth Edition – McGraw Hill Education Private Limited. 2019

REFERENCE BOOKS

1. Patrick Naughton, Herbert Schildt - The Complete Reference Java 2 - India: McGraw Hill, 5th Edition. (2006).
2. Dr. K.Somasundaram - Introduction to Java Programming -India: Jaico Publishing House. (2013).

COURSE OUTCOMES:

Upon successful completion of the course the students will be able to

CO1: Know the basics of OOP and the syntax of Java language – K1
CO2: Empower the knowledge of Input/Output functions with file manipulations using I/O – K2
CO3: Analyze GUI programming applications using AWT packages – K4
CO4: Develop Java based Applications using GUI and database Connectivity - K4

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	M	M	M	M	S	M
CO2	S	S	M	S	M	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSA33	STATISTICAL METHODS	L	T	P	C
ALLIED -III			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To have a broad background in Statistics fundamentals and techniques.
2. To recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines.
3. To become familiar with a variety of examples where mathematics or statistics helps accurately explain abstract or physical phenomena.
4. Creating confidence to have the versatility to work effectively in a broad range of analytic, scientific, government, financial, health, technical and other positions.

UNIT I: Organizing data:

RawData-Frequency distribution-percentage- bar graph- pie graph-histogram-cumulative frequency distributions- Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean.

UNIT II: Regression

Regression – Principles of Least Square – Correlation – Rank Correlation.

UNIT III: Assignment Problem

Experiments, sample space – compound events- probability- marginal and continuous probability- mutually exclusive events- Baye's Theorem – permutation and combination.

UNIT IV: Simplex Method

Binomial Distribution – Poisson Distribution – Normal Distribution (Problems only) – Some more continuous distribution.

UNIT V: Transportation Problem

χ^2 – Distribution - χ^2 Test - χ^2 test to test the goodness of fit – Test for independence of attributes.

TEXT BOOK:

1. S.Arumugam Issac - Statistics - New Gamma Publishing House, Palayamkottai, 2014.
2. Larry.J.Stephens - Beginning statistics - Schaum's Outline Series, McGraw-Hill Education; 2nd edition, January 2006

REFERENCE BOOKS:

1. S.C.Gupta, V.K.Kapoor - Element of Mathematical Statistics - Sultan Chand &Sons, 2014.
2. Dr.S.P.Gupta - Statistical Methods - Sultan Chand & Sons, 2012.

COURSE OUTCOMES:

After successful completion of the course, student shall be able to:

CO1: Acquire the knowledge of Statistics fundamentals and techniques – K1
CO2: Solve the Regression and Correlation problems – K3
CO3: Describe the solution methods using Bayes theorem – K1
CO4: Evaluate problems using various distributions – K4

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	S	M
CO2	S	M	S	S	M	M	M	S	M
CO3	S	S	S	M	M	M	M	M	M
CO4	S	M	S	S	M	M	M	S	M

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

COURSE CODE	**U21CSE311**	**CHOICE I**	**L**	**T**	**P**	**C**
ELECTIVE -I		**OBJECT ORIENTED PROGRAMMING USING JAVA – LAB**	**-**	**-**	**4**	**3**
Cognitive Level	K1: Recall	K2: Understand K3: Apply K4: Analyze				

OBJECTIVES:

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3. To Understand the principles of inheritance, packages and interfaces
4. The Student can develop software in the Java programming language.

Exercise:

1. Arrays and flow control statements.
2. Run time exception And I/O exception.
3. Multi- Threading.
4. Layout Management.
5. GUI Components (Labels, Check box, Menus, Text, etc.)
6. Event Handling (Focus Events, Key Events, Paint Events, Text Events, Mouse Events, Window Events, Etc.)
7. Animation and Images.

8. Java Applet.
9. Java files management methods.
10. Java Streams.
11. JDBC (Java Database Connectivity).
12. Arithmetic Operation Using Java Script
13. Prime Number Using Java Script
14. Find Largest Number in Array Using Java Script
15. Palindrome Using Java Script

TEXT BOOK

E. Balagurusamy - Programming with Java, Sixth Edition – McGraw Hill Education Private Limited. 2019

REFERENCE BOOKS

1. Patrick Naughton, Herbert Schildt - The Complete Reference Java 2 - India: McGraw Hill, 5th Edition. (2006).
2. Dr. KSomasundaram - Introduction to Java Programming -India: Jaico Publishing House. (2013).

COURSE OUTCOMES:

On successful completion of the course, students will be able to
CO1: Solve problems using OOPs concept in Java – K2
CO2: Implement simple software using JAVA – K3
CO3: Implement the Input/Output functions with file manipulations using I/O Streams – K3
CO4: Implement the GUI programming applications using AWT packages – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	M	M	M	S	M
CO2	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSE312	CHOICE II	L	T	P	C
ELECTIVE -I		GRAPHICS USING C++ - LAB	-	-	4	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives:

1. To apply the fundamentals of Graphics primitives using C++
2. To create a program using 2D & 3D Transformations
3. To understand the features of line, circle and ellipse algorithms
4. To emphasize the properties of composite transformations in Graphics

Program List

1. Draw a Line using DDA Algorithm
2. Draw a Line using Bresenham's Line Drawing Algorithm
3. Draw a Circle using Mid Point Circle Algorithm
4. Draw an Ellipse using Mid Point Ellipse Algorithm
5. Implement various attributes of Output primitives
6. Implement 2D Transformation
7. Implement 2D Composite Transformation
8. Clip a Line using Cohen Sutherland Clipping Algorithm
9. Implement 3D Transformation
10. Implement 3D Composite Transformation

COURSE OUTCOMES:

Upon successful completion of the course the students will be able to

CO1: Apply the concepts to solve graphical primitives using C++ programming language – K3

CO2: Implement the 2D & 3D transformations using C++ - K2

CO3: Solve the real world problems using the features of clipping algorithm – K2

CO4: Recognize the importance of Composite transformations & its features – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S
CO2	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S
CO4	S	M	M	S	M	M	S	M	M

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

SEMESTER IV

COURSE CODE	U21CST41	WEB TECHNOLOGY	L	T	P	C
CORE VI			4	-	-	4

OBJECTIVES:

1. To understand the concept of Tables, Forms, Files, Basic Web server Controls.
2. Able to know Internet Basics and HTML.
3. To understand the concept of OLEDB connection class & Cookies.
4. Knowledge of solving web &client/server problems.

UNIT-I: Introduction to Web Designing

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-II: Active Server Pages

ASP. NET Language Structure – Page Structure – Page event, Properties & Compiler Directives. HTML server controls – Anchor, Tables, Forms, Files. Basic Web server Controls- Label, Textbox, Button, Image, Links, Check & Radio button, Hyperlink.

UNIT-III: Designing Controls

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

UNIT-IV: Database Connectivity

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives.

UNIT-V: Security

Error handling. Security - Authentication, IP Address, Secure by SSL and Client Certificates

TEXT BOOK

Deitel & Deitel - Internet & World Wide Web - How to program, Pearson Education, 2012.

REFERENCE BOOKS

1. I.Bayross - Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI - BPB Publications, 2000
2. J.Jaworski - Mastering Java script - BPB Publications, 1999
3. T.A.Powell - Complete Reference HTML (Third Edition) - TMH, 2002
4. G.Buczek - ASP.NET Developers Guide - TMH, 2002

COURSE OUTCOMES

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

CO1: Learn to design web pages using HTML – K1

CO2: To gain knowledge on creating interactive web pages using ASP.Net – K2

CO3: To understand how to use Cookies and DOM – K2

CO4: To develop server-side scripting using OLEDB – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	M	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S
CO3	S	M	M	M	M	M	M	M	M
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

COURSE CODE	U21CSP44	WEB TECHNOLOGY LAB	L	T	P	C
CORE VII			-	-	4	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. Apply the knowledge of the internet and related internet concepts that are vital in understanding web application development and analyze the insights of internet programming to implement complete application over the web.
2. To understand, analyze and apply the role of markup languages in the workings of the web applications
3. To automate the real time problems by developing & analyzing a web project and identify its elements and attributes in comparison to traditional projects.
4. The Students can choose best technologies for solving web client/server problems.

Programs using the following concepts

VB.NET

1. Enumeration
2. Exception handling
3. Constructor
4. Destructor
5. Inheritance
6. Polymorphism
7. Interface

ASP.NET

1. Designing simple Form
2. Data Grid
3. Request and Response Object
4. Cookies
5. Ad Rotator Control

6. Validator Control
7. String Functions
8. OLEDB
9. Generate the Hotspots in the image

VB SCRIPT

1. branching statements
2. Sorting
3. Looping through Arrays
4. Functions
5. Forms

TEXT BOOK

Deitel & Deitel - Internet & World Wide Web - How to program, Pearson Education, 2012.

REFERENCE BOOKS

1. I.Bayross - Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI - BPB Publications, 2000

2. J.Jaworski - Mastering Java script - BPB Publications, 1999
3. T.A.Powell - Complete Reference HTML (Third Edition) - TMH, 2002
4. G.Buczek - ASP.NET Developers Guide - TMH, 2002

COURSE OUTCOMES:

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

CO1: To perform the basic functions of VB.NET – K2
CO2: Perform tests, resolve defects and revise existing code – K2
CO3: Develop dynamic web applications, create and consume web services – K3
CO4: Use appropriate data sources and data bindings in VB.NET / ASP.Net – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	M	S	M
CO2	S	S	S	M	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	M	M	S	M

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

COURSE CODE	U21CSA44	FUNDAMENTALS OF COMPUTER ALGORITHMS	L	T	P	C
ALLIED -IV			4	-	-	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To write rigorous correctness proofs for algorithms.
2. To understand about the major algorithms and data structures.
3. To apply important algorithmic design paradigms and methods of analysis.
4. To analyze the complexities of various problems in different domains.

UNIT I: Introduction

Introduction: Divide and conquer: General Method-binary search-finding the maximum and minimum – Merge sort – Quick sort – Selection sort.

UNIT II: Greedy Approach

The greedy method: General method –Prim's Algorithm – Kruskal Algorithm- Minimum spanning trees- Single Source Shortest path (Dijkstra's Algorithm).

UNIT III: Dynamic Programming

Dynamic Programming: General method – Multistage graphs – All pairs shortest paths – Optimum Binary search Trees –0/1 Knapsack – the travelling salesman problem

UNIT IV: Traversal Techniques

Basic search and Traversal Techniques: The techniques – Code optimization – AND/OR graphs – Bi-connected components and Depth first search – Breadth first search.

UNIT V: Backtracking

Backtracking: General Method- 8 Queens Problem – Hamiltonian cycles – Knapsack problem – Euler circuit. Branch and bound: Assignment Problem - Travelling Salesman

TEXT BOOKS:

1. Anany Levitin – Introduction to the Design and Analysis of Algorithms – Pearson Education 2003

REFERENCE BOOKS

1. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran - Fundamentals of Computer Algorithms - India: Galgotia Publications. (2005).
2. Clifford Stein, Thomas H. Cormen, Charles E. Leiserson & Ronald L.Rivest - Introduction to Algorithms - India: Prentice Hall of India. (2006).

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Understand the concepts of Divide and Conquer technique and have the skills to write efficient procedures like sorting, searching etc. – K3

CO2: Understand the concepts of Greedy techniques and acquire the knowledge to develop optimal

procedures for problems like minimum spanning tree construction, single source shortest paths – K3

CO3: Acquire the knowledge to solve backtracking and Branch-and-Bound techniques – K1
CO4: Analyze the algorithms based on time complexity – K4

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	M	S

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

COURSE CODE	U21CSE421	CHOICE I	L	T	P	C
ELECTIVE II		SYSTEM SOFTWARE	3	-	-	3
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand the relationship between system software and machine architecture.
2. To know the design and implementation of assemblers, macro processors, loaders, linkers and compilers.
3. To understand the process of scanning and parsing of a program.
4. To have clear knowledge about system software like assemblers, loaders, linkers, macro processors and compilers.

UNIT I: Background

Introduction – System Software and Machine Architecture – The Simplified Instructional Computer (SIC) – Traditional (CISC) machines – RISC Machines

UNIT II: Assemblers

Basic Assembler Functions – Machine-Dependent Assembler Features – Machine-Independent Assembler Features – Assembler Design Options

UNIT III:Loaders and Linkers

Basic Loader Functions – Machine-Dependent Loader Features - Machine-Independent Loader Features - Loader Design Options

UNIT IV:Macro Processors

Basic Macro Processor Functions – Machine-Independent Macro Processor Features – Macro Processor Design Options

UNIT V: Compilers

Basic Compiler Functions – Machine-Dependent Compiler Features - Machine-Independent Compiler Features

TEXT BOOK

1. Leland L. Beck & Manjula. D - System Software - An Introduction to Systems Programming - 3rd Edition. India: Pearson Education (2009)..

REFERENCE BOOKS

1. Dhamdhere.D.M - System Programming and Operating Systems - India: Tata McGraw Hill Education Private Limited. (2006)
2. Donovan.J.J - Systems Programming - India: Tata McGraw Hill Education Private Limited. (2001).

COURSE OUTCOMES

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

CO1: Understand the relationship between System Software and Machine Architecture - K2
CO2: To know the design and implementation of assemblers, macro processors, loaders, linkers and compilers – K3
CO3: Interpret various concepts of scanning and parsing of a program – K2
CO4: Discuss the processing of a HLL program for execution on a computer system – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S
CO3	S	S	M	M	S	S	S	M	S
CO4	M	S	M	S	S	M	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSE422	CHOICE II	L	T	P	C
ELECTIVE II		PHP with MySQL	3	-	-	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

OBJECTIVES:

1. To study the Web Programming concepts
2. To make use of PHP elements
3. To examine the working environment with WAMP, LAMP and XAMPP
4. To interpret the concepts of MySQL

UNIT I: GENESIS OF PHP

Introducing PHP: Use of PHP – the evolution of PHP. First PHP script: Installing PHP – other ways to run PHP - creating first script. PHP Language Basics: Using variables – data types – operators and expression – constants. Decision and loops: Making decisions – doing repetitive tasks with loops – making decision and looping. Strings: Creating and accessing strings – searching strings – replacing text within strings – *dealing with upper and lowercase – formatting strings.

UNIT II: ARRAYS AND FUNCTIONS

Arrays: Creating arrays – accessing array elements – looping through arrays with foreach – multidimensional arrays – manipulating arrays. Functions: Calling functions – working with variable functions – writing our own functions. Objects: Object oriented programming – advantages of OOP – understanding basic OOP concepts – creating classes and objects in PHP – creating and using properties – working with methods – automatically loading class files – storing objects as strings.

UNIT III: USING PHP WITH HTML

Handling HTML forms with PHP: Capturing form data with PHP - dealing with multi-value fields - generating web forms with PHP - storing PHP variables in forms - creating file upload forms - redirecting after a form submission. Preserving state with query strings, cookies, and sessions: Saving state with query strings - *working with cookies - using PHP sessions to store data. Working with files and directories: Getting information on files - opening and closing files - reading and writing to files - working with file permissions - copying, renaming, and deleting files - working with directories - building a text editor.

UNIT IV: PHP WITH MySQL

Introducing databases and SQL: Setting up MySQL - connecting to MySQL from PHP. Retrieving data from MySQL with PHP: Setting up the book club database - *retrieving data with select - creating a member record viewer. Manipulating MySQL data with PHP: Inserting records - updating records - deleting records - building a member registration application - creating a members' area - creating a member manager application.

UNIT V: PHP AND OUTSIDE WORLD

Generating images with PHP: Creating images - manipulating images - using text in images. String matching with regular expressions: Regular Expression - pattern matching in PHP - replacing text - altering matching behavior with pattern modifiers - splitting a string with a regular expression.

Working with XML: XML Document Structure – reading XML Documents with PHP – writing and manipulating XML documents with PHP - doing XML the easy way with simple XML – working with XSL and XSLT.

TEXT BOOK

1. Doyle. M., - Beginning PHP 5.3 - First Edition - Wiley Publications Ltd., Indianapolis, 2010.

REFERENCE BOOKS

1. Bayross.I., and S. Shah. - PHP 5.1 for Beginners -Tenth reprint, Shroff Publishers and Distributors, Mumbai, 2011.
2. Nixon.R. - Learning PHP, MySQL, JavaScript and CSS - Second Edition, O'Reilly Media, Sebastopol, 2012.
3. Rao.M.N. - Fundamentals of Open Source Software - First Edition, Prentice Hall of India Pvt Ltd., New Delhi, 2014.
4. Sklar.D. - Learning PHP 5 - First Edition, O Reilly Media, Sebastopol, 2004.
5. Ullman.L. - PHP and MySQL for Dynamic websites: Visual Quick Pro Guide - Fourth edition, Dorling Kindersley India Private Ltd, New Delhi, 2011.

COURSE OUTCOMES :

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

CO1: Summarize Web Programming concepts – K1
CO2: Apply PHP elements to solve real world problems – K3
CO3: Examine the working environment with WAMP, LAMP and XAMPP – K1
CO4: Interpret the concepts of MySQL with PHP – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	M	M
CO2	S	S	M	S	M	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

SEMESTER – V

COURSE CODE	U21CST51	RELATIONAL DATA BASE MANAGEMENT SYSTEM	L	T	P	C
CORE -VIII			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand the overview of Data Base systems & Data Models.
2. To modify and maintain the database structure.
3. To Understand about the PL/SQL &QL.
4. The students can able to handle the Database.

UNIT I: Introduction

Introduction: Purpose of Data Base Systems – View of Data – Data Models – Database Languages – Transaction Management – Storage Management – Database Administrator – Database Users – Overall System Structure.

UNIT II: E-R Model

Entity – Relationship Model - Basic Concepts – Design Issues – Mapping Cardinalities – Keys – E-R Diagrams – Weak Entity Sets – Extended E-R features – Design of an E-R Database scheme – Reduction of an E-R scheme to table.

UNIT III: Relational Model

Relational Model: Structure of relational databases – Relational algebra – The tuple relational calculus – The Domain Relational Calculus – Extended Relational Algebra operations – Modification of the Database – Views.

UNIT IV: Integrity Constraints

Other Relational Languages & Integrity Constraints: Query by Example – Quel – Datalog – Domain Constraints – Referential Integrity – Assertions – Triggers – Functional Dependencies.

UNIT V: PL/SQL

PL/SQL – Relationships between SQL & PL/SQL – Advantages of PL/SQL – Arithmetic & Expressions in PL/SQL – Loops and Conditional Statements in PL/SQL – Exceptions Handling – Cursor Management – Triggers – Functions & Procedures.

TEXT BOOK

1. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts (third edition)- McGraw - Hill international editions, 1997.

REFERENCE BOOKS

1. S.Atre - Database Structured Techniques for Design, Performance & Management - John Wiley & sons, 1988.
2.James W, Martin N - Principles of database management - Prentice hall,1979.
3.C.J.Date - An Introduction to Database System - addition Wesley,1981.

COURSE OUTCOMES

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

CO1: Understand the fundamentals of database system – K2

CO2: Design and create tables in database and execute queries - K3

CO3: Have knowledge in network and hierarchical data base system – K2

CO4: Design a database based on a data models using normalization – K3.

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	M	M	M	S	M
CO2	S	M	M	M	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S
CO4	S	M	M	S	M	M	M	M	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CST52	OPERATING SYSTEM CONCEPTS	L	T	P	C
CORE -IX			5	-	-	4
Cognitive Level	K1: Recall	K2: Understand K3: Apply K4: Analyze				

OBJECTIVES:

1. To introduce various components of Computer Hardware and Operating Systems.
2. To discuss the structure of Operating System, its functions and algorithms.
3. To understand the working of operating system, its structures and functioning
4. To Learn various algorithms used in operating systems**.**

UNIT I: Introduction

Introduction — What is operating system do-operating System structure-operating system services-user operating system interface -system calls-Operating system design and implementation—operating –system structure. Process Management- Process scheduling-operations on processes Inter-process communication –Threads and concurrency-overview- multithreading models.

UNIT II: CPU Scheduling

CPU scheduling - Basic concepts-scheduling criteria - scheduling algorithms – Multiprocessor scheduling. Process Synchronization: Critical-Section Problem-Hardware support for Synchronization- Semaphores-Synchronization Examples-Classical Problems of Synchronization

UNIT III: Deadlock

Deadlocks: Deadlock Characterization- Methods for Handling Deadlocks-Deadlock Prevention-Avoidance-Detection-Recovery. Main Memory: Background-Contiguous Memory Allocation-paging- Structure of the page table-swapping

UNIT I V: Memory Management

Virtual Memory: Demand Paging-Copy on Write-Page Replacement-Allocation of Frames-Thrashing- Mass Storage Structure- RAID structure

UNIT V: File System

File System Interface: File Concepts- Access Methods Directory Structures –Protection-File System Implementation-File System Structures–Allocation Methods-Free Space Management. System Security: Security Problems – Program Threats –System and Network Threats

TEXT BOOK

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley Publications, 10th Edition, 2018.

REFERENCE BOOKS

1. Andrew S Tanenbaum, Herbert Bos - Modern Operating Systems - 4e Fourth Edition, Pearson Education, 2016
2. Abraham Silberschatz, Peter Galvin, Greg Gagne - Operating System Concepts - Wiley, 8th Edition, 2008.

COURSE OUTCOMES:

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

CO1: Understand the types, design, implementation of operating system and I/O programming concepts – K2

CO2: Recognize the management of main and virtual memory schemes - K1

CO3: Analyze different scheduling algorithms and the management of devices – K3

CO4: Understand and manage the information system using OS – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	S	S
CO2	S	S	M	S	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	M
CO4	S	S	S	S	M	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CST53	COMPUTER NETWORKS	L	T	P	C
CORE -X			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To build an understanding of the fundamental concepts of Computer Networking
2. To identify various components in data communication system
3. To understand the working principles of various application protocols
4. Tobefamiliarwiththeconceptsofnetworkinterfaces, anddesign/performanceissuesin local areanetworks and wideareanetworks

UNIT I: Introduction

Introduction: Uses of Computer Networks–Types of Computer Networks-Network Technology – Examples of Networks – Network protocols-Reference Models – Network Standardization.

UNIT II: Physical Layer

Physical Layer: Guided Transmission Media – Wireless Transmission – The public switched Telephone system – Cellular Networks – Communication satellites.

UNIT III: Data Link Layer

Data Link Layer & Medium Access Layer – Data Link Layer – Design Issues – Elementary Data link protocols – Multiple Access Protocols – Ethernet, Wireless LAN, Bluetooth

UNIT IV: Network Layer

Network Layer & Transport Layer: Network Layer Design Issues – Routing Algorithms – Transport Layer- The Transport Service – Elements of Transport Protocol.

UNIT V: Application Layer

Application Layer &Security: DNS- E-Mail – Security – Cryptography – Digital Signature – Social Issues.

TEXT BOOK

1. Andrew S. Tanenbaum, Amsterdam, Nick Feamster, David J. Wetherall - Computer Networks - 6th Edition, Pearson, 2021

REFERENCE BOOKS

1) Behrouz A.Forouzan - Data Communications and Networking - Fifth Edition, TMH, 2013.
2) Andrew S. Tanenbaum, David J. Wetherall - Computer Network - Fifth Edition, Pearson Education, 2011.

COURSE OUTCOMES:

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

CO1: Explain the concepts of various reference models, Internet and protocols – K1
CO2: Identify different transmission media and topologies - K1
CO3: Distinguish error detection and error correction of data - K2
CO4: Implement routing algorithms to determine the optimal path – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	S	M	S	S	M
CO2	S	S	M	S	M	S	S	M	S
CO3	S	M	S	S	M	S	S	M	S
CO4	S	M	S	S	S	S	S	S	S

S – Strongly Correlating **M – Moderately Correlating** **W-Weakly Correlating**

COURSE CODE	U21CST54	COMPUTER GRAPHICS	L	T	P	C
CORE XI			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To understand computational development of graphics
2. To analyze the concept of Line attribute & curve attribute
3. To design animation with rotation, translation and scaling
4. The student can gain in-depth knowledge about the current 3D graphics.

UNIT I: Overview of graphics systems

Overview of graphics systems: Video display devices – Raster-scan systems – Random-scan systems – Graphics monitors and workstation – Input devices – Hard-copy devices – Graphics software.

UNIT II: Output primitives

Output primitives: Points and lines – Line-drawing algorithms – DDA algorithm – Bresenham's line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes.

UNIT III: Geometric transformations

Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Other transformations.

UNIT IV: Windowing and Clipping

Windowing and Clipping – Windowing concepts – Clipping Algorithms – Window to view port Transformations – segments – Interactive input methods – Physical input devices – logical classification of input devices – interactive picture construction techniques – input functions.

UNIT V: 3-D Concepts

Three dimensional concepts – 3D Display Methods – 3D Object representations – polygon surfaces-curved line and surfaces – 3D transformations- Translation-Rotation-Scaling- Other Transformations-Composite Transformations

TEXT BOOK

Donald Hearn and M.Pauline Baker - Computer Graphics - C Version - Second Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. William M.Neuman and Robert F Sproul - Principles of Interactive computer Graphics - McGraw Hill International Edition, 2nd Edition, 2014.
2. Foley, van Dam, Feiner, and Hughes - Computer Graphics: Principles and Practice - 3rd edition, 2002.

COURSE OUTCOMES:

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

CO1: Have a broad knowledge about the overview of Graphics System – K2

CO2: Analyse and design algorithms using attributes in graphics – K4

CO3: Recognise the properties of Two and Three-dimensional geometric transformations – K1
CO4: Understand the importance of Windowing and Clipping – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	S	M
CO2	S	S	M	S	M	S	S	S	M
CO3	S	M	M	S	S	M	M	S	S
CO4	S	S	S	M	M	S	S	M	M

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSP55	RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
CORE XII			-	-	5	4
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES

1. To become familiar with SQL fundamental Concepts.
2. To apply Normalization techniques to summarize a database
3. To know the connectivity of databases with controls (DAO,ADO& RDO)
4. The Student can Gain a good understanding of the architecture and functioning of Database Management Systems as well as associated tools and techniques.

LIST OF PROGRAMS

1. Queries using DDL commands
2. Queries using DML commands
3. Program using conditional control, interactive controls & sequential controls.
4. Program using excepting handling
5. Programs using explicit cursors & implicit cursors
6. Program using PL/SQL tables & records
7. Programs using database triggers
8. Program to design procedures using In, Out, Parameter
9. Program to design procedures using functions
10. Program to design procedures using packages
11. Program using ADO connectivity.
12. Program using DAO connectivity.
13. Program using RDO connectivity.

COURSE OUTCOMES:

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

CO1: Describe the concepts of database technologies – K1
CO2 Discuss PL/SQL including stored procedures, stored functions, cursors, packages – K1
CO3 Apply constraints on a database using RDBMS – K3
CO4 Demonstrate the concept of Triggers and Subroutines – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	M	S	M	M
CO2	S	S	M	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSE531	CHOICE -I	L	T	P	C
ELECTIVE -III		MULTIMEDIA & APPLICATIONS	3	-	-	3
Cognitive Level	K1: Recall	K2: Understand K3: Apply K4: Analyze				

OBJECTIVES:

1. To understand the concept of Multimedia & its Architecture
2. To Design & apply various Authoring Tools
3. To Gain the importance of Internet in multimedia.
4. The student can able to work with the current multimedia applications

UNIT I: INTRODUCTION

Introduction- Brief history of Multimedia – Resources for multimedia developers – Types of products – Multimedia Computer Architecture

UNIT II: AUDIO AND VIDEO

Digital Audio – Characteristics of sound and Digital Audio – Digital Audio Systems – MIDI – Audio File Formats - Using Audio in Multimedia Applications – Digital Video – Background on Video – Characteristics of Digital Video – Digital Video Data Sizing – Video Capture and Playback Systems – Computer Animation – Using Digital Video in Multimedia Applications.

UNIT – III: AUTHORING

Product Design – Building Blocks – Classes of products – Content Organizational Strategies – Story Boarding – Authoring Tool – Categories of Authoring Tools – Selecting the right Authoring paradigm

UNIT IV: MULTIMEDIA

Multimedia and the Internet – The Internet – HTM Land Web Authoring – Multimedia Considerations for the Internet – Design Considerations For Web Pages – Multimedia Development Team – Team Approach – Assembling a Multimedia Production Team.

UNIT V: TEXT

Text – Elements of Text – Text Data Files – Using Text in Multimedia Applications – Hypertext – Graphics – Element of Graphics – Images and Color – Graphics file and Application Formats – Obtaining Images for Multimedia Use – Using Graphics in Multimedia Applications.

TEXT BOOKS:

1. David Hillman, Multimedia Technology and Applications — Galgotia Publications Pvt. Ltd., 1998.

REFERENCE BOOKS:

1. Tay Vaughan -Multimedia making it work –TMH 1996.

COURSE OUTCOMES

After completing the course, the students can able to

CO1: Define multimedia to potential clients – K1

CO2: Identify and describe the function of the general skill sets in the multimedia industry – K1

CO 3: Identify the basic components of a multimedia project- K1

CO 4: Work with text files and graphics files - K2

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S
CO3	S	S	M	M	S	S	S	M	S
CO4	M	S	M	S	S	M	S	S	S

S – Strongly Correlating **M- Moderately Correlating**

COURSE CODE	U21CSE532	CHOICE -II	L	T	P	C
ELECTIVE -III		CLOUD COMPUTING	3	-	-	3
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

OBJECTIVES:

1. To understand the cloud computing concepts & its benefits
2. To analyze the implementation of virtualization in Cloud Computing
2. To interpret the security issues and threats in Cloud
3. To explore various web services in Cloud Computing

UNIT I: Introduction

Cloud Computing – An Overview: Introduction – History of Cloud Computing – Characteristics of Cloud – Cloud Computing Model. Issues and Challenges for Cloud Computing – Advantages and Disadvantages of Cloud computing – Security, Privacy and Trust – Virtualization – Threats to Cloud Computing – Next Generation of Cloud Computing. Cloud Computing Architecture: Introduction – Cloud Architecture – Cloud Computing models – Comparisons of Service models – Deployment Models – Identity as a Service (IDaaS).

UNIT II: Virtualization

Virtualization in Cloud: Introduction – Virtualization – Implementation of Virtualization– Virtualization support at the OS level – Middleware Support for Virtualization –Advantages of Virtualization – Application Virtualization – Virtualization Implementations Techniques – Hardware Virtualization – Types of virtualization – Load balancing in Cloud Computing – Logical Cloud Computing Model – Virtualization for Data-Centre.

UNIT III: Security Issues and Challenges

Security Issues and Challenges in Cloud Computing: Introduction – Security Challenges in Cloud Computing – Information Security in Cloud Computing – Security, Privacy and Trust. Security Management: Introduction – Security Reference Architecture – Security Issues in Cloud Computing – Classification of Security Issues – Types of Attackers – Security Risks in Cloud Computing – Security Threats against Cloud Computing – Novel Security Approaches.

UNIT IV: Web Services

Web Services: Introduction – Amazon Web Services – Microsoft Azure – Google App Engine. Data Security and Privacy: Introduction – Data Security – Privacy.

UNIT V: Applications

Cloud Computing Applications: Introduction – Business Applications – Finance and Banking Application – Cloud Computing in Education. Mobile Cloud Computing: Introduction – Need of Mobile Cloud Computing – Mobile Computing Architecture – Technologies of MCC – MCC Applications – Issues in MCC – Challenges in Building Applications – Platforms.

TEXT BOOK

1. Pachghare .V.K. - Cloud Computing - PHI Learning Private Limited, 2016

REFERENCE BOOKS

1. Anthony T.Velte, Toby J.Velte& Robert Elsenpeter - Cloud Computing - A Practical Approach, 5th Reprint. New Delhi: Tata McGraw-Hill Education Private Limited, 2011.
2. Barrie Sosinsky - Cloud Computing Bible, Wiley India Private Limited, 2011.

COURSE OUTCOMES

On the Successful completion of the course, students will be able to
CO1: Understand the need for cloud computing – K2
CO2: Comprehend virtualization concept in cloud – K2
CO3: Get an idea of security threats in cloud – K2
CO4: Know the available web services in cloud computing – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	M	S
CO2	S	S	M	S	M	S	S	S	S
CO3	S	S	M	M	S	M	S	M	S
CO4	S	S	S	M	S	S	M	S	M

S – Strongly Correlating M – Moderately Correlating

COURSE CODE	U21CSS53	OPERATING SYSTEM LAB	L	T	P	C
SKILL BASED ELECTIVE III			-	-	2	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To write shell script programs to solve problems.
2. To implement some standard Linux utilities using system calls.
3. To run various UNIX commands on a standard UNIX/LINUX Operating system.
4. To do shell programming on UNIX OS.

LIST OF EXERCISES:

1. Creation of a child, orphan and Zombie process.
2. Execution of various file/directory handling commands.
3. Shell scripts to check various attributes of files and directories.
4. Shell scripts to perform various operations on given strings.
5. write a shell script to find the factorial of given integer
6. Shell scripts to explore system variables such as PATH, HOME etc.
7. Shell scripts to check and list attributes of processes.
8. Execution of various system administrative commands.
9. Write a shell script to display list of users currently logged in.
10. Write a shell script to delete all the temporary files.
11. Simulation of FCFS process scheduling.
12. Simulation of ROUND ROBIN process scheduling.
13. Simulation of SJF process scheduling.
14. Demonstration of process synchronization using signals.
15. Demonstration of process synchronization using semaphores.
16. Deadlock avoidance using banker's algorithm.

COURSE OUTCOMES:

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

CO1: Learn basic Linux commands – K1
CO2: Understand the basic behaviour of operating system – K2
CO3: Demonstrate different process scheduling and executing algorithm – K3
CO4: Do shell programming on LINUX OS – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	M	S	S	M
CO2	S	S	M	S	M	S	S	M	S
CO3	S	S	S	S	M	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

SEMESTER VI

COURSE CODE	U21CST61	SOFTWARE ENGINEERING	L	T	P	C
CORE -XIII			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To describe the processes of software development
2. To develop software design and modules for real time system
3. To analyze verification & validation techniques
4. To identify, formulate, and solve engineering problems.

UNIT I: Introduction

Introduction to Software engineering some definitions – some size factors – quality to productivity factors – managerial Issue. Planning a software project: defining the problems developing a solution strategy – planning on organization structure – other planning activities.

UNIT II: Cost estimation

Software cost estimation: Software cost factors – Software cost estimation techniques – staffing – level estimation – estimative software maintenance costs.

UNIT III: Requirements

Software requirements, definition: the software requirements specifications – formal specification techniques – language and processors for requirements specification.

UNIT IV: Design

Software Design: fundamentals Descartes concepts – Modules and Modularizing criteria - Design techniques – detailed design considerations – real time and distributed system design – test plan – mile – stones walk through and inspection – design guide line.

UNIT V: Verification and validation

Verification and validation techniques: Quality Assurance – static analysis – symbolic execution – unit testing and debugging system - testing formal verification.
Software maintenance: enhancing maintainability during developments managerial aspects of software maintenance – configuration management – sources code metrics – other maintenance tools and techniques.

TEXT BOOK:

Richard E. Fairley - Software Engineering Concepts - McGraw Hill pvt ltd, 2001

REFERENCE BOOKS:

1. Roger S, Pressman - Software Engineering, A Practitioner's Approach,.(2014).
2. Pankaj Jalote - An Integrated Approach to Software Engineering - Narosa, 3rd Edition, 2005

COURSE OUTCOMES:

After Completion of this Course, Students will be able to
CO1: Understand the factors and strategies in Software Engineering – K3

CO2: Recognize the cost metrics and feasibility study in Software estimation - K1
CO3: Create software design using real time applications – K3
CO4: Analyze the quality based on validation and verification techniques in Software development – K4

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	M	M	S	M
CO2	S	S	M	S	M	M	S	S	M
CO3	S	S	S	M	M	S	M	M	M
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CST62	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
CORE -XIV			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To understand the requirements of Mobile programming environment.
2. To Learn about basic methods, tools and techniques for developing Apps
3. To Explore and practice App development on Android Platform
4. To develop working prototypes of Mobile systems for various uses in daily lives.

UNIT I: **Introduction to Android Operating System**:
Definition of Android – Open Handset Alliance – Android Ecosystem – Need for Android – Android Versions – Features of Android – Android Architecture – Stack Linux Kernel. Configuration of Android Environment: Operating System – Java JDK – Android SDK – Android Development Tools (ADT) – Android Virtual Devices (AVDs) – Emulators – Steps to install and configure Eclipse and SDK.

UNIT II: **Creating the First Android Application**
Directory Structure. Android User Interface: Understanding the components of a screen – Linear Layout – Absolute Layout – Frame Layout – Relative Layout – Table Layout. Designing Your User Interface with View: TextView – Button – A standard push button – Image Button – Edit Text.

UNIT III: Designing Your User Interface with View:
Check Box – Toggle Button – Radio Button and Radio Group – Progress Bar – AutoComplete Text View – Spinner – List View – Grid View – Image View – Scroll View – Custom Toast Alert – Time and Date Picker.

UNIT IV: Inactivity:
Introduction – Intent – Intent filter – Activity Life Cycle – Broadcast Life Cycle – Service.

UNIT V: SQLite Database in Android:
SQLite Database – Need for SQLite – Creation and connection of the database – Extracting value from Cursors – Transactions.

TEXT BOOK :
1.Prasanna Kumar Dixit – Android - Vikas Publishing House Private Ltd. ,2014

REFERENCE BOOKS
1. Reto Meier - Professional Android 4 Application development - John Wiley & Sons Inc. , 2012
2. John Horton - Android programming for beginners - 2nd edition, 2018
3. Dawn Griffiths- Head first android Development: A brain- friendly guide, 2nd edition, 2017

COURSE OUTCOME:
On the successful completion of the course, students will be able to
CO1: Gain basic idea of XML and using it to develop an Android application – K1
CO2: Familiarize themselves with the concept of UI components and SQLite Database – K1
CO3: Implement GUI concepts in Android Platform – K3
CO4: Build any application for Android devices – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	M	M	S	M
CO2	S	S	M	S	M	M	S	S	M
CO3	S	S	S	M	M	S	M	M	M
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSP66	MOBILE APPLICATION DEVELOPMENT LAB	L	T	P	C
CORE -XVI			-	-	5	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To learn the basics of Android app
2. To understand how to create an android app
3. To practice the various features of android application
4. To practice mobileapp with SQLite database

Develop ANDROID programs for the following

1. Install Android Studio and Run Hello World Program.
2. Create an application with login module. (Username and Password).
3. Create spinner with strings taken from resource folder (res>>value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box.
5. Create a list of all subjects in your course and on selecting a particular subject teacher – in - charge of that subject should appear at the bottom of the screen.
6. Create an application with three option buttons. On clicking a button, color of the screen will change.
7. Create an application for hotel menu card using Check Box widget and provide toast message for displaying item names with quantity ordered and total price of the items.
8. Create an application for rating two images and display highest rating value using Rating Bar.
9. Create a Login application. On successful login, pop up the message.
10. Create an application using Date and Time Component display your Birthdate and Birth time
11. Create an application to perform create, insert, update, delete and retrieve operations on SQLite database.
12. Create an application to perform update operation on SQLite database.
13. Create an application to perform delete and retrieve operations on SQLite database.

COURSE OUTCOMES

On completion of the course, the students will be able to
CO1: design and develop applications for mobile devices – K3
CO2: develop applications with various UI components using Java and XML – K3
CO3: build an application using SQLite Database – K3
CO4: know how to launch developed applications in mobile devices – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	M	M	S	M
CO2	S	S	M	S	M	M	S	S	M
CO3	S	S	S	M	M	S	M	M	M
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CST63	ARTIFICIAL INTELLIGENCE	L	T	P	C
CORE -XV			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To summarize the basics of AI and Machine learning.
2. To understand different search methods in AI
3. To analyze the various logics and applications of Machine Learning
4. To interpret the different learning methods in Expert Systems

UNIT I: Definition

Artificial intelligence meaning- The AI problems – The underlying assumption – What is an AI Techniques? – The level of the model. Problems, problem spaces, and search: Defining the system – problem characteristics – production system characteristics.

UNIT II: **Heuristic search techniques**

Heuristic search techniques: Generate and Test – Hill climbing – Best –first search – Problem reduction – Constraint satisfaction – Means –ends analysis. Knowledge representation issues: Representations and mappings – Approaches to knowledge representation.

UNIT III: **Predicate logic**

Using predicate logic: Representing simple facts in logic – Representing instance and ISA relationships – computable functions and predicates resolution – natural deduction. Representing Knowledge using rules: Procedural versus declarative knowledge – Logic programming – Forward versus Backward reasoning – Matching – Control Knowledge.

UNIT IV: **Game playing**

Game playing: Overview – The minimax search procedure – Adding alpha – beta cutoffs – Additional refinements – Iterative Deepening – References on specific games. Understanding: What understands? What makes understanding hard? Planning- The blocks world- components of a planning system –Good stack planning-Coral Stack planning-Non linear planning using constraint posting.

UNIT V: Expert systems

Expert systems: Representing & using domain knowledge – Expert system shells – Knowledge acquisition. Perception and Action: Real-time search – perception- Action – Robot Architectures.

TEXT BOOK:

1. Elaine rich, Kevin Knight, Shivashankar B Nair - Artificial Intelligence - Tata McGraw Hill 3rd Edition, 2011

REFERENCE BOOKS:

1. Stuart Russell - Artificial Intelligence: A Modern Approach - Pearson 3rd Edition, 2013
2. Deepak Khemani - A First Course in Artificial Intelligence - McGraw Hill 2013
3. Mishra R. B. - Artificial Intelligence - Prentice Hall of India 2010

COURSE OUTCOMES:

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

CO1: Learn about the artificial intelligence problem and its characteristics – K1

CO2: Demonstrate the fundamentals of heuristic search techniques and reasoning for problem solving – K3

CO3: Understand the problem-solving using predicates – K2

CO4: Describe the concepts of expert systems with case studies for various applications – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	M	S
CO2	S	S	M	S	M	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSE641	CHOICE I	L	T	P	C
ELECTIVE IV		INTERNET OF THINGS	3	-	-	3
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To explore various components of Internet of things such as Sensors, inter-networking and cyber space.
2. To design and implement IoT circuits and solutions.
3. To understand the concepts of Internet of Things
4. To build IoT applications.

UNIT I:Introduction to IoT

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs

UNIT II:IoT & M2M

Machine to Machine, Difference between IoT and M2M, Software define Network

UNIT III:Network & Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

UNIT IV:Challenges in IoT

Design challenges, Development challenges, Security challenges, Other challenges - Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications.

UNIT V:Developing IoTs

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

TEXT BOOK

Vijay Madisetti, ArshdeepBahga - Internet of Things: A Hands-On Approach - Orient Blackswan Private Limited - New Delhi, 2014

REFERENCE BOOKS:

1. Samuel Greengard, The Internet of things, The MIT Press, 2015.

COURSE OUTCOMES:

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

CO1: Explain the components of IoT – K1

CO2: Make use of IoT Circuits to obtain solutions – K3

CO3: Interpret different design challenges faced in IoT – K2

CO4: Develop IoT applications in Python – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	M	S	M	S
CO2	S	S	S	S	M	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSE642	CHOICE II	L	T	P	C
ELECTIVE IV		R PROGRAMMING	3	-	-	3
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To learn R-Programming environment and libraries
2. To understand the basics in R programming in terms of constructs, control statements and built-in functions
3. To analyze to apply R programming for matrix and vector processing
4. To visualize data using graphs and chart

UNIT I INTRODUCTION:

Getting R - Downloading R - R Version -32-bit vs. 64-bit - Installing - Installing on Windows - Installing on Mac OS X - Installing on Linux - Microsoft R Open - Conclusion. The R Environment - Command Line Interface - RStudio - RStudio Projects - RStudio Tools - Git Integration - Microsoft Visual Studio - R Packages - Installing Packages - Uninstalling Packages - Loading Packages - Unloading Packages - Building a Package

UNIT II BASICS OF R:

Basics of R –Basic Math–Variables–Variable Assignment– Removing Variables–Data Types– Numeric Data–Character Data–Dates–Logical. Vectors–Vector Operations–Factor Vectors. Calling Functions–Function Documentation–Missing Data– Pipes–Advanced Data Structures–data frames– Lists–Matrices–Arrays.

UNIT IIIREADING DATA INTO R:

Reading Data into R - Reading CSVs - read_delim- fread. Excel Data - Reading from Databases - Data from Other Statistical Tools- R Binary Files- Data Included with R - Extract Data from Web Sites - Simple HTML Tables - Scraping Web Data - Reading JSON Data

UNIT IVGRAPHICS IN R:

Statistical Graphics - Base Graphics - Base Histograms - Base Scatterplot -Boxplots. ggplot2 - ggplot2 Histograms and Densities- ggplot2 Scatterplots - ggplot2 Boxplots and Violins Plots - ggplot2 Line Graphs - Themes. Writing R functions - Hello, World! - Function Arguments- Default Arguments - Extra Arguments- Return Values- do call.

UNIT VCONTROL STATEMENTS:

Control Statements - if and else - switch – if else - Compound Tests. Loops, the Un-R Way to Iterate - for Loops - while Loops - Controlling Loops. Group Manipulation - Apply Family - aggregate - Speed versus Convenience – data table - Keys – data table Aggregation.

TEXT BOOK

1. Jared P. Lander - R for Everyone: Advanced Analytics and Graphics - Addison-Wesley Professional, 2nd Edition, 2017

REFERENCE BOOKS :

1. Gardener. M -Beginning R: The Statistical Programming Language - Wiley India Pvt. Ltd., New Delhi, First Edition, 2017.

2. Kabacoff, R.I. - R in Action: Data analysis and graphics with R - Manning publications company, Shelter Island, Second Edition, 2011.
3. Andrie de Vries, Joris Meys - R Programming for Dummies - Wiley India Private Ltd., New Delhi, Second Edition, 2015.

COURSE OUTCOMES:

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

CO1: Explain the basic R programming concepts – K1
CO2: Make use of functions and packages in R – K3
CO3: Interpret various statistical models in R Program – K2
CO4: Develop functions and control statements in R – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	M	S	S	M
CO2	S	S	S	S	M	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSS64	IMAGE PROCESSING LAB	L	T	P	C
SKILL BASED ELECTIVE -IV			2	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To understand the spatial image enhancement functions on Bitmap image
2. To practice filter operations in image processing
3. To perform Smoothening & sharpening concepts in image processing
4. To expertise in performing image processing tools with various techniques

List of Programs

1. Implement the spatial image enhancement functions on a bitmap image – mirroring(Inversion)
2. Implement the spatial image enhancement functions on a bitmap image – notation(Clockwise)
3. Implement the spatial image enhancement functions on a bitmap image – Enlargement (Double Size)
4. Implement (a) Low Pass Filter (b) High Pass Filter
5. Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter
6. Implement Smoothing and Sharpening of an eight bit color image
7. Implement (a) Boundary Extraction Algorithm (b) Graham & #39; Scan Algorithm
8. Implement (a) Edge Detection (b) Line Detection
9. Display an image and its histogram
10. Write a Program to Perform Shrinking, Zooming and Cropping of an image
11. Write a Program to perform the experiment for histogram equalization.
12. Write a Program to Perform blurring and de-blurring on an image.
13. Write a Program to Remove salt and pepper noise in an image.
14. Write a Program to Perform Edge detection using Operators.
15. Write a Program to Perform2-D DFT and DCT.
16. Write a Program to Perform DWT of images.
17. Implement a function for image segmentation.
18. Implement a function for image morphology that analyze the form and shape detail of image structures.
19. Implement a function for Image Restoration.
20. Models for representing the color and methods of processing the color plane

COURSE OUTCOMES:

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

CO1: Explain the spatial image enhancement concept – K1
CO2: Make use of filter and sharpening techniques in image processing – K2
CO3: Interpret zooming and cropping methods in image processing – K2
CO4: Implement image enhancement, restoration and segmentation techniques – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	M	S	S	M
CO2	S	S	S	S	M	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

NON-MAJOR ELECTIVE
(OFFERED BY PARENT DEPARTMENT)

COURSE CODE	U21CSN31	WEB DESIGNING USING HTML LAB	L	T	P	C
NME - I			2	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To Use formatting tags in HTML
2. To recognize How to Insert the Image file in web pages.
3. To understand How to navigate through web pages.
4. To become Master in creating Web pages using basic HTM tags.

LAB Exercises

1. Web page creation using head, title, body, h1 – h6.
2. Web page creation using formatting tags (bold, italic, underline etc)
3. Ordered list
4. Unordered list
5. Definition list
6. Marquee creation
7. Web page with images
8. Web page creation with various font styles and body colors.
9. Hyper link
10. Tables
11. Frames
12. Forms

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to
CO1: Understand the concepts of webpage - K2
CO2: Analyze various tags in HTML – K4
CO3: Gain knowledge in creating webpage – K1
CO4: Design new webpages using HTML – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	S	S
CO2	S	S	M	S	M	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	M	M	M

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

COURSE CODE	U21CSN42	PHOTO DESIGNING TOOLS	L	T	P	C
NME - II			2	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To navigate Photoshop's Workspace, Create & setup documents
2. To Understand about the Layers and Masking.
3. To work with effects, filters and adjustments
4. To create a broad range of design skills pertaining to publication & web design.

Exercises

1. Album preparation
2. Invitation Preparation
3. Wall Papers
4. Visiting Card
5. Background Changing and Removing
6. Birthday Card
7. Friendship Card
8. Wedding invitation Card
9. Cloning an Image
10. Flex Designing
11. Photo Editing
12. Book Cover

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Design real world applications using photoshop – K3
CO2: Analyze new features in Photoshop – K4
CO3: Develop new drawings using Photoshop – K3
CO4: Expertise to work with Photoshop – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	M	S	S	M
CO2	S	S	M	S	M	S	S	S	M
CO3	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	M	S

S – Strongly Correlating M – Moderately Correlating W-Weakly Correlating

VALUE ADDED COURSE

COURSE CODE	U21CSV51	QUANTITATIVE APTITUDE	L	T	P	C
SEMESTER V			-	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:
1. To equip with the relevant skills to appear for various competitive examinations.
2. To acquire right skills to tackle aptitude problems.
3. To improve the speed of solving problems
4. To solve problems with ease and confidence.

UNIT I: Numbers - HCF & LCM of numbers – Decimal fraction
UNIT II: Average - Problems on numbers – Problems on Ages
UNIT III: Percentage – Profit &loss - Ratio& Proportion
UNIT IV: Time &work – Time & Distance – Problems on Trains
UNIT V: Simple Interest – Compound Interest - Permutation & Combination. (13 Hours)

TEXT BOOK
1. Aggarwal, R.S. - Quantitative Aptitude for Competitive Examinations, New Delhi: S.Chand Publications, Seventh Revised Edition, Reprint 2008.

COURSE OUTCOMES
After Completion of this Course, Students will be able to
CO1: Acquire right skills to tackle aptitude problems – K1
CO2: Improve mental calculations – K2
CO3: Solve problems with ease and confidence – K3
CO4: Improve the speed of solving problems and equip them employable – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	M	S	S	S	M
CO2	S	S	M	S	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S
CO4	S	M	S	M	S	S	S	M	S

S – Strongly Correlating M – Moderately Correlating

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