DEPARTMENT OF COMPUTER SCIENCE

HOLY CROSS COLLEGE (AUTONOMOUS)

Affiliated to Bharathidasan University

Nationally Accredited (3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.

Tiruchirapalli - 620002.

DEPARTMENT OF COMPUTER SCIENCE

Programme: B.Sc. Computer Science

PO No.	Programme Outcomes *Upon completion of the B.Sc. Degree Programme, the graduate will be able to*
PO-1	Understand the basic and advanced concepts of computer science research and career growth.
PO-2	Acquire analytical, creative and problem solving practical skills to meet the industry standards.
PO-3	Apply knowledge of computing principles to solve real time problems.
PO-4	Equip themselves with Empowered professional and ethical attitude and communicate effectively and work as a team.
PO-5	Implement independent projects of their own choice using latest tools.

Use words that show the outcomes will be fulfilled following the completion of the Programme.

PSO No.	Programme Specific Outcomes *Upon completion of these courses the student would*
PSO-1	quire academic excellence with professional skill for higher studies and research.
PSO-2	Achieve greater heights in various sectors of IT Industrythrough analytical design and implementation skills.
PSO-3	Identify and apply computing practices to succeed as an employee or an entrepreneurial pursuit.
PSO-4	Be ethically and professionally responsible with the ability to relatecomputer applications to broader social context for the growth of the nation.
PSO-5	eate, select and apply modern tools and techniques to analyze and develop a successful software sy stem.

The (Intended) Programme Outcomes and the Programme Specific Outcomes should come before the first paper of the first semester only.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-620 002.

SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES PG DEPARTMENT OF COMPUTER SCIENCE

COURSE STRUCTURE (I & II SEMESTER) – CBCS

(For Candidates admitted from June 2020 onwards)

Sem	Part	Course	Title of the Course	Code	Hrs / Wk	Credits	Marks
I	I	Language	Tamil Paper I / Hindi Paper I / French Paper I	U20TL1TAM01/ U20HN1HIN01/ U20FR1FRE01	3	3	100
	II	English	English Paper I	U20EL1GEN01	3	3	100
	III	Major Core-1	Problem Solving using C	U20CS1MCT01	5	4	100
	III	Major Core-2	Problem Solving using C Lab	U20CS1MCP02	4	2	100
	III	Major Core-3	Web designing and PHP Lab	U20CS1MCP03	4	3	100
	III	Allied-1	Statistical Methods	U20MA1ALT03	4	2	100
	III	Allied-2	Digital Electronics	U20PH1ALT03	4	2	100
	IV	Environmental Studies	Environmental Studies	U20RE1EST01	2	1	100
	IV	Value Education	Ethics I/ Bible Studies I/ Catechism I	U20VE2LVE01/ U20VE2LVB01/ U20VE2LVC01	1	-	-
		Service Oriented Course		-	-	-	-
		Internship / Field Work / Field Project 30 Hours - Extra Credit		U20SP1ECC01	-	2(Extra Credit)	100
		TOTAL			**30**	**20 + 2**	**800+ 100**

Sem	Part	Course	Title of the Course	Code	Hrs / Wk	Credits	Marks
II	I	Language	Tamil Paper II / Hindi Paper II / French Paper II	U20TL2TAM02/ U20HN2HIN02/ U20FR2FRE02	3	3	100
	II	English	English Paper II	U20EL2GEN02	3	3	100
	III	Major Core-4	Data Structures and Algorithms	U20CS2MCT04	5	4	100
	III	Major Core-5	Computer Organization and Architecture	U20CS2MCT05	4	3	100
	III	Major Core-6	Optimization Techniques	U20CS2MCT06	5	4	100
	III	Allied-3 (Compulsory)	Numerical Methods	U20MA2ALT10	4	2	100
	IV	Skill-Based Course (SBC) -1	Soft Skills Development	U20RE2SBT01	2	1	100
	IV	Skill-Based Course (SBC) -2	Sustainable Rural Development and Student Social Responsibility	U20RE2SBT02	2	1	100
		Industrial Relation	Industrial Relation	U20CS2IRT01	1	1	100
	IV	Value Education	Ethics I/ Bible Studies I/ Catechism I	U20VE2LVE01/ U20VE2LVB01/ U20VE2LVC01	1	1	100
			Service Oriented Course	-	-	-	
			Internship / Field Work / Field Project 30 Hours - Extra Credit	U20SP2ECC02		2(Extra Credit)	100
			TOTAL		**30**	**23+2**	**1000 +100**

Semester	Part	Course	Title of the Course	Code	Hrs / Wk	Credits	Marks
III	I	Language	Tamil Paper III / Hindi Paper III / French Paper III		6	3	100
	II	English	English III		6	3	100
	III	Major Core-5	Database Systems	U19CS3MCT05	5	5	100
	III	Major Core-6	Database Systems Lab	U19CS3MCP06	5	5	100
	IV	Allied-4 (Optional)	Allied Optional Paper I Applied Mathematics III	U15MA3AOT13	4	3	100
	IV	Skill-based Elective-3	UI/UX Design and Animation Lab using Open Source Tools	U19CS3SBP03	2	2	100
	IV	Gender Studies	Gender Studies	U15WS3GST01	1	1	100
	IV	Value Education	Ethics II/ Bible Studies II/ Catechism II		1	-	-
	VI		Service Oriented Course		-	-	-
		Internship/Field Work/Field Project 30 hours- Extra Credit		U18SP3ECC03/ U18SP3ECC02	-	2(Extra Credit)	100
			TOTAL		**30**	**22+2**	**700+100**
IV	I	Language	Tamil Paper IV / Hindi Paper IV / French Paper IV		5	3	100
	II	English	English IV		6	3	100
	III	Major Core-7	Operating Systems	U18CS4MCT07	5	5	100
	III	Major Elective-1	Shell Programming Lab/ Open Source Tools Lab / Web Application Development Tools Lab	U19CS4MEP01/ U19CS4MEP02/ U18CS4MEP03	5	5	100
	III	Allied-5 (Optional)	Physics		4	4	100
	III	Allied-6 (Optional)	Physics Lab		4	3	100
	IV	Value Education	Ethics II/ Bible Studies II/ Catechism II		1	1	100
	VI		Service Oriented Course		-	1	100
		Internship/Field Work/Field Project 30 hours- Extra Credit		U18SP4ECC04/ U18SP4ECC02	-	2(Extra Credit)	100
			TOTAL		**30**	**25+2**	**800+100**

(For Candidates admitted from the academic year 2020-21onwards)

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM

BCA & B.Sc., Computer Science - First Year - Semester – I

Course Title	**Major Core 1: Problem Solving using C**
Total Hours	**75**
Hours/Week	**5 Hrs/Wk**
Code	**U20CA1MCT01/ U20CS1MCT01**
Course Type	**Theory**
Credits	**4**
Marks	**100**

General Objective:

To understand the concepts of problem solving approaches and to develop programming skills using C language.

Course Objectives:

CO No.	Course Objectives
CO-1	Understand the concepts of algorithms and create flowcharts for a given problem
CO-2	Apply the basic concepts of C in real-time applications
CO-3	Analyze the control constructs, different types of arrays and apply the concepts for solving problems in real time
CO-4	Understand the concepts of strings, user defined functions, structures and union in C
CO-5	Understand the basics of pointers and create files using C

UNIT I **15 Hrs**

INTRODUCTION TO COMPUTER PROBLEM SOLVING

Introduction: Steps involved in Problem Solving Using Computers – Algorithms – Flow Charts – Pseudocode – Evolution of Programming Languages: Introduction – Classification of Programming Languages - Compiler – Interpreter, Loader and Linker.

Extra Reading: Develop Algorithms for real time applications.

UNIT II **15 Hrs**

CONSTANTS, VARIABLES, AND DATA TYPES: Introduction – Character Set – C Tokens – Keywords and Identifiers – Constants – Variables – Data Types – Declaration of Storage Class.

OPERATORS AND EXPRESSIONS: Introduction - Arithmetic Operators - Relational Operators - Logical Operators - Assignment Operators - Increment and Decrement Operators- Conditional Operators - Bitwise Operators - Special Operators - Arithmetic Expressions - Evaluation of Expressions - Precedence of Arithmetic Operators - Some Computational Problems. **MANAGING INPUT AND OUTPUT OPERATORS:** Introduction - Formatted Input - Formatted Output.

Extra Reading: Basic I/O and Control operations in Python.

UNIT III **15 Hrs**

DECISION MAKING AND BRANCHING: Introduction - Decision Making with if Statement - Simple if Statement- The if else Statement - Nesting of if...else Statements - The Else if Ladder -

Switch Statement - ?: Operator - Goto Statement.

DECISION MAKING AND LOOPING: Introduction – The While Statement - The do Statement – The for Statement - Jumps in Loops.

ARRAYS: Introduction – One-dimensional Array – Two-dimensional Arrays - Initializing Two - dimensional Arrays – Multi-dimensional Arrays.

Extra Reading: Develop multidimensional array programs

UNIT IV **15 Hrs**

HANDLING OF CHARACTER STRINGS: Introduction - Declaring and Initializing String Variables - Arithmetic Operations on Characters - String- handling Functions - Table of Strings.

USER DEFINED FUNCTIONS: Introduction - Definition of Functions - Function Declaration - Category of functions - No Arguments and No Return Values - Argument but No Return Values - Arguments with Return Values – No Arguments but Returns a Value – Functions that Return Multiple Values – Recursion.

STRUCTURES AND UNIONS : Introduction – Defining a Structure - Declaring Structure Variables – Accessing Structure Members - Structure Initialization - Arrays of Structures - Arrays Within Structures – Structures Within Structures - Structures and Functions – Unions.

Extra Reading: Create Programs using functions.

UNIT V **15 Hrs**

POINTERS: POINTERS : Introduction - Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointer - Chain of Pointers - Pointer Expressions - Pointers and Arrays - Pointers and Character Strings – Arrays of Pointers - Pointers to Functions – Pointers and Structures.

FILE MANAGEMENT IN C: Introduction - Defining and Opening a File - Closing a File - Input/Output Operations on Files - Error Handling during I/O Operations - Random Access to Files - Command Line Arguments. ***Extra Reading: Implement the system and file concepts using emulator.***

Course Outcomes(CO):

The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Know the correct and efficient ways of solving problems.	PSO 1, PSO 2	U
CO-2	Write C program for simple applications	PSO 2	An

CO-3	Formulate algorithm for simple problems	PSO 2	U
CO-4	Analyze different data types and arrays	PSO 5	An
CO-5	Perform simple search and sort	PSO 1	Ap
CO-6	Understand memory management and write programs using structures and union for solving complex computational problem	PSO 2, PSO 3	U
CO-7	Create files and perform file operations using C	PSO 1, PSO5	R, An
CO-8	Use programming language to solve problems	PSO 1, PSO 5	E

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT

1. M. T. Somashekara, “Problem Solving with C”, PHI Learning Private Limited, 2009.
2. E. Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education (India) Private Limited, New Delhi.

BOOKS FOR REFERENCE

1. BrianW. Kernighan and Dennis M. Ritchie, **“**The C programming Language**”**, Prentice-Hall Publishing Company, 2006.
2. Deitel and Deitel, **“**C How to Program**”**, Seventh Edition, Pearson Education Pvt. Ltd., 2013.
3. R.G.Dromey, **“**How to Solve it by Computer**”**, Fifth Edition, Pearson Education Pvt. Ltd., New Delhi, 2007.
4. Kamthane, A.N., **“**Programming with ANSI and Turbo C**”**, Pearson Education Pvt. Ltd., New Delhi, 2006.
5. K R Venugopal , Sudeep R Prasad, **“**Mastering C**”**, Second Edition, McGraw Hill Education Private Limited, 2015.

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG DEPARTMENT OF COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM

BCA & B.Sc., Computer Science - First Year - Semester – I

Course Title	**Major Core 2: Problem Solving using C Lab**
Total Hours	**30**
Hours/Week	**4 Hrs Wk**
Code	**U20CA1MCP02 / U20CS1MCP02**
Course Type	**Practical**
Credits	**2**
Marks	**100**

General Objective:

Student writes application programs using C for solving real time problems.

Course Objectives:

The Learner will be able to

CO No.	Course Objectives
CO-1	Recall the syntax of control structures and solve problems using C
CO-2	Remember the syntax of looping statements and solve problems using C
CO-3	Create programs for arrays and strings using C
CO-4	Develop programs for Functions, Pointers and Structures in C
CO-5	Write programs for creating a file and perform I/O operation on files

EXERCISES

1. Control Statements

2. Loop Statements

3. Arrays (Searching and Sorting)

4. Strings

5. Functions and Pointers

6. Structure and Union

7. Dynamic Memory Allocation

8. Macros and File Handling

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG DEPARTMENT OF COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM

BCA & B.Sc., Computer Science - First Year - Semester – I

Course Title	**MAJOR CORE 3: WEB DESIGNING AND PHP LAB**
Total Hours	**75**
Hours/Week	**4 Hrs /Wk**
Code	**U20CA1MCP03 /U20CS1MCP03**
Course Type	**Practical**
Credits	**3**
Marks	**100**

General Objectives:

To develop the skill and knowledge of Web page design.

Course Objectives:

Develop skills in analyzing the usability of a web site. Understand how to plan and conduct user research related to web usability.

CO NO.	COURSE OBJECTIVES
CO-1	Understand the basic concept of HTML.
CO-2	Understand the principle of Web page design.
CO-3	Recognize the elements of HTML.
CO-4	Write PHP scripts to handle HTML forms.
CO-5	Create PHP programs that use various PHP library functions, and that manipulate files and directories.

HTML

1. Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags.
2. Create your class timetable using table tag.

3. Create user Student feedback form (use textbox, text area , checkbox, radio button, select box etc.)
4. Write html code to develop a webpage having two frames that divide the
5. Create your resume using HTML tags also experiment with colors, text , link , size and also other tags you studied.

PHP

1. Arithmetic Calculator Using HTML Tag and PHP
2. PHP Control Structures
3. PHP Loop Statements
4. PHP Date and Time
5. Connecting to MYSQL from PHP.

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
PG DEPARTMENT OF COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM

BCA & B.Sc., Computer Science - First Year - Semester – II

Course Title	**DATA STRUCTURES AND ALGORITHMS**
Total Hours	**75**
Hours/Week	**5 Hrs /Wk**
Code	**U20CA2MCT04/U20CS2MCT04**
Course Type	**Theory**
Credits	**4**
Marks	**100**

General Objective:

To understand the fundamental concepts of data structures and learn to develop algorithms.

Course Objectives:

The Learner will be able to

CO No.	Course Objectives
CO-1	Learn the fundamental Concepts of Data Structures.
CO-2	Understand the working principles of Queues and Linked Lists.
CO-3	Study how to balance a Binary Search trees and 2-3 and so on other Trees.
CO-4	Understanding of various sorting algorithms, including insertion sort, selection sort, merge sort, heap sort and quick sort.
CO-5	Understand the concepts of Graphs and its terminologies.

Unit - I **15Hrs**

INTRODUCTION TO DATA STRUCTURE: Definitions – Overview of Data Structures - Implementation of Data Structures. **ARRAYS:** Definition – Terminology – One-dimensional Array: Operations on Arrays. **STACK:** Definition and Example - Representing Stack: Implementing the Pop operation – **APPLICATIONS:** Infix, Postfix and Prefix; Basic Definitions

and Examples – evaluating a Postfix Expression - Converting an Expression from infix to postfix.
Extra **Extra Reading /Key words:** *two dimensional and multi-dimensional array concepts.*

Unit - II **15Hrs**

QUEUES: The Queue and its Sequential representation: The Queue as an Abstract Data Type – Insert Operation – Priority Queue – Array implementation of a Priority Queue.

LINKED LISTS: Inserting and Removing Nodes from a List – Linked implementation of Stacks – getnode and freenode operations – Linked implementation of Queues – Linked list as a Data Strucutre – Header nodes.

Extra Reading /Key words: *real time applications of Stacks & Linked Lists.*

Unit - III **15Hrs**

TREES: BINARY TREES: Operations on Binary trees – Applications of Binary Trees.
BINARY TREE REPRESENTATIONS: Node representation of Binary Trees – Internal and External Nodes.

APPLICATIONS: Tree Traversals – General Expression as Trees – Evaluating an

Expression tree – Constructing a Tree.

Extra Reading /Key words: *Tree Traversals, Binary Search Tree.*

Unit - IV **15Hrs**

SORTING: Bubble Sort – Quick Sort – Heap Sort; Insertion Sort: Simple Insertion – Shell Sort – Merge Sort.

Extra Reading /Key words: *Applications of Sorting Techniques.*

Unit - V **15Hrs**

GRAPHS: Introduction- Graph terminologies - Representation of Graphs: Set Representations – Linked Representations - Transitive Closure - Warshall‟s Algorithm – Shortest Path Algorithm – Dijkstra‟s Algorithm Revisited**.**

Extra Reading /Key words: *cyclic and acyclic graph, shortest path.*

Course Outcomes:

The Learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall the fundamental Concepts of Data Structures.	PSO 1	R, U
CO-2	Determine the applications of, Queues and Linked Lists.	PSO 2	A
CO-3	Grasp various operations and searching methods applied using Binary Tree.	PSO 2	U
CO-4	Demonstrate of various sorting algorithms, including insertion sort, selection sort, merge sort, heap sort and quick sort.	PSO 3	Ap
CO-5	Demonstrate Shortest Path Algorithms	PSO 4	An

PRESCRIBED TEXT

1. **Samanta. D**, **Classic Data Structures**, 2005, Prentice Hall of India Private Ltd, New Delhi.
   Unit – I, V.
2. **Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "DataStructures Using C and C++"**, 2006, Second Edition.
   Unit – I, II, III, IV, V.

BOOKS FOR REFERENCE

1. Ellis Horowitz, SartajSahni and Dinesh Mehta, “Fundamentals of Data Structures in C++”, University Press (India) Pvt. Ltd., Hyderabad, 2007.
2. Yashavant P. Kanetkar, “Data Structures Through C++”, BPB Publications, 2003.
3. 1. A. Chitra and P.T. Rajan, Data Structures, Tata McGraw – Hill Publishing Company Limited, New Delhi.
4. Jean Paul Tremblay and Paul G. Sorenson, An Introduction To Data Structures with Applications, Tata McGraw-Hill, Second Edition.
5. S.E. Goodman and S.T. Hedetniemi, “Introduction to the Design and Analysis of Algorithms”, Tata McGrawHill, International Edition, 1987.

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM

B.Sc. Computer Science - First Year - Semester – II

Course Title	**Major Core 5 – Computer Organization and Architecture**
Total Hours	**75**
Hours/Week	**4 Hrs/Wk**
Code	**U20CS2MCT05**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objectives:

To give Basic Knowledge on Various Building Blocks of a Digital Computer and Architecture.

Course Objectives:

The Learner will be able to

CO No.	Course Objectives
CO-1	Understand and learn the types of computer Instructions.
CO-2	Learn and understand the Machine language and Assembly languages.
CO-3	Know and understand the categories of the peripheral devices and its data transfer.
CO-4	Learn and understand the instruction formats, addressing, modern pipelining and vector processing techniques.
CO-5	Know and understand the main memory, auxiliary memory, associative, cache and virtual memory.

UNIT I **15 Hrs**

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction Codes - Computer Registers - Computer Instructions: Instruction Set Completeness-Timing And Control-Instruction Cycle: Fetch And Decode- Determine The Type Of Instruction-Register-Reference Instructions- Memory-

Reference Instructions–Input-Output And Interrupt: Input-Output Configuration-Input- Output Instructions-Program Interrupt-Interrupt Cycle.

Extra Reading (Key words): Computer Instructions about various Processors.

UNIT II **15 Hrs**

PROGRAMMING THE BASIC COMPUTER: Introduction –Machine Language-Assembly Language: Rules Of The Language-An Example-Translation To Binary-The Assembler: Representation Of Symbolic Program In Memory-First Pass-Second Pass-Program Loops. Micro programmed Control: Control Memory-Addressing Sequencing: Conditional Branching-Mapping Of Instruction-Subroutines.

Extra Reading(Key words): Other translators for program translation.

UNIT III **15 Hrs**

COMPUTER ARITHMETIC: Introduction -Addition and Subtraction.

INPUT – OUTPUT ORGANIZATION: Peripheral Devices -- Input Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access.

Computer arithmetic**:** Introduction -Addition and Subtraction.

Key terms: INTEL 8085 & 8086 Instructions.

UNIT IV **15 Hrs**

CENTRAL PROCESSING UNIT: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation.

PIPELINE AND VECTOR PROCESSING: Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline – RISC Pipeline – Vector Processing.

Key terms: Compare and process the real time data with Stack, Pipeline and vector processing.

UNIT V **15 Hrs**

MEMORY ORGANIZATION: Memory Hierarchy – Main Memory – RAM and ROM Chips – Memory Address Map – Memory Connection to CPU – Auxiliary Memory – Magnetic Tape – Associative Memory -- Cache Memory – Virtual Memory –

Key terms: Acquire knowledge about Memory Organization.

Course Outcomes:

The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	ognitive Level
CO-1	Describe the Computer Instructions	PSO 1	R, U
CO-2	Explain the Instruction Cycle.	PSO 2	U
CO-3	Illustrate the concept of Micro programmed Control	PSO 2	U
CO-4	Ilustrate the concepts of transfer of data.	PSO 3	U
CO-5	Differentiate different types of addressing modes and explain pipeline and vector processing.	PSO 4	An
CO-6	Analyze the various types of Memory and the purpose	PSO 4	An

	of Memory Management.		
CO-7	Apply Basic Knowledge on Various Building Blocks of a Digital Computer and Architecture	PSO 4	R,U

PRESCRIBED TEXT

1. M.Morris Mono, **Computer System Architecture**, Third Edition,2011,Prentice – Pearson, New Delhi.

UNIT I : Chapters 5.1 - 5.7

UNIT II : Chapters 6.1 – 6.5, 7.1, 7.2
UNIT III : Chapters10.1-10.2, 11
UNIT IV : Chapters 8.1 – 8.6, 9.1 – 9.6

UNIT V : Chapters 12

BOOKS FOR REFERENCE

1. Thomas C.Bartee, **Digital Computer Fundamental**, 1991,Tata McGraw – Hill Publishing Company, New Delhi.
2. Albert Paul Malvino and Jerald A.Brown, **Digital Computer Electronics** ,1999 ,Tata McGraw – Hill Publishing Company, New Delhi.
3. M.Morris Mano, **Digital Logic and Computer Design**,1998, Prentice Hall of India Private Ltd, New Delhi.
4. Kai Hwang, Faye A. Briggs, **Computer Architecture and Parallel Processing** , 1985,McGraw – Hill Book Company, New Delhi.

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PG DEPARTMENT OF COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM

BCA & B.Sc., Computer Science - First Year - Semester – II

Course Title	**MAJOR CORE- 6: OPTIMIZATION TECHNIQUES**
Total Hours	**75**
Hours / Week	**5**
Code	**U20CS2MCT06**
Course type	**Theory**
Credits	**4**
Marks	**100**

General Objective:

To enable the students to convert any real life situation into a mathematical model and solve them using an appropriate algorithm.

Course Objectives(CO) :

The learner will be able to

CO No.	Course Objectives
CO – 1	UnderstandL.P.P and finding solution by Graphical and Simplex Method.
CO – 2	Evaluate of solution of L.P.P by Big M method and Two phase Method
CO – 3	Understand sequencing problem and obtaining the sequence of processing n jobs through two machine and k machines
CO – 4	Understand inventory control theory and finding EOQ
CO – 5	Evaluate PERT and CPM.

UNIT I : LINEAR PROGRAMMING PROBLEM AND SIMPLEX ALGORITHM. 15 Hrs

Introduction to OR - Mathematical formulation of the problem - Graphical solution methods - General Linear Programming Problem - Canonical and standard forms of L.P.P. The Simplex Method - Simplex Algorithm.

Extra Reading/ Keywords:*Revised simplex method , Dual simplex method.*

UNIT II : ARTIFICIAL VARIABLES AND SEQUENCING PROBLEM 15 Hrs

Artificial variables - Charnes Method of penalties (Big - M method) - Two-Phase Simplex method – Sequencing problem - processing n jobs through two machines - processing n jobs through k machines .

Extra Reading/ Keywords:*Fractional cut method ,Processing 2 jobs through k machines*

UNIT III : TRANSPORTATION PROBLEM AND ASSIGNMENT PROBLEM 15 Hrs

Transportation Problem - Initial basic feasible solution - North west corner rule - Row minima method - Column minima method - Matrix minima Method - Vogel's approximation method - Optimal solution - u - v method - Degeneracy - Unbalanced Transportation Problem-Assignment problem-Hungarian method-unbalanced assignment problem, Travelling salesman problem.

Extra Reading/ Keywords *:Stepping stone solution method,Dual of the Assignment problem*

UNIT IV: INVENTORY CONTROL 15 Hrs

Types of inventory - Economic order quantity - Deterministic inventory problems with shortages - Deterministic inventory problems without shortages - Problems of EOQ with price breaks.

Extra Reading/ Keywords*:*Multi-item Deterministic problems

UNIT V :NETWORK SCHEDULING 15 Hrs

Introduction to network problems-Network scheduling by CPM and PERT.

Extra Reading/ Keywords*:Time cost Optimization Algorithm,Resource allocation and scheduling*

Note: Tests given in the Extra Reading /Key Word: must be tested only through assignment andseminars.

Course Outcomes(CO):
The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO – 1	Recall L.P.P and Solving LPP by Graphical and Simplex Method	**PSO - 3**	**U,E**
CO – 2	Solve L.P.P by Big M method and Two phase Method	**PSO -2**	**E**
CO – 3	Recognize and solve sequencing problem	**PSO -4**	**E**
CO – 4	Discuss inventory control theory and compute EOQ.	**PSO -1**	**U,E**
CO – 5	Evaluate PERT and CPM	**PSO -5**	**E**

CO – 6	Enable the students to convert any real life situation into a mathematical model and solve them using an appropriate algorithm- Skill Development	**PSO – 1,PSO -2**	**U,E**

PRESCRIBED TEXT

Kantiswarup,P.K.Gupta& Man Mohan , (2009) OPERATIONS RESEARCH , UNIT - I - Chapters 2 ,Chapter 3 : 3.1 -3.5 ,Chapter 4: 4.1- 4.3

UNIT II- Chpter 4: 4.4 ;Chapter 12:12:1-12:5

UNIT III - Chapter 10 : 10.1 – 10.3 , 10.5, 10.8 -10.13,10.15, Chapter 11-11.1 to 11.4,11.7

UNIT IV - Chapter 19: 19.1 - 19:12

UNIT V - Chapter 25

BOOKS FOR REFERENCE

1. H. Taha(IV Edition) OPERATIONS RESEARCH ,Prentice Hall of India
2. P. K. Gupta, D. S. Hira, (2001) PROBLEMS IN OPERATIONS RESEARCH, S.Chand ,New Delhi

HOLY CROSS COLLEGE (AUTONOMOUS)
Affiliated to Bharathidasan University
Nationally Accredited(3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.
Tiruchirapalli - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

Programme: B.C.A

PO No.	Programme Outcomes *Upon completion of the B.C.A Degree Programme, the graduate will be able to*
PO-1	Attain excellence in the area of Computer Applications
PO-2	Utilize the practical skill to examine, plan and engineer the applications of technology using computing tools and techniques
PO-3	Design innovative methodologies/techniques/ideas for solving real time problems to cater to the need for the society.
PO-4	Create student employability and be competent enough to work in IT industry.
PO-5	Integrate ethical values in designing computer application.

PSO No.	Programme Specific Outcomes *Upon completion of these courses the student would*
PSO-1	Acquire advanced knowledge in various area of computer Applications
PSO-2	Analyze and find the best techniques for solving computational problem
PSO-3	Develop competent technical writing skills for software
PSO-4	Apply the recent technology in various domains and evaluate the methods of implementing it.
PSO-5	Design and Create innovative ideas that meet the requirements of software industry

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 620002

SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE

COURSE STRUCTURE (I & II SEMESTER) – CBCS

(For Candidates admitted from June 2020 onwards)

Semester	Part	Course	Title of the Course	Code	Hours/ Week	Credits	Marks
I	I	Language	Tamil Paper I/ Hindi Paper I/ French Paper I	U20TL1TAM01/ U20HN1HIN01/ U20FR1FRE01	3	3	100
	II	English	English Paper I	U20EL1GEN01	3	3	100
	III	Major Core -1	Problem Solving using C	U20CA1MCT01	5	4	100
		Major Core - 2	Problem Solving using C Lab	U20CA1MCP02	4	2	100
		Major Core - 3	Web designing and PHP Lab	U20CA1MCP03	4	3	100
		Allied - 1	Statistical Methods	U20MA1ALT03	4	2	100
		Allied - 2	Basics Of Accounting	U20C01ALT02	4	2	100
	IV	Environmental Studies	Environmental Studies	U20RE1EST01	2	1	100
		Value Education	Ethics I/ Bible Studies I/ Catechism I	U20VE2LVE01/ U20VE2LVB01/ U20VE2LVC01	1	-	-
		Service Oriented Course		-	-	-	-
		Internship / Field Work / Field Project 30 Hours - Extra Credit		U20SP1ECC01	-	2(Extra Credit)	100
		Total			30	20+2	800+100

Semester	Part	Course	Title of the course	Code	Hours/ Week	Credits	Marks
II	I	Language	Tamil Paper II/ Hindi Paper II/ French Paper II	U20TL2TAM02/ U20HN2HIN02/ U20FR2FRE02	3	3	100
	II	English	English Paper II	U20EL2GEN02	3	3	100
	III	Major Core - 4	Data Structures and Algorithms	U20CA2MCT04	5	4	100
		Major Core - 5	Digital Principles and Computer Architecture	U20CA2MCT05	4	3	100
		Major Core - 6	Optimization Techniques	U20CA2MCT06	5	4	100
		Allied - 3	Numerical Methods	U20MA2ALT10	4	2	100
	IV	Skill Based Course(SBC) – 1	Soft Skills Development	U20RE2SBT01	2	1	100
		Skill Based Course(SBC) – 2	Sustainable Rural Development and Student Social Responsibility	U20RE2SBT02	2	1	100
		Industrial Relation	Industrial Relation	U20CA2IRT01	1	1	100
		Value Education	Ethics I / Bible Studies I/ Catechism I	U20VE2LVE01/ U20VE2LVB01/ U20VE2LVC01	1	1	100
		Service Oriented Course		-	-	-	
		Internship / Field Work / Field Project 30 Hours - Extra Credit		U20SP2ECC02		2(Extra Credit)	100
		Total			30	23+2	1000+100

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-620 002.
DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BACHELOR OF COMPUTER APPLICATIONS
(For Candidates admitted from June 2019 onwards)

Allied Optional Offered to Commerce Department

Semester	Part	Course	Title of the Course	Code	Hrs / Wk	Credits	Marks
III	I	Language	Tamil Paper III/Hindi Paper III/ French Paper III		6	3	100
	II	English	English Paper III		6	3	100
	III	Major Core - 5	Database Systems	U19CA3MCT05	5	5	100
	III	Major Core - 6	Database Systems Lab	U19CA3MCP06	5	5	100
	III	Allied - 4 (Optional)	Allied Optional Paper I Applied Mathematics III		4	3	100
	IV	SkillBasedElective - 3	Multimedia Lab	U19CA3SBP03	2	2	100
	IV	Gender Studies	Gender Studies	U15WS3GST01	1	1	100
	IV	Value Education	Ethics / Bible Studies / Catechism		1	-	-
	VI		Service Oriented Course		-	-	-
		Internship/Field Work/Field Project 30 hours- Extra Credit		U18SP3ECC03/ U18SP3ECC02	-	2(Extra Credit)	100
			TOTAL		**30**	**22+2**	**700+ 100**
IV	I	Language	Tamil Paper IV/Hindi Paper IV/ French Paper IV		5	3	100
	II	English	English Paper IV		6	3	100
	III	Major Core - 7	Java Programming	U18CA4MCT07	5	5	100
	III	Major Elective - 1	Web Designing and PHP Lab / Unix and Shell Programming Lab / Ruby on Rails Lab	U18CA4MEP01/ U18CA4MEP02/ U18CA4MEP03	5	5	100
	III	Allied - 5 (Optional)	Allied Optional Paper II Basics of Accounting		4	4	100
	III	Allied - 6 (Optional)	Allied Optional Paper III Java Programming Lab	U18CA4AOP03	4	3	100
	IV	Value Education	Ethics II/ Bible Studies II/ Catechism II		1	1	100
	VI		Service Oriented Course		-	1	100
		Internship/Field Work/Field Project 30 hours- Extra Credit		U18SP4ECC04/ U18SP4ECC02	-	2(Extra Credit)	100
			TOTAL		**30**	**25+2**	**800+ 100**

Semester	Part	Course	Title of the Course	Code	Hrs / Wk	Credits	Marks
III	**III**	**Allied Optional Lab**	**Data Analytics Lab**	**U18CA3AOP05**	**4**	**3**	**100**

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-620 002.
DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BACHELOR OF COMPUTER APPLICATIONS
(For Candidates admitted from June 2018 onwards)

Semester	Part	Course	Title of the Course	Code	Hrs/Wk	Credits	Marks
V	III	Major Core – 8	Digital Principles and Computer Architecture	U18CA5MCT08	4	4	100
	III	Major Core – 9	Operating Systems	U18CA5MCT09	4	3	100
	III	Major Core – 10	Computer Networks	U18CA5MCT10	4	3	100
	III	Major Core – 11	Object-oriented Programming Using C# and .Net	U18CA5MCT11	4	3	100
	III	Major Core – 12	C# and .Net Programming Lab	U18CA5MCP12	4	3	100
	III	Major Elective – 2	Cloud Computing/ Green Computing/ Fog Computing	U19CA5MET04 U19CA5MET05 U19CA5MET06	5	5	100
	IV	Non Major Elective - 1	Desktop Publishing Lab	U15CA5NMP01	2	2	100
	IV	Skill Based Elective - 4	Online Course	U19OC5SBT04	2	2	100
	IV	Value Education	Ethics / Bible Studies/ Catechism		1	-	
			TOTAL		**30**	**25**	**800**
VI	III	Major Core – 13	Computer Graphics	U18CA6MCT13	5	4	100
	III	Major Core – 14	Software Engineering Concepts	U18CA6MCT14	5	4	100
	III	Major Core – 15	Internet of Things	U19CA6MCT15	4	4	100
	III	Major Core – 16	Graphics and Animation Lab	U18CA6MCP16	4	3	100
	III	Major Elective – 3	Data Mining/ Principles of Data Science/ Big Data Analytics	U19CA6MET07/ U19CA6MET08/ U18CA6MET09	5	5	100
	IV	Non Major Elective - 2	Multimedia Lab	U18CA6NMP02	2	2	100
	IV	Skill Based Elective - 5	Python Programming Lab	U19CA6SBP05	2	2	100
	IV	Skill Based Elective - 6	Research Methodology	U15DS6SBT06	2	2	100
	IV	Value Education	Ethics / Bible Studies/ Catechism		1	-	100
	V	Extension Activity	RESCAPES-Impact Study of Project		-	1	100
		Internship/Field Work/Field Project 30 hours- Extra Credit		U18SP4ECC04/ U18SP4ECC02	-	2(Extra Credit)	100
			TOTAL		**30**	**27+2**	**1000+ 100**
			GRAND TOTAL		**180**	**141**	**4800**
			ED : Extra Credit (Compulsory) : Mini Project	U18CA6ECP01		2	100

(For Candidates admitted from the academic year 2020-21 onwards)
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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BCA & B.Sc., Computer Science
First Year - Semester – I

Course Title	Major Core 1: Problem Solving using C
Total Hours	75
Hours/Week	5 Hrs/Wk
Code	U20CA1MCT01/U20CS1MCT01
Course Type	Theory
Credits	4
Marks	100

General Objective:
To understand the concepts of problem solving approaches and to develop programming skills using C language.

Course Objectives:

CO No.	Course Objectives
CO-1	Understand the concepts of algorithms and create flowcharts for a given problem
CO-2	Apply the basic concepts of C in real-time applications
CO-3	Analyze the control constructs, different types of arrays and apply the concepts for solving problems in real time
CO-4	Understand the concepts of strings, user defined functions, structures and union in C
CO-5	Understand the basics of pointers and create files using C

UNIT I **15 Hrs**
INTRODUCTION TO COMPUTER PROBLEM SOLVING
Introduction: Steps involved in Problem Solving Using Computers – Algorithms – Flow Charts – Pseudocode – Evolutio of Programming Languages: Introduction – Classification of Programming Languages - Compiler – Interpreter, Loade and Linker.
Extra Reading: Develop Algorithms for real time applications.

UNIT II **15 Hrs**
CONSTANTS, VARIABLES, AND DATA TYPES: Introduction – Character Set – C Tokens – Keywords and Identifiers – Constants – Variables – Data Types – Declaration of Storage Class.
OPERATORS AND EXPRESSIONS: Introduction - Arithmetic Operators - Relational Operators - Logical Operators - Assignment Operators - Increment and Decrement Operators-
Conditional Operators - Bitwise Operators - Special Operators - Arithmetic Expressions - Evaluation of Expressions - Precedence of Arithmetic Operators - Some Computational Problems.
MANAGING INPUT AND OUTPUT OPERATORS: Introduction - Formatted Input - Formatted Output.
Extra Reading: Basic I/O and Control operations in Python.

UNIT III **15 Hrs**
DECISION MAKING AND BRANCHING: Introduction - Decision Making with if Statement - Simple if Statement- The if else Statement - Nesting of if...else Statements - The Else if Ladder - Switch Statement - ?: Operator - Goto Statement.

DECISION MAKING AND LOOPING: Introduction – The While Statement - The do Statement – The for Statement - Jumps in Loops.
ARRAYS: Introduction – One-dimensional Array – Two-dimensional Arrays - Initializing Two -dimensional Arrays – Multi-dimensional Arrays.
Extra Reading: Develop multidimensional array programs

UNIT IV **15 Hrs**
HANDLING OF CHARACTER STRINGS: Introduction - Declaring and Initializing String Variables - Arithmetic Operations on Characters - String- handling Functions - Table of Strings.
USER DEFINED FUNCTIONS: Introduction - Definition of Functions - Function Declaration - Category of functions - No Arguments and No Return Values - Argument but No Return Values - Arguments with Return Values – No Arguments but Returns a Value – Functions that Return Multiple Values – Recursion.
STRUCTURES AND UNIONS : Introduction – Defining a Structure - Declaring Structure Variables – Accessing Structure Members - Structure Initialization - Arrays of Structures - Arrays Within Structures – Structures Within Structures - Structures and Functions – Unions.
Extra Reading: Create Programs using functions.

UNIT V **15 Hrs**

POINTERS: POINTERS : Introduction - Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointer - Chain of Pointers - Pointer Expressions - Pointers and Arrays - Pointers and Character Strings – Arrays of Pointers - Pointers to Functions – Pointers and Structures.
FILE MANAGEMENT IN C: Introduction - Defining and Opening a File - Closing a File - Input/Output Operations on Files - Error Handling during I/O Operations - Random Access to Files - Command Line Arguments.
Extra Reading: Implement the system and file concepts using emulator.
Course Outcomes (CO):
The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Know the correct and efficient ways of solving problems.	PSO 1, PSO 2	U
CO-2	Write C program for simple applications	PSO 2	An
CO-3	Formulate algorithm for simple problems	PSO 2	U
CO-4	Analyze different data types and arrays	PSO 5	An
CO-5	Perform simple search and sort	PSO 1	Ap
CO-6	Understand memory management and write programs using structures and union for solving complex computational problem	PSO 2, PSO 3	U
CO-7	Create files and perform file operations using C	PSO 1, PSO5	R, An
CO-8	Use programming language to solve problems	PSO 1, PSO 5	E

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT

1. M. T. Somashekara, "Problem Solving with C", PHI Learning Private Limited, 2009.
2. E. Balagurusamy, "Programming in ANSI C", Seventh Edition, McGraw Hill Education (India) Private Limited, New Delhi.

BOOKS FOR REFERENCE

1. BrianW. Kernighan and Dennis M. Ritchie, **"**The C programming Language**"**, Prentice-Hall Publishing Company, 2006.
2. Deitel and Deitel, **"**C How to Program**"**, Seventh Edition, Pearson Education Pvt. Ltd., 2013.
3. R.G.Dromey, **"**How to Solve it by Computer**"**, Fifth Edition, Pearson Education Pvt. Ltd., New Delhi, 2007.
4. Kamthane, A.N., **"**Programming with ANSI and Turbo C**"**, Pearson Education Pvt. Ltd., New Delhi, 2006.
5. K R Venugopal , Sudeep R Prasad, **"**Mastering C**"**, Second Edition, McGraw Hill Education Private Limited, 2015.

(For Candidates admitted from the academic year 2020-21 onwards)
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TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BCA & B.Sc., Computer Science
First Year - Semester – I

Course Title	Major Core 2: Problem Solving using C Lab
Total Hours	30
Hours/Week	4 Hrs/Wk
Code	U20CA1MCP02/U20CS1MCP02
Course Type	Practical
Credits	2
Marks	100

General Objective:
Student writes application programs using C for solving real time problems.

Course Objectives:

CO No.	Course Objectives
CO-1	Recall the syntax of control structures and solve problems using C
CO-2	Remember the syntax of looping statements and solve problems using C
CO-3	Create programs for arrays and strings using C
CO-4	Develop programs for Functions, Pointers and Structures in C
CO-5	Write programs for creating a file and perform I/O operation on files

EXERCISES

1. Control Statements
2. Loop Statements
3. Arrays (Searching and Sorting)
4. Strings
5. Functions and Pointers
6. Structure and Union
7. Dynamic Memory Allocation
8. Macros and File Handling

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BCA & B.Sc., Computer Science
First Year - Semester – I

Course Title	Major Core: 3 - Web Designing & PHP Programming
Total Hours	75
Hours/Week	4 Hrs /Wk
Code	U20CA1MCP03/U20CS1MCP03
Course Type	Practical
Credits	3
Marks	100

General Objectives:
To discuss and develop websites using script type, style sheets, jquery, html and php languages.
Course Objectives:

CO NO.	COURSE OBJECTIVES
CO-1	Understand the basic concepts of html and stylesheets.
CO-2	Perform basic operations using CSS
CO-3	Learn how to use jquery for effective website creation
CO-4	Learn various functions of MySQL
CO-5	Understand the Scripting language of website creation

HTML5 & CSS:

1. Create a HTML page that will have the following: Headers, Linking and Images.
2. Create a HTML page that will have the following: Frames, Unordered Lists, Nested and Ordered Lists
3. Create a HTML page that will have the following: Tables and Formatting
4. Create a HTML page that will have the following: Forms, Creating and Using Image Maps, Tags

JAVA SCRIPT:

1. Write a script to generate Random Numbers within 1 to 10 and display the numbers in a Table.
2. Write a script to create an Arithmetic Calculator using Function.
3. Write a script to check the given String is Palindrome or not.

JQUERY:

1. Write a program to display the Week Days.
2. Write a program to generate Date and Time in different format.
3. Write a program to Validate Age and Numeric Value.

PHP & MySQL:

1. Creating a simple PHP program using the concepts: Flow Control, Strings and Arrays, creating Functions.
2. FORM processing using PHP.
3. Connecting to MySQL from PHP, PHP MySQL Connectivity, Creating Databases and Tables with PHP Programs: Storing data and Retrieving data.

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BCA & B.Sc., Computer Science
First Year - Semester – II

Course Title	**Major Core 4 - Data Structures and Algorithms**
Total Hours	**75**
Hours/Week	**5 Hrs /Wk**
Code	**U20CA2MCT04/U20CS2MCT04**
Course Type	**Theory**
Credits	**4**
Marks	**100**

General Objective:

To understand the fundamental concepts of data structures and learn to develop algorithms.

Course Objectives:

The Learner will be able to

CO No.	Course Objectives
CO-1	Learn the fundamental Concepts of Data Structures.
CO-2	Understand the working principles of Queues and Linked Lists.
CO-3	Study how to balance a Binary Search trees and 2-3 and so on other Trees.
CO-4	Understanding of various sorting algorithms, including insertion sort, selection sort, merge sort, heap sort and quick sort.
CO-5	Understand the concepts of Graphs and its terminologies.

Unit - I **15Hrs**

INTRODUCTION TO DATA STRUCTURE: Definitions – Overview of Data Structures - Implementation of Data Structures. **ARRAYS:** Definition – Terminology – One-dimensional Array: Operations on Arrays. **STACK:**

Definition and Example - Representing Stack: Implementing the Pop operation – **APPLICATIONS:** Infix, Postfix and Prefix; Basic Definitions and Examples – evaluating a Postfix Expression - Converting an Expression from infix to postfix.
***Extra* Extra Reading /Key words:** *two dimensional and multi-dimensional array concepts.*

Unit - II **15Hrs**

QUEUES: The Queue and its Sequential representation: The Queue as an Abstract Data Type – Insert Operation – Priority Queue – Array implementation of a Priority Queue.
LINKED LISTS: Inserting and Removing Nodes from a List – Linked implementation of Stacks – getnode and freenode operations – Linked implementation of Queues – Linked list as a Data Strucutre – Header nodes.
Extra Reading /Key words: *real time applications of Stacks & Linked Lists.*

Unit - III **15Hrs**

TREES: BINARY TREES: Operations on Binary trees – Applications of Binary Trees.
BINARY TREE REPRESENTATIONS: Node representation of Binary Trees – Internal and External Nodes.
APPLICATIONS: Tree Traversals – General Expression as Trees – Evaluating an Expression tree – Constructing a Tree.
Extra Reading /Key words: *Tree Traversals, Binary Search Tree.*

Unit - IV **15Hrs**

SORTING: Bubble Sort – Quick Sort – Heap Sort; Insertion Sort: Simple Insertion – Shell Sort – Merge Sort.
Extra Reading /Key words: *Applications of Sorting Techniques.*

Unit - V **15Hrs**

GRAPHS: Introduction- Graph terminologies - Representation of Graphs: Set Representations – Linked Representations - Transitive Closure - Warshall‟s Algorithm – Shortest Path Algorithm – Dijkstras Algorithm Revisited**.**
Extra Reading /Key words: *cyclic and acyclic graph, shortest path.*

Course Outcomes:

The Learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall the fundamental Concepts of Data Structures.	PSO 1	R, U
CO-2	Determine the applications of, Queues and Linked Lists.	PSO 2	A

CO-3	Grasp various operations and searching methods applied using Binary Tree.	PSO 2	U
CO-4	Demonstrate of various sorting algorithms, including insertion sort, selection sort, merge sort, heap sort and quick sort.	PSO 3	Ap
CO-5	Demonstrate Shortest Path Algorithms	PSO 4	An

PRESCRIBED TEXT

1. **Samanta. D**, **Classic Data Structures**, 2005, Prentice Hall of India Private Ltd, New Delhi.
   Unit – I, V.

2. **Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "Data Structures Using C and C++"**, 2006, Second Edition.

   Unit – I, II, III, IV, V.

BOOKS FOR REFERENCE

1. Ellis Horowitz, SartajSahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", University Press (India) Pvt. Ltd., Hyderabad, 2007.

2. Yashavant P. Kanetkar, "Data Structures Through C++", BPB Publications, 2003.

3. 1. A. Chitra and P.T. Rajan, Data Structures, Tata McGraw – Hill Publishing Company Limited, New Delhi.

4. Jean Paul Tremblay and Paul G. Sorenson, An Introduction To Data Structures with Applications, Tata McGraw-Hill, Second Edition.

5. S.E. Goodman and S.T. Hedetniemi, "Introduction to the Design and Analysis of Algorithms", Tata McGrawHill, International Edition, 1987.

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HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
B.C.A
First Year - Semester – II

Course Title	Major Core 5 – Digital Principles and Computer Architecture
Total Hours	60
Hours/Week	4HrsWk
Code	U20CA2MCT05
Course Type	Theory
Credits	3
Marks	100

General Objectives:

To give Basic Knowledge on Various Building Blocks of a Digital Computer and Architecture.

Course Objectives:

CO No.	Course Objectives
CO-1	Understand and learn the types of number systems and basic theorems and properties of Boolean algebra.
CO-2	Learn and understandthe types of flipflops,registers and counters.
CO-3	Knowand understand the categories of the peripheral devices and its data transfer.
CO-4	Learn and understandthe instruction formats, addressing, modernpipelining and vector processing techniques.
CO-5	Knowand understand the main memory, auxiliary memory, associative, cache andvirtual memory.

UNIT I **12Hrs**

NUMBER SYSTEMS: Binary, Decimal, Octal, Hexadecimal – Conversion from one to another – Complements – ASCII – Excess 3 – Gray – Parity Generator and Checker.

DIGITAL LOGIC: Basic Logic Gates - Basic theorems and properties of Boolean algebra - NAND, NOR Implementation – K- Map – Pairs, Quads, Octet – K map Simplification – Sum of Product and Product of Sum – Don‟t Care conditions.

UNIT II **12Hrs**

COMBINATIONAL LOGIC CIRCUITS DESIGN: Multiplexers – De multiplexers – Encoders – Decoders - Arithmetic Building blocks – Half Adder – Full Adder –Half Subtractor – Full Subtractor. FLIPFLOPS, REGISTERS, COUNTERS: RS FlipFlop – JK

FlipFlop – D Flipflop – T Flipflop – Edge triggered Flipflop – Master – Slave Flipflop –Types of Registers – Serial in Serial Out – Serial in Parallel out – Parallel in Serial out – Parallel in Parallel out – Counters – Ripple counter.

UNIT III **12Hrs**

INPUT – OUTPUT ORGANIZATION: Peripheral Devices -- Input Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access.

UNIT IV **12Hrs**

CENTRAL PROCESSING UNIT: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation.

PIPELINE AND VECTOR PROCESSING: Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline – RISC Pipeline – Vector Processing.

UNIT V **12Hrs**

MEMORY ORGANIZATION: Memory Hierarchy – Main Memory – RAM and ROM Chips – Memory Address Map – Memory Connection to CPU – Auxiliary Memory – Magnetic Tape – Associative Memory -- Cache Memory – Virtual Memory – Memory Management Hardware.

Course Outcomes (CO):
The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describe the types of number systems.	PSO 1	R, U
CO-2	Explain the arithmetic building blocks	PSO 2	U
CO-3	Illustrate the concept of flipflops,registers and counters	PSO 2	U
CO-4	Ilustrate the concepts of transfer of data.	PSO 3	U
CO-5	Differentiate different types of addressing modes and explain pipeline and vector processing.	PSO 4	An
CO-6	Analyze the various types of Memory and the purpose of Memory Management.	PSO 4	An

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT

1. Albert Paul Malvino, Donald. P.Leach , Digital Principles and Applications, 2002, Tata McGraw- Hill Publishing Company Limited, New Delhi.

UNIT I : Chapters 2.1 -2.7, 3.1 - 3.8, 5.1 – 5.8

UNIT II : Chapters 8.1 – 8.7, 9.1 – 9.5, 10.1 – 10.3,4.1 – 4.3 ,4.6

2. M.Morris Mono, Computer System Architecture, Third Edition,2005,Prentice – Hall of India Private Ltd, New Delhi.

UNIT III : Chapters 11

UNIT IV : Chapters 8.1 – 8.6, 9.1 – 9.6

UNIT V : Chapters 12

BOOKS FOR REFERENCE

1. B.Govinderajalu, “Computer Architecture and Organization”,2004 ,Tata McGraw – Hill Publishing Company, New Delhi.

2. William Stallings, “Computer Organization and Architecture “, 2006, 7th Edition, Pearson Education.

3. Carl Hamacher, AuonkoUranesic and SafwatZaky , “Computer Organization”, 2002, 5th Edition, Tata McGraw – Hill Publishing Company, New Delhi.

4. Kai Hwang , “Advanced Computer Architecture” , 2000, Tata McGraw – Hill Publishing Company, New Delhi.

5.P.Pal Chaudhuri, “Computer Organization and Design”,2008, 3rd Edition , Prentice Hall of India Pvt Ltd, New Delhi.

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SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
BCA & B.Sc., Computer Science
First Year - Semester – II

Course Title	**MAJOR CORE- 6: OPTIMIZATION TECHNIQUES**
Total Hours	**75**
Hours / Week	**5**
Code	**U20CA2MCT06/U20CSMCT06**
Course type	**Theory**
Credits	**4**
Marks	**100**

General Objective:

To enable the students to convert any real life situation into a mathematical model and solve them using an appropriate algorithm.

Course Objectives(CO) :
The learner will be able to

CO No.	Course Objectives
CO – 1	UnderstandL.P.P and finding solution by Graphical and Simplex Method.
CO – 2	Evaluate of solution of L.P.P by Big M method and Two phase Method
CO – 3	Understand sequencing problem and obtaining the sequence of processing n jobs through two machine and k machines
CO – 4	Understand inventory control theory and finding EOQ
CO – 5	Evaluate PERT and CPM.

UNIT I: LINEAR PROGRAMMING PROBLEM AND SIMPLEX ALGORITHM. 15HRS

Introduction to OR - Mathematical formulation of the problem - Graphical solution methods - General Linear Programming Problem - Canonical and standard forms of L.P.P. The Simplex Method - Simplex Algorithm.
Extra Reading/ Keywords*:Revised simplex method , Dual simplex method.*

UNIT II : ARTIFICIAL VARIABLES AND SEQUENCING PROBLEM 15 Hrs

Artificial variables - Charnes Method of penalties (Big - M method) - Two-Phase Simplex method – Sequencing problem - processing n jobs through two machines - processing n jobs through k machines .
Extra Reading/ Keywords*:Fractional cut method ,Processing 2 jobs through k machines*

UNIT III : TRANSPORTATION PROBLEM AND ASSIGNMENT PROBLEM 15 Hrs

Transportation Problem - Initial basic feasible solution - North west corner rule - Row minima method - Column minima method - Matrix minima Method - Vogel's approximation method - Optimal solution - u - v method - Degeneracy - Unbalanced Transportation Problem-Assignment problem-Hungarian method-unbalanced assignment problem, Travelling salesman problem.

Extra Reading/ Keywords *:Stepping stone solution method,Dual of the Assignment problem*

UNIT IV: INVENTORY CONTROL 15 Hrs

Types of inventory - Economic order quantity - Deterministic inventory problems with shortages - Deterministic inventory problems without shortages - Problems of EOQ with price breaks.

Extra Reading/ Keywords*:*Multi-item Deterministic problems

UNIT V :NETWORK SCHEDULING 15 Hrs

Introduction to network problems-Network scheduling by CPM and PERT.

Extra Reading/ Keywords*:Time cost Optimization Algorithm,Resource allocation and scheduling*

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Course Outcomes(CO):

The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO - 1	Recall L.P.P and Solving LPP by Graphical and Simplex Method	**PSO - 3**	**U,E**
CO - 2	Solve L.P.P by Big M method and Two phase Method	**PSO -2**	**E**
CO - 3	Recognize and solve sequencing problem	**PSO -4**	**E**
CO - 4	Discuss inventory control theory and compute EOQ.	**PSO -1**	**U,E**
CO - 5	Evaluate PERT and CPM	**PSO -5**	**E**
CO - 6	Enable the students to convert any real life situation into a mathematical model and solve them using an appropriate algorithm- Skill Development	**PSO – 1,PSO -2**	**U,E**

PRESCRIBED TEXT

1.Kantiswarup,P.K.Gupta& Man Mohan , (2009) OPERATIONS RESEARCH ,
UNIT - I - Chapters 2 ,Chapter 3 : 3.1 -3.5 ,Chapter 4: 4.1- 4.3
UNIT II- Chpter 4: 4.4 ;Chapter 12:12:1-12:5
UNIT III - Chapter 10 : 10.1 – 10.3 , 10.5, 10.8 -10.13,10.15, Chapter 11-11.1 to 11.4,11.7
UNIT IV - Chapter 19: 19.1 - 19:12
UNIT V - Chapter 25

BOOKS FOR REFERENCE

1. H. Taha(IV Edition) OPERATIONS RESEARCH ,Prentice Hall of India
2. P. K. Gupta, D. S. Hira, (2001) PROBLEMS IN OPERATIONS RESEARCH, S.Chand ,New Delhi

(For Candidates admitted from the academic year 2020-21 onwards)
HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI- 620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

PG DEPARTMENT OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM
B.COM
First Year - Semester – II

Course Title	ALLIED OPTIONAL 1 COMPUTER APPLICATIONS IN BUSINESS
Total Hours	60
Hours/Week	4 Hrs Wk
Code	U20CA2ALT01
Course Type	Theory
Credits	3
Marks	100

General Objectives:
To make the students familiar with the use of IT and the various facets of IT and to equip the students with practical skills to use computers.

Course Objectives:

CO No.	Course Objectives
CO-1	understands the components, different applications and issues of information technology
CO-2	remembers and understands the terminologies of operating system and features of Microsoft Word
CO-3	explain the features of Excel environment
CO-4	create power point presentation with multimedia effects
CO-5	solve ecommerce framework with real-time applications.

UNIT I **12 Hrs**

INFORMATION TECHNOLOGY: Introduction: Meaning – Need – Components. **Role of IT**: It in Business, IT in Manufacturing, IT in Mobile Computing, IT in Public Sector, IT in Defense, IT in Media, IT in Publication, IT and Internet. **Emerging Trends in IT**: E-Commerce, IT And Supply Chain Management, IT And SIS, Electronic Data Interchange(EDI) and Mobile Communication. **IT and Ethical Issues:** Privacy, Accuracy, Property and Accessibility Issues.

Extra Reading (Key Words): Cyber Law Security and Practices

UNIT II **12 Hrs**

BASICS OF OPERATING SYSTEMS: Meaning, Definition and Functions of OS. **Microsoft Window 2007**: Task Bar, Desktop and Customizing, My Computer-Setting, Control Panel Components, Windows Explorer, Using Help

and Search Features. **Word Processing Using MS Word 2007**: Basics - Working with Word documents – Working with Text. *Checking Spelling and Grammar*: Using Spelling and Grammar Dialog Box - Using Auto Correct- Using Synonyms and Thesaurus. Adding Graphics and Drawing Objects – Mail Merge.

Extra Reading (Key Words): Distributed Operating System

UNIT III **12 Hrs**

MS-EXCEL : Spread Sheet Using Microsoft Excel 2007: Excel Environment – *Working With Worksheet*: Entering Data – Navigating Through Cells – Naming And Renaming Cells – Editing A Worksheet – Cut-Copy, Paste Functions - Find And Replace Features. *Formulas and Functions*: Functions and Formulas - Using Auto Sum, Auto Fill and Command. Creating and Inserting a Chart and Transporting to Word and PowerPoint Documents.

Extra Reading (Key Words): Import Excel to analysis tools

UNIT IV **12 Hrs**

MS-POWER POINT: *Making Presentation Using Microsoft Power Point 2007*. PowerPoint Environment – *Working with PowerPoint*: Creating a Presentation using Design Templates and Blank Presentation - Working with Different Views. *Designing Presentation*: Working with Slides – Working with Text – Formatting the Text - Graphics and Adding Multimedia Animation - Inserting Pictures and Tables From Other Office Products – Running Slides.

Extra Reading (Key Words): Presentation with Hyperlink and Animation.

UNIT V **12 Hrs**

APPLICATIONS OF E-COMMERCE: *Introduction to E-Commerce*: Meaning, Need, Advantages, E-Commerce Framework, Types of E-Commerce. *The Anatomy of E-Commerce Applications*: Electric Consumer Application - Electronic Commerce Organization Application. *Electronic Payment System*: Introduction to EPS, EFT and SET - Types of Payment System. *Technology and Cyber Law*: Basics Concepts and Importance of Cyber Law - Cyber Laws in India (Information Technology Act 2000).

Extra Reading (Key Words): Usage of E-purchase Websites

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describe the Components, different Applications and issues of Information Technology.	PSO 1	R, U
CO-2	Discuss the terminologies of Operating System and features of Microsoft Word.	PSO 1, 2	R, Ap
CO-3	Explain the features of Excel Environment.	PSO 1, 4, 5	U, Ap, E
CO-4	Create Power Point Presentation with Multimedia Effects.	PSO 3, 5	R, Ap
CO-5	Relate Ecommerce Framework with Real-Time Applications.	PSO 4,5	R, Ap

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT

1. Alexis Leon, Mathews Leon, Leena Leon, "**Introduction to Information Technology**", Vijay Nicole, imprints Private Ltd, Chennai.
2. R. Parameswaran, "**Computer Applications in Business**", S.Chand & Company Ltd. New Delhi.

BOOKS FOR REFERENCE

1. V. Rajaraman, "**Introduction to Information Technology**", PHI Learning Pvt Ltd, New Delhi.
2. Dr. Ch. Seetha ram, "**Information Technology For Management**", Deep & Deep Publications Pvt Ltd, New Delhi.
3. Leon, "**Introduction to Computers**", Vikas Publishing House Pvt Ltd.
4. Srinivasa vallaban SV, "**Computer In Business**", Sultan Chand and Sons, New Delhi.
5. "**Introduction to Computers with Ms Office**", New Delhi.

PRACTICALS

1. Typing and formatting a page in MS Word
2. Typing all kinds of letters
3. Typing a Resume
4. Creation of tables in MS Word and entering text and numeric data
5. Use of Mail merge
6. Preparing a graph for a given data
7. Creating power point file using templates and master slide
8. Importing data from word and excel to power point slides
9. Inserting picture files and audio files
10. Using animation and slide transition schemes in slides
11. Opening net banking account
12. Case study on Cyber Laws

(For Candidates admitted from June 2019 Onwards)

Holy Cross College (Autonomous), Tiruchirappalli-2

Affiliated to Bharathidasan University

Nationally Accredited (4rd cycle) with A++ (CGPA 3.75/4) Grade by NAAC

College with potential for Excellence

Tiruchirappalli-620002

PG DEPARTMENT OF COMPUTER SCIENCE
Programme: M.C.A

PONo	ProgrammeOutcomes *Upon completion of the M.C.A.. Degree Programme, the graduate will be able to*
PO-1	Acquire the abilities in Computing, Aptitude and Accounts to find novel solutions for the complex problems in ITfield.
PO-2	Acquire the knowledge to understand and analyse the problem, design a paradigm and to develop a software product to cater the needs of Industry and Society
PO-3	Instill the confidence in students for self learning to update the current trends in IT to become an efficient Professionals
PO-4	Understand the Code of Ethics and Standards of the computer Professionals and develop the young minds with Social responsibilities and commitments
PO-5	Apply the Management principles and skills to develop a software product as a team member and effectively manage the team as well as the product

PSO No.	**Programme Specific Outcomes** ***Upon completion of these courses the student would***
PSO-1	Acquire academic excellence with an aptitude for higher studies and research
PSO-2	Understand the concepts of programming, computation and management and apply them in the field of Computer Science
PSO-3	Apply the skills gained to analyse, design and to develop effective software product
PSO-4	Understand the recent technologies and tools to provide innovative ideas and solutions to the existing problems.
PSO-5	Apply the managerial skills in working environment to work effectively with other team members
PSO-6	Apply the appropriate Software Engineering practices to deliver a Quality products catering to the needs of Industry and Society at a large.

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI – 620 002.

PG DEPARTMENT OF COMPUTER SCIENCE

COURSE STRUCTURE (I & II SEMESTER) – CBCS

(For Candidates admitted from June 2020 onwards)

MASTER OF COMPUTER APPLICATIONS

Semester	Course	Title of the Course	Code	Hrs/ Wk	Credits	Marks
I	Major Core 1	Computer Organization and Architecture	P20CA1MCT01	4	4	100
	Major Core 2	Advanced Java Programming	P20CA1MCT02	5	4	100
	Major Core 3	Data Structures	P20CA1MCT03	4	4	100
	Major Core 4	Computer Networks And Network Security	P20CA1MCT04	4	4	100
	Major Core 5	Accounting and Financial Management	P20CA1MCT05	4	4	100
	Major Core 6	Advanced Java Programming- Practical I	P20CA1MCP06	4	2	100
	Major Core 7	Open Source Server Side Scripting Tools – Practical II	P20CA1MCP07	4	2	100
		Value Education		1	-	-
		Internship/Field Work/Field Project (30 Hours)	P18SP1ECC01		2 (EC)	100
		TOTAL		**30**	**24+2**	**700+100**
II	Major Core 8	Operating Systems	P20CA2MCT08	4	4	100
	Major Core 9	Database Management Systems	P20CA2MCT09	5	4	100
	Major Core 10	Resource Management Techniques	P20CA2MCT10	4	4	100
	Major Core 11	Organizational Behaviour	P20CA2MCT11	4	4	100
	Major Elective 1	Cloud Computing / Fog Computing / Green Computing	P20CA2MET01/ P20CA2MET02/ P20CA2MET03	4	4	100
	Major Core 12	Shell Programming– Practical III	P20CA2MCP12	4	2	100
	Major Core 13	Database Management Systems Programming – Practical I	P20CA2MCP13	4	2	100
		Value Education		1		
		Internship/Field Work/Field Project (30 Hours)	P18SP1ECC01		2 (EC)	100
		TOTAL		**30**	**24+2**	**700+100**

(For Non-Major Candidates admitted from June 2020 onwards to acquire **PREREQUISITE CREDITS**)

Semester	Course	Title of the Course	Code	Credits	Marks
I	Major Core 1	Object - Oriented Programming With C++	P20CA1PRT01	5	100
I	Major Core 2	C++ Programming – Practical I	P20CA1PRP02	5	100
II	Major Core 3	Computer Graphics	P20CA2PRT03	5	100
II	Major Core 4	Computer Graphics- Practical II	P20CA2PRT04	5	100
TOTAL				**20**	**400**

TOTAL NO. OF CREDITS TO BE ACQUIRED = 20

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI – 620 002.

PG DEPARTMENT OF COMPUTER SCIENCE

MASTER OF COMPUTER APPLICATIONS

(For Candidates admitted from June 2019 Onwards)

Semester	Course	Title of the Course	Code	Hrs/ Wk	Credits	Marks
III	Major Core 15	Probability and Statistics	P15CA3MCT15	4	4	100
	Major Core 16	J2EE &Python Programming	P18CA3MCT16	4	4	100
	Major Core 17	Database Management Systems	P19CA3MCT17	5	4	100
	Major Core 18	Business Intelligence	P18CA3MCT18	5	3	100
	Major Elective 1	Fog Computing / Green Computing/ Cloud Computing	P19CA3MET01/ P19CA3MET02/ P18CA3MET03	4	3	100
	Major Core 19	J2EE and Python Programming Practical V	P18CA3MCP19	4	2	100
	Major Core 20	Database Management Systems Programming - Practical VI	P19CA3MCP20	4	2	100
		Internship/Field Work/Field project 30 hrs	P18SP3ECC03/ P18SP3ECC02			
		TOTAL		**30**	**22**	**700**
IV	Major Core 21	Simulation and Modeling	P18CA4MCT21	5	4	100
	Major Core 22	DOTNET Technologies	P19CA4MCT22	5	4	100
	Major Core 23	Organizational Behaviour	P18CA4MCT23	4	4	100
	Major Core 24	Open Source Server Side Scripting Tools	P18CA4MCT24	4	3	100
	Major Elective 2	Cyber Crime And Digital Forensics / Internet of Things/ Adhoc and Sensor Networks	P18CA4MET04/ P19CA4MET05/ P19CA4MET06	4	3	100
	Major Core 25	DOTNET Technologies – Practical VII	P19CA4MCP25	4	2	100
	Major Core 26	Open Source Server Side Scripting Tools – Practical VIII	P18CA4MCP26	4	2	100
	2017 Onwards	Self Study Paper (Professional Ethics)	P17CA4SST01	_	2(Extra Credit)	100
		Internship/Field Work/Field project 30 hrs	P18SP4ECC04/ P18SP4ECC02			
		TOTAL		**30**	**22**	**700**

List of Elective Courses

Semester	Course	Title of the Course	Code	Hrs/Wk	Credits	Marks
III	Major Elective 1	Fog Computing / Green Computing/ Cloud Computing	P19CA3MET01/ P19CA3MET02/ P18CA3MET03	4	3	100
IV	Major Elective 2	Cyber Crime And Digital Forensics / Internet of Things/Adhoc and Sensor Networks	P18CA4MET04/ P19CA4MET05/ P19CA4MET06	4	3	100

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI – 620 002.

PG DEPARTMENT OF COMPUTER SCIENCE

MASTER OF COMPUTER APPLICATIONS

Semester	Course	Title of the Course	Code	Hrs/ Wk	Credits	Marks
V	Major Core 27	Software Engineering	P18CA5MCT27	5	5	100
	Major Core 28	Principles of Compiler Design	P18CA5MCT28	5	5	100
	Major Elective 3	Internet of Things/ Big Data Analytics	P18CA5MET07/ P18CA5MET08	5	5	100
	Major Core 29	Multi Platform Application Development	P18CA5MCT29	5	5	100
	Major Elective 4	Artifcial Intelligence/ Fuzzy Logic/ Artifical Neural Networks	P19CA5MET10/ P19CA5MET11/ P19CA5MET12	5	5	100
	Major Core 30	Multi Platform Application Development – Practical IX	P19CA5MCP30	5	3	100
		Mini Project	P18CA5DIS01	–	**4**	**100**
		Internship/Field Work/Field project 30 hrs	P18SP5ECC02/ P18SP5ECC02/			
		TOTAL		**30**	**32**	**700**
VI		Project Work	P18CA6DIS02		22	100

(For Candidates admitted from June 2018 Onwards)

List of Elective Courses

Semester	Course	Title of the Course	Code	Hrs/Wk	Credits	Marks
V	Major Elective 3	Internet of Things/ Big Data Analytics	P18CA5MET07/ P18CA5MET08/	5	5	100
	Major Elective 4	Artifical Intelligence/ Fuzzy Logic/ ArtificialNeural Networks	P19CA5MET10/ P19CA5MET11/ P19CA5MET12	4	3	100

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	Major Core 1- Computer Organization And Architecture
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA1MCT01
Course Type	Theory
Credits	4
Marks	100

General Objective:

To learn the structure and behavior of the various modules of the computer and to understand the way in which the hardware components are connected together to form computer system.

Course Objectives (CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Understand the various kinds of Number Systems and their conversions.
CO-2	Describe the Sequential Circuits and Combinational Circuits.
CO-3	Present the concepts of instruction cycle, instruction code and I/O interrupts.
CO-4	Compare different types of addressing modes and explain the concepts of vector processing.
CO-5	Analyze the purpose of Register transfer, micro operations and memory management.

UNIT I

12 Hrs

NUMBER SYSTEM: Decimal, Binary, Octal, Hexadecimal – Conversion to one another – Gray Code – BCD – EBCDIC – ASCII – Binary Addition – Binary Subtraction – Binary Multiplication – Binary Division – 1's Complement – 2's Complement – Fixed Point Representation – Floating Point Representation.

DIGITAL LOGIC CIRCUITS: Logic Gates – Boolean Laws –Demorgan'sLaw – K-Map Simplification – Sum of Product – Product of SumMethods.

Extra Reading(Key words): Designing the Logic circuits using K-Maps.

UNIT II

12 Hrs

COMBINATIONAL CIRCUITS: Half Adder – Full Adder – FlipFlops – JK Flip Flop – RS FlipFlop –D Flip Flop – T Flip Flop – Master-Slave Flip Flop.
DIGITAL COMPONENTS: Decoders – Encoders – Multiplexers – DeMultiplexers – Registers – Shift Registers – Binary Counter.
Extra Reading(Key words): Comparison of combinational and sequential circuits.

UNIT III **12 Hrs**

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction Codes – ComputerRegister

– Computer Instructions – Timing and Control – Instruction Cycle – Memory ReferenceInstructions
– I/O interrupt – Complete Computer Description.
Extra Reading(Key words): INTEL 8085 & 8086 Instructions.

UNIT IV **12 Hrs**

CPU: General Register Organization – Stack Organization – Instruction Format– RISC – Addressing Modes – Data Transfer andManipulation.

PIPELINE AND VECTOR PROCESSING: Parallel Processing – Pipelining– Arithmetic Pipeline

– Instruction Pipeline – RISC Pipeline – Vector Processing.
Extra Reading(Key words): Compare and process the real time data with Stack, Pipeline and vector processing.

UNIT V **12 Hrs**

REGISTER TRANSFER AND MICRO OPERATIONS: Register Transfer Language – Register Transfer– Bus and Memory Transfers – Arithmetic Micro-operations – Logic Micro-operations – Shift Micro-operations.

MEMORY ORGANIZATION: Memory Hierarchy – Main Memory – Auxiliary Memory – Associate Memory – Cache Memory – Virtual Memory.
Extra Reading(Key words): Study on other types of Memory.

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminar.

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall and relate the various number systems.	PSO 1	R, U
CO-2	Explain the Sequential Circuits and Combinational Circuits.	PSO 2	A
CO-3	Illustrate the concepts of instruction cycle, instruction code and I/O interrupts.	PSO 2	U
CO-4	Differentiate different types of addressing modes.	PSO 3	Ap
CO-5	Summarize on memory organization.	PSO 4	An
CO-6	Acquire the knowledge of working principles of computer systems	PSO 2	Ap

PSO-Programme Specific Outcomes; CO- Course Outcomes; R-Remember, U-Understand; Ap-Apply; An-Analyse;E-Evaluate;C-Create

PRESCRIBED TEXT:

1. Albert Paul Malvino, Leach Donald. P,**"Digital Principles and Applications"**, 2000, Fourth Edition Tata McGraw Hill Publishing Company Ltd., NewDelhi.
   UNITI Chapters 4 (4.1– 4.8)

   UNITII Chapters 11(11.1,11.3)

2. Morris Mano. M, **"Computer System Architecture"**, 2005, Third Edition, Prentice – Hallof India Private Ltd., NewDelhi.
   UNITI Chapters 3(3.3 – 3.4)**,** Chapters 1(1.2 – 1.4)
   UNITII Chapters 1(1.5,1.6)**,** Chapters 2(2.2 – 2.3)
   UNITIII Chapter 5(5.1–5.8)

   UNITIV Chapter 8 (8.2 – 8.6)**,** Chapter 9 (9.1 –9.6)
   UNITV Chapter 4(4.1– 4.6)**,** Chapter12(12.1 –12.6)
3. Floyd and Jain **"Digital Fundamentals"**,2006, Eighth Edition,PearsonEducation
   UNITII Chapter 9(9.2 –9.5)

BOOKS FOR REFERENCE:

1. Anokh Singh, Chanbra. A.K., **"Fundamentals of Digital Electronics"**, 2003, S. Chand Company, New Delhi.
2. Bartee Thomas C., **"Digital Computer Fundamentals"**, 2000, Tata McGraw Hill Publishing Company Ltd., NewDelhi.
3. Carl Hamacher, ZvonkoVranesic, SafwatZaky, **"ComputerOrganization"**,2002, Tata McGraw Hill Publishing Company Ltd., NewDelhi.
4. DezsoSima, Terence Fountain, Peter Kacsuk, **"Advanced Computer Architecture"**, 2005, Pearson Education, New Delhi.
5. Tanenbaum Andrew S. **"Structured Computer Organization"**, 2002, PrenticeHallof India Private Ltd., New Delhi.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	**Major Core 2 – Advanced Java Programming**
Total Hours	**60**
Hours/Week	**5 Hrs per Wk**
Code	**P20CA1MCT02**
Course Type	**Theory**
Credits	**3**
Marks	**100**

General Objective:

To impart sound knowledge in object oriented programming with developing programming skills in Java.

To understand various components of J2EE like JSP, Servlets, EJB, JDBC and effectively use in Web applications.

Course Objectives (CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Understand the Concepts of Object Oriented Programming and remember the working process of Class and the concept of Inheritance.
CO-2	Applying the concepts of Packages to organize classes and interfaces. Applying the concepts of String handling functions and Exception Handling.
CO-3	Discuss and apply the concepts of Applets. Differentiate and Implement JDBC Driver types and JDBC Objects to access database.
CO-4	Understand and classify the various tiers in J2EE. Analyze and Distinguish CGI and Java Servlet technology in distributed applications.
CO-5	Design and Implement JSP and EJB technology for creation of ERP software.

UNIT I **12 Hrs**

INTRODUCING CLASSES: Class Fundamentals – Declaring Objects – Assigning Object Reference Variables – Introducing Methods – Constructors – The this Keyword – Garbage Collection – The finalize() Method.

A CLOSER LOOK AT METHODS AND CLASSES: Overloading Methods – Using Objects as Parameters – A Closer Look at argument Passing – Returning Objects – Recursion – Introducing Access Control – Understanding static – Introducing final – Introducing Nested and Inner Classes.

INHERITANCE: Inheritance Basics – Using super – Creating Multilevel Hierarchy – Method Overriding – Dynamic Method Dispatch – Using Abstract Classes – Using final with Inheritance.

Extra Reading (Key terms): comparing different kinds of Inheritance.

UNIT II **12 Hrs**

PACKAGES AND INTERFACES: Packages – Access Protection – Importing Packages – Interfaces.

EXCEPTION HANDLING: Exception – Handling Fundamentals – Exception Types – Uncaught Exceptions – Using try and catch – Multiple catch Clauses – Nested try Statements – throw – throws – finally – Java's Built – in Exceptions.

STRING HANDLING: The String Constructors – String Length – Special String Operations – Character Extraction – String Comparison – Searching Strings – Modifying a String – Data Conversion using valueOf( ) – Changing the Case of Characters Within a String – String Buffer. ***Extra Reading (Key terms): Apply*****ing all the string functions in programs.**

UNIT III **12 Hrs**

I/O, APPLETS, OTHER TOPICS: I/O Basics – Reading Console Input – Writing Console Output –The PrintWriterClass –Reading and Writing Files – Applet Fundamentals.

JDBC OBJECTS: The concept of JDBC – JDBC Driver Types – JDBC packages – A brief overview of the JDBC process – Database Connection – Associating the JDBC / ODBC Bridge with the Databases – Statement objects – Result set.

Extra Reading (Keyword): Threading and Multi-Threading, Java Persistance API.

UNIT IV **12 Hrs**

J2EE MULTI – TIRE ARCHITECTURE: J2EE Multi-Tier Architecture – Client Tier Implementation – Web Tier Implementation – Enterprise JavaBeans Tier Implementation – Enterprise Information Systems tier Architecture.

JAVA SERVLETS: Java Servlets and Common Gateway Interface programming – Benefits of using a Java servlet – A simple Java servlet – Anatomy of a Java servlet – Deployment Descriptor – Reading data from a client – Sending data to a client – Reading HTTP request header – Writing the HTTP response header.

Extra Reading (Keyword): AjaX–Asynchronous JavaScript and XML.

UNIT V **12 Hrs**

JAVA SERVER PAGES: Java Server Pages – Java Server pages Tags – Tomcat – Request String – User Sessions – Cookies – Session Objects.

ENTERPRISE JAVA BEANS: Enterprise Java Beans – Session Java Bean – Entity Java Bean – Message Driven Bean – The JAR File.

Extra Reading (Keyword): JSTL core and Formatting tag, server – Glassfish, Websphere.

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describe the Apply the concepts of Class, data encapsulation, inheritance, and polymorphism to large scale software.	PSO 1	R, U, Ap
CO-2	Apply the concepts of String handling and Exception handling.	PSO 2	U
CO-3	Investigate the concepts of Graphical User Interfaces. Identify various driver and Objects used in JDBC connection with database.	PSO 3	R
CO-4	Recall and relate the various technologies with multitier in J2EE architecture.	PSO 4	R
CO-5	Design and implement Java servlet program using HTTP protocol.	PSO 4	C, Ap
CO-6	Apply JSP tags and create Web application software for real time problems	PSO 5	Ap
CO-7	Design and construct business software using various types of beans in EJB.	PSO 3 PSO 5	C, Ap
CO-8	Develop advanced java programs for creating web applications and web sites	PSO 3	Ap

PSO-Programme Specific Outcomes; CO- Course Outcomes; R-Remember, U-Understand; Ap-Apply; An-Analyse;E-Evaluate;C-Create

PRESCRIBED TEXT:

1. Herbert Schildt, Java 2: "**The Complete Reference",** 2011 Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

UNIT I **:** CHAPTERS 6, 7, 8

UNIT II **:** CHAPTERS 9, 10, 17

UNIT III (First Half)**:** CHAPTERS 13

2. Jim Keogh, **"The Complete Reference J2EE"**, 2014, Tata McGraw – Hill Publishing Company Limited, New Delhi.

UNIT III (Second Half)**:** CHAPTER 6

UNIT IV **:** CHAPTERS 2, 10

UNIT V **:** CHAPTERS 11, 12

BOOKS FOR REFERENCE:

1. C. Muthu, "**Programmingwith** JAVA", Vijay Nicole Imprints Private Limited, 2nd Ed, Chennai, 2011
2. James McGovern, Rahim Adatia, Yakov Fain, Jason Gordon, Ethan Henry, Walter Hurst, Ashish Jain, Mark Little, Vaidayanathan Nagarajan, Harsad Oak, Lee Anne Phillips, **"J2EE BIBLE 1.4"**, 2011, Wiley Dreamtech Private India Ltd., New Delhi.
3. Dreamtech Software Team,**"Java Server Programming J2EE Black Book",** 2005, DreamtechPress.
4. Denninger, Stefan, Peters, Ingo, Castaneda, Rob, **"Enterprise JavaBeans 3.1"**, 2010, Apress Publishers.
5. Joel Murach and Michael Urban, **"Murach's Java Servlets and JSP"**, 2014, Mike Murach & Associates.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	**Major core 3 – Data Structures**
Total Hours	**60**
Hours/Week	**4 Hrs Wk**
Code	**P20CA1MCT03**
Course Type	**Theory**
Credits	**4**
Marks	**100**

General Objective:
To understand the fundamental concepts of Data Structures and Algorithms.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Understand the basics of Data Structures and its applications.
CO-2	Apply the real time applications in Linear Data Structures.
CO-3	Analyze the different types of Trees and its basic operations.
CO-4	Analyze sorting and searching algorithms
CO-5	Explain Graph and its Applications

UNIT I **12 Hrs**

INTRODUCTION AND OVERVIEW: Introduction– Basic Terminology; Elementary Data Organization– Data Structures – Data Structure Operations.
STRING PROCESSING: Introduction– Basic Terminology – Storing Strings – Character Data Type – String Operations – Word Processing – Pattern Matching Algorithms.
ARRAYS, RECORDS AND POINTERS: Introduction – Linear Arrays – Representation of Linear Arrays in Memory – Traversing Linear Arrays – Inserting and Deleting

Extra Reading : Compare the efficiency of various Search and Pattern Matching Algorithms.

UNIT II **12 Hrs**

LINKED LISTS: Introduction – Linked Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Searching a Linked List – Memory Allocation: Garbage Collection – Insertion into a Linked List – Deletion from a Linked List – Header Linked Lists – Two – way Lists.

STACKS, QUEUES, RECURSION: Introduction – Stacks – Array Representation of Stacks – Linked Representation of Stacks – Arithmetic Expressions : Polish Notation – Quicksort, Application of Stacks – Recursion – Towers of Hanoi – Implementation of Recursive Procedures by Stacks – Queues – Linked Representation of Queues – Dequeue – Priority Queues.

Extra Reading : Apply the Linear Data Structures and develop algorithms for real time applications using Linked List, Stack, Queue.

UNIT III **12 Hrs**

TREES: Introduction – Binary Trees – Representing Binary Trees in Memory – Traversing Binary Trees – Traversal Algorithm using Stacks – Header Nodes – Threads – Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in a Binary Search Tree – AVL Search Trees – Insertion in an AVL Search Tree – Deletion in an AVL Search Tree

Extra Reading : Implement the Tree Structures in Real Time Applications.

UNIT IV **12 Hrs**

SORTING AND SEARCHING : Introduction Searching: Linear Search – Binary Search - Sorting: Bubble Sort – Insertion sort – Selection sort – Merging – Merge sort – Radix Sort, Heap – Heap sort, searching and data modification

Extra Reading : Find the Time and Space Complexity of Algorithms.

UNIT V **12 Hrs**

GRAPHS AND THEIR APPLICATIONS: Introduction , graph theory Terminology, sequential representation of graphs, Adjacency matrix and path matrix, Warshall's algorithms; shortest path, Linked representation of a Graph Operations on Graph, Traversing a Graph, Topological sorting, Spanning tree

Extra Reading : Compare Minimum Spanning Tree and Maximum Spanning tree

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand the fundamentals of Data Structures and basic concepts of String Processing, Linear Arrays, Records and Pointers.	PSO 1	U
CO-2	Analyze the representation of Linked Lists in memory, Stack, Queues and implement real time applications in Stack and Queues.	PSO 2	An
CO-3	Explore the structure of Trees, basic operations of Trees, analyze and illustrate the algorithms.	PSO 2	U
CO-4	Apply data structures and algorithms in real time applications.	PSO 3	Ap
CO-5	Analyze various searching and sorting algorithms	PSO 4	An
CO-6	Discuss various trees and Traversing	PSO 2	An

PSO-Programme Specific Outcomes; CO- Course Outcomes; R-Remember, U-Understand; Ap-Apply;

An-Analyse;E-Evaluate;C-Create

PRESCRIBED TEXT:

Seymour Lipschutz, G.A. VijayalakshmiPai.. *Data Structures*, 2006, Tata McGraw Hill Education Private Limited, New Delhi.

UNIT I : Chapter1(1.1-1.4),Chapter 3 , Chapter 4(4.1- 4.8)

UNIT II : Chapter 5, Chapter 6

UNIT III : Chapter 7(7.1-7.12),7.17

UNIT IV : Chapter 9(9.1-9.8)

UNIT V : Chapter 8(8.1-8.7),8.9

BOOKS FOR REFERENCE:

1. Seymour Lipschutz, **"Theory and Problems of Data Structures"**, 2000, McGrawHill Book Company, International Editions.

2. Tanenbaum A.M and Augustein M.J., **"Data structures with Pascal"**, 2002, Prentice Hall of India Ltd, New Delhi.

3. Alfred V. Aho, John E.Hopcroft, Jeffrey D.Ullman, **"Data Structures and Algorithms"**, 2004, Addison Wiley Publishing company.

4. Robert.L.Kruse, **"Data structures and program design"**, Third Edition , 2001.

5. Ellis Horowitz, SartajSahni, Dinesh Mehta. **"Fundamentals of DataStructures in C++"**, 2009,Second Edition.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	Major core 4 – Computer Networks And Network Security
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA1MCT04
Course Type	Theory
Credits	3
Marks	100

General Objective:

To learn and understand the computer networking concepts, its implementation details and the importance of network security.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Remembers and understands the basic concept of computer hardware and software.
CO-2	Understand the types of Transmission Media and remembers the working principles of Public Switched Telephone Network and Mobile Telephone System.
CO-3	Understand the general techniques of Error control, Flow control in Data Link Protocols.
CO-4	Analyses the Routing and Congestion Control Algorithms in Network Layer; remember the underlying protocol in Transport Layer.
CO-5	Remember the various services of Transport Layer and Application Layer; analyze the various techniques in cryptography.
CO-6	Understand the fundamentals of network security and learn the encryption and digital signature techniques.

UNIT I **12 Hrs**

INTRODUCTION: Network Hardware – Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection– Oriented and Connectionless Service – Service Primitives – Reference Models: The OSI Reference Model, The TCP/IP Reference Model, A Comparison of the OSI and TCP/IP Reference Models.

Extra Reading: Learn the general concepts of Networks.

UNIT II **12 Hrs**

THE PHYSICAL LAYER: Guided Transmission Media – Wireless Transmission Media – Communication Satellites – The Public Switched Telephone Network: Structure of the Telephone System – Mobile Telephone System.

Extra Reading: Working with real time examples using Mobile Networks.

UNIT III **12 Hrs**

THE DATA LINK LAYER: Data Link Layer Design issues – Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols.

THE NETWORK LAYER: Network Layer Design Issues – Routing Algorithms: The Optimality Principle – Shortest Path Routing – Flooding – Distance Vector Routing – Link State Routing – Hierarchical Routing – Broadcast Routing – Multicast Routing – Congestion Control Algorithms.

Extra Reading: Analyse the Routing Algorithms

UNIT IV **12 Hrs**

THE TRANSPORT LAYER: The Transport Service: Services Provided to the Upper Layers – Transport Service Primitives– Elements of Transport Protocols.

THE APPLICATION LAYER: DNS – The Domain Name System – Electronic Mail: Architecture and Services – The User Agent – Message Transfer – The World Wide Web: Architectural Overview – Performance Enhancements.

Extra Reading: Examine the Protocols and WWW.

UNIT V **12 Hrs**

NETWORK SECURITY: Cryptography: Introduction to Cryptography – Substitution Ciphers – Transposition Ciphers – Symmetric Key Algorithms: DES - The Data Encryption Standard – AES—The Advanced Encryption Standard – Public Key Algorithms: RSA – Digital Signatures: Symmetric Key Signatures – Public Key Signatures – Communication Security: Firewalls – Virtual Private Networks – Wireless Security.

Extra Reading: Implement the Security concepts in real time examples

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

Course Outcomes(CO):

The learner

CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	To educate concepts, vocabulary and techniques currently used in the area of computer networks.	PSO 1	R, U
CO-2	To study protocols, network standards, the OSI model, cabling, networking components, and basic LAN design.	PSO 2	R
CO-3	To accumulate existing state of the art in network protocols, architectures, and applications.	PSO 2	U
CO-4	To be familiar with contemporary issues in networking technologies.	PSO 3, 4	U
CO-5	Explain the fundamentals of network security.	PSO 4	R
CO-6	Learn the encryption and digital signature techniques.	PSO 3,4	An, Ap
CO-7	Illustrate various encryption techniques with applications involved.	PSO 4,5	An, Ap
CO-8	Develop enhanced network security algorithms	PSO 1	U, Ap

PSO-Programme Specific Outcomes; CO- Course Outcomes; R-Remember, U-Understand; Ap-Apply;

An-Analyse;E-Evaluate;C-Create

PRESCRIBED TEXT:

1. Tanenbaum Andrew S., **"Computer Networks"**, 2006, Fourth Edition, Prentice Hall of India Pvt. Ltd., New Delhi.

UNIT I **:** Chapter 1 – 1.2, 1.3(1.3.1 – 1.3.4), 1.4 (1.4.1 – 1.4.3)
UNIT II **:** Chapter 2 – 2.2, 2.3, 2.4, 2.5(2.5.1), 2.6
UNIT III **:** Chapter 3 – 3.1 – 3.4,Chapter 5 – 5.1,5.2(5.2.1 – 5.2.8),5.3
UNIT IV **:** Chapter 6 – 6.1(6.1.1 – 6.1.2),6.2
Chapter 7 – 7.1, 7.2(7.2.1, 7.2.2, 7.2.4), 7.3(7.3.1, 7.3.5)
UNIT V **:** Chapter 8 – 8.1(8.1.1 – 8.1.3), 8.2(8.2.1 – 8.2.2), 8.3(8.3.1), 8.4(8.4.1 – 8.4.2), 8.6(8.6.2 – 8.6.4)

BOOKS FOR REFERENCE:

1. Comer Dougles E., Droms Ralph E., **"Computer Networks and Internets"**, 2004, Prentice Hall Publications Private Ltd., New Delhi.
2. FarouzanBehrouz A., **"Data Communications and Networking"**, 2002, Tata McGraw –Hill Publications, New Delhi.
3. Peterson Larry L., **"Computer Networks: A Systems Approach"**, 2003, Morgan Kaufmann Publications, New Delhi.
4. Vijay Ahuja, **"Design and Analysis of Computer Communication Networks"**, 2000, Tata McGraw Hill Publishing Company, New Delhi.
5. William Stallings, **"Data and Computer Communications"**, 2003, Prentice Hall of India, New Delhi.

M.COM (For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	**Major core 5 - ACCOUNTING AND FINANCIAL MANAGEMENT** **(for MCA students)**
Total Hours	**60**
Hours/Week	**4Hrs / Wk**
Code	**P20CA1MCT05**
Course Type	**Theory**
Credits	**4**
Marks	**100**

General Objective:

To enable the students to understand the basic accounting principles and final accounts and to provide an insight into financial decision making procedures and their applications in complex financial management.

Course Objectives(CO):

CO No.	Course Objectives
CO-1	Understand the accounting concepts and conventions and the accounting cycle
CO-2	Prepare final accounts of a sole trader.
CO-3	Analysis profitability and financial status of a business based on ratios calculated.
CO-4	Understand the nature and objective of financial management and the procedure for analyzing the leverages
CO-5	Evaluate the methods of capital investment decision making.

UNIT - I INTRODUCTION TO ACCOUNTING **12 Hrs**

Accounting : Scope - Functions-Advantages-Limitations- Accounting Concepts and Conventions- Journal-Ledger-Trial Balance

EXTRA READING/ KEY WORDS: *Accounting, Accounting Concepts And Conventions, double entry system of book keeping.*

UNIT – II FINAL ACCOUNTS **12 Hrs**

Adjusting and closing entries-Final accounts of sole trader (with simple adjustments).

EXTRA READING/ KEY WORDS: *Adjusting and Closing entries, trading account, profit and loss account and balance sheet*

UNIT- III RATIO ANALYSIS **12 Hrs**

Ratio Analysis- Computation of profitability, liquidity and long term solvency ratios– Advantages and limitations of ratio analysis.

EXTRA READING/ KEY WORDS: *Ratios, liquidity, solvency, profitability.*

UNIT- IV INTRODUCTION TO FINANCIAL MANAGEMENT& LEVERAGES **12 Hrs**

Financial Management - Nature and Scope - Objectives of Financial Management -Analysis of leverages: operating leverage, Financial leverage and Combined leverage - EBIT, EPS analysis.

EXTRA READING/ KEY WORDS: *Finance, leverage, trading on equity*

UNIT- V CAPITAL EXPENDITURE DECISIONS **12 Hrs**

Capital Budgeting: Methods of capital investment decision making – Payback - Accounting Rate of Return method - Discounted cash flow methods: Net Present Value and Internal Rate of Return.

EXTRA READING/ KEY WORDS: *Capital Budgeting, Cash Flow, Discounted Cash Flow, NPV,ARR.*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recognize the basic accounting concepts and conventions and the accounting cycle.	PSO – 2	U
CO-2	Apply the rules of double entry book keeping for the preparation of final account of a sole trader.	PSO – 2	Ap
CO-3	Recognize the classification of ratio and calculate the ratios.	PSO – 1	Ap
CO-4	Recognize the nature and objective of financial management and the procedure for analyzing the leverages.	PSO – 1	An
CO-5	Analysis and Evaluate the methods of capital investment decision making.	PSO – 3	An
CO-6	Helps to analyse the organisations turnover through financial tools	PSO – 2	Ap

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

- Dalston L. Cecil & Jenitra L. Merwin, *Financial Accounting,* Trichy: Learntech Press.
- Reddy, T.S. & Murthy, A., *Financial Accounting*, Margham Publishers.

- Maheswari.S.N., Elements of Financial Management, Sultan Chand & Sons
- Dalston L. Cecil & Jenitra L. Merwin, *Management Accounting*, Trichy: Learntech Press.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	**Major Core 6 – Advanced Java Programming Practical I**
Total Hours	**60**
Hours/Week	**4 Hrs Per Week**
Code	**P20CA1MCP06**
Course Type	**Practical**
Credits	**2**
Marks	**100**

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Apply the Concept of Object Oriented Programming in real time problems
CO-2	Implement the working process of Packages, Interfaces with the concepts of Exception handling and String handling functions.
CO-3	Applying the concepts GUI and Establishing JDBC connection in Java
CO-4	Develop a Java servlet program using HTTP protocol.
CO-5	Apply JSP tags and create Web application software for real time problems Implement business software using various types of beans in EJB for real time problems.

Exercise:

INTRODUCING CLASSES - METHODS AND CLASSES - INHERITANCE

1. To create a Class and Objects.

2. To define a class, define instance methods for setting and retrieving values of instance

variablesand instantiate its object.

3. To define a class, describe its constructor, overload the Constructors and instantiate

its object.

4. To implement inheritance and demonstrate use of method overriding.

5. To define a class, define instance methods and overload them and use them for dynamic

method invocation.

PACKAGES AND INTERFACES

6. To demonstrate use of implementing interfaces.

7. To demonstrate use of extending interfaces.

8. To implement the concept of importing classes from user defined package and creating packages

EXCEPTION HANDLING:

9. To implement Wrapper classes and their methods.

10. To implement the concept of Exception Handling using predefined exception.

11. To implement the concept of Exception Handling by creating user defined exceptions.

STRING HANDLING:

12. To practice using String class and its methods.

13. To practice using String Buffer class and its methods.

I/O, APPLETS, OTHER TOPICS:

14. To display a message in the Applet.

15. Applet for configuring Applets by passing parameters.

16. Applet to demonstrate Keyboard event.

17. Applet to dmonstrate Mouse events.

18. Applet program for using Graphics class -to display basic shapes and fill them;draw Differentitems using basic shapes; set background and foreground colors.

JAVA SERVLETS:

19. Java Servlet Program for Session Tracking using HTTP Session.

20. Design a Java Servlet Program to insert details in to the database.

21. Construct a Java Servlet Program to retrieve details from the database.

JSP

22. Implement a JSP Program for creation of bio data using all form elements in HTML.

EJP

23. Develop a Program that create session bean to generate business Process.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – I

Course Title	Major Core 7 –Open source server side scripting Tools–Practical II
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA1MCP07
Course Type	Practicals
Credits	4
Marks	100

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Understand and apply the syntax of various linux commands
CO-2	Apply the syntax of PHP statements to develop Applications
CO-3	Understand the syntax of MySQL statements and apply in PHP programs
CO-4	Apply the syntax of simple Ruby on Rails statements to develop Applications
CO-5	Understand and Apply Perl statements to implement the programs in Perl

1. Write and execute the Linuxcommands.
2. Write a PHP program using Built-infunctions.
3. Write a Simple PHP program for performing ShoppingCart.
4. Write a PHP program for calculating CIA marks of students using user definedfunctions.
5. Write a PHP Program to produce Student Mark Sheet by connecting to the MySQLdatabase.
6. Write a PHP Program to produce Employee Pay Slip using the MySQLdatabase.
7. Write a simple Ruby on Rails program using Functions andHashes.
8. Develop a simple Ruby on Rails project usingMVC.
9. Write a simple Perl program using controlstatements.
10. Write a Perl program using the concepts of subroutines andpackages.

Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major core 8 – Operating Systems
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA2MCT08
Course Type	Theory
Credits	4
Marks	100

General Objective:

To enable the students to understand and learn the fundamental concepts of Operating System.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Understand the various types of Main Frame operating system
CO-2	Understand, Apply, Analyze and Evaluate the various scheduling algorithms
CO-3	Understand, Analyze the Deadlock concepts and Memory Management techniques
CO-4	Understand, Apply the File System concepts and RAID levels
CO-5	Understand the various mechanisms related to protection and security and Apply the basic concepts of OS to Linux.

UNIT I

12 Hrs

INTRODUCTION: What is an Operating System – Mainframe Systems – Desktop Systems – Multiprocessor System – Distributed Systems – Clustered Systems – Real – Time Systems – Handheld Systems – Feature Migration – Computing Environments.

OPERATING SYSTEM STRUCTURES: System Components – Operating System Services – System Calls – System Programs – System Structure – Virtual Machines – System Design And Implementation.

Extra reading (keywords): Mobile Operating Systems.

UNIT II

12 Hrs

PROCESS MANAGEMENT: Processes:ProcessConcept – Process Scheduling – Operation on Processes – Cooperating Processes – Inter– processCommunication.

CPU SCHEDULING: Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple

– Processor Scheduling – Real Time Scheduling.

PROCESS SYNCHRONIZATION: Background – The Critical– Section Problem –

Synchronization Hardware – Semaphores – Classical Problems of Synchronization

Extra reading (keywords): **Operating system synchronization.**

UNIT III 12 Hrs

DEADLOCKS: System Model – Deadlock Characterization – Methods For Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery From Deadlock.

STORAGE MANAGEMENT: Memory Management: Background – Swapping – Contiguous Memory Allocation – Paging – Segmentation – Segmentation with Paging.

VIRTUAL MEMORY: Background –DemandPaging–Process Creation – PageReplacement.

Extra reading (keywords): Pre-paging, Inverted page table, Real time processing.

UNITIV 12 Hrs

FILE SYSTEM INTERFACE: File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing –Protection.

FILE SYSTEM IMPLEMENTATION: File – System Structure – File System Implementation– Directory Implementation– Allocation Methods.

MASS – STORAGE STRUCTURE: Disk Structure – Disk Scheduling – Disk Management – Swap– Space Management – RAID Structure – Disk Attachment.

Extra reading (keywords): Log structure filessystem.

UNITV 12 Hrs

PROTECTION: Goals of Protection –Domain of Protection –Access Matrix- Access Rights.

SECURITY: The Security Problem – User Authentication – Program Threats – System Threats – Securing Systems and Facilities – Intrusion Detection – Cryptography.

THE LINUX SYSTEM: Introduction to Bash Shell –Basic Commands – Commands to work with file – Text editor – Stream text editor (grep, sed, and awk) – Process Management – Scheduling – Memory Management – File System – Input and Output – Inter – process Communication.

Extra reading (keywords): Intrusion Detection and Cryptography.

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminar.

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	ognitive Level
CO-1	List and Recognize the various types of operating system.	PSO 1	R, U
CO-2	Explain, Discuss, Compare and Contrast the various scheduling algorithms	PSO 2	Ap
CO-3	Describe, Compute and choose the correct scheduling algorithm for the given problem	PSO 2	E
CO-4	Explain the Deadlock concepts and Memory Management Techniques	PSO 3	R, U
CO-5	Discuss the concepts of file systems and mass storage structure, explain the different allocation methods, compare the various levels of RAID.	PSO 4	R, Ap
CO-6	Acquire the knowledge of operating system software	PSO 1	U

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. Abraham Silberschatz and Peter Baer Galvin, Greg Gagne **"Operating System Concepts"**, Sixth Edition,Windows XP Update,John Wiley and Sons Inc., New Delhi.

UNITI	Chapters:1(1.1 To 1.10), 3(3.1 To3.8)
UNITII	Chapters:4(4.1 To 4.5),6(6.1 to 6.6),7(7.1 To7.7)
UNITIII	Chapters:8(8.1 To 8.7)9(9.1 To 9.6), 10(10.1 To10.4)
UNITIV	Chapters:11(11.1 To 11.6),12(12.1To12.4)14(14.1 To14.6)
UNITV	Chapters: 18(18.1 To 18.5),19(19.1 To 19.7)20(20.2 To20.9)

BOOKS FOR REFERENCE:

1. AchyntS.Godbole, **"Operating Systems –With Core Studies in UNIX, NetWare, Windows NT"**, 2002, Tata McGraw – Hill Publishing Company Ltd., New Delhi.

2. Harvey M. Deitel, **"Operating Systems"**, 2003, Pearson Education,Singapore.

3. Milan Milenkovic, **"Operating Systems Concept and Design"**, 2005, Tata McGrawHill Publishing Company Ltd.,NewDelhi.

4. Tanenbaum Andrew S. Woodhull Albert S.,**"Operating System Design and Implementation"**, 2002, Pearson Education,Singapore.

5. William Stallings, **"Operating Systems Internals & Design Principles"**, 2003, Prentice– Hallof India Private Ltd., NewDelhi.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major core 9 – Database Management Systems
Total Hours	75
Hours/Week	5 Hrs/Wk
Code	P20CA2MCT09
Course Type	Theory
Credits	4
Marks	100

General Objective:

To enable the students to understand the fundamental concepts of database management system, to learn and apply SQL and NOSQL Queries.

Course Objectives(CO):

CO No.	Course Objectives
CO-1	Understand the basic concepts of database system and fundamental relational algebraic operations.
CO-2	Understand and apply SQL queries, implement the database concepts using advanced SQL techniques, Create ER model for any database applications.
CO-3	Understand & apply the normalization techniques, learn the basic idea of object – based database.
CO-4	Understand physical storage media and file structure, Compare the file organization techniques; understand, analyze & compareIndexing & Hashing techniques.
CO-5	Understand the concepts of Transaction and Concurrency control, classify the database system architecture, Understand and apply NOSQL queries

UNIT I 15 Hrs

INTRODUCTION: Database system applications – Purpose of database systems – View of Data – Database Languages – Relational databases – Database design – Object – based and semi structured databases – Data storage and Querying – Transaction Management – Data Mining and Analysis – Database Architecture – Database Users and Administrators. RELATIONAL MODEL: Structure of Relational Databases – Fundamental Relational – Algebra Operations – Null values – Modification of databases. Extra Reading (keywords)

UNIT II 15 Hrs

SQL: Background – Data Definitions – Basic structure of SQL Queries – Set Operations – Aggregate Functions – Nested subqueries – Complex queries. ADVANCED SQL: SQL data types and schemas – Integrity constraints – Authorization – Embedded SQL – Dynamic SQL. DATABASE DESIGN AND

THE E – R MODEL: Overview of the design process – The Entity – Relationship Model – Constraints – E – R Diagram. Extra Reading (keywords): Query – by Example.

UNIT III 15 Hrs

FUNCTIONAL DEPENDENCIES AND NORMAL FORMS:

Introduction – Basic Definitions – Trivial and Nontrivial Dependencies – First, Second, and Third Normal Forms – Boyce/Codd Normal Form – Multi – Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form. OBJECT – BASED DATABASES: Overview – Complex Data types

– Structured types and Inheritance in SQL – Table Inheritance – Array and Multiset Types in SQL – Object – Identity and Reference types in SQL. Extra Reading (keywords): Additional Normal Forms.

UNIT IV 15 Hrs

STORAGE AND FILE STRUCTURE:

Overview of physical storage media – Magnetic disks – RAID – Tertiary Storage – Storage Access – File Organization – Organization of Records in Files – Data Dictionary Storage. INDEXING AND HASHING: Basic Concepts – **Ordered** Indices – B + – Tree Index Files – B– tree Index Files – Multiple Key Access – Static Hashing – Dynamic Hashing – Comparison Ordered Indexing and Hashing – Bitmap Indices – Index Definition in SQL. Extra Reading (keywords): Storage for Object – Oriented databases.

UNIT V 15 Hrs

TRANSACTIONS: Transaction Concept – Transaction State– Concurrent Execution –.DATABASE SYSTEMARCHITECTURES: Centralized and Client – Server Architectures – Server System Architectures – Parallel Systems – Distributed System – Network Types. NOSQL Basics: NOSQL Storage Architecture, CRUD operations with MongoDB, Querying, Modifying andManaging NOSQL Data stores, Indexing and ordering datasets(MongoDB/CouchDB/Cassandra)

Extra Reading (keywords): Introduction to Nosql and MongoDB and its Features Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the basic concepts of database system and fundamental relational algebraic operations.	PSO 1	R, U
CO-2	Explain, Apply SQL queries, Create ER model for any database applications.	PSO 2	Ap
CO-3	Explain the normalization techniques, discuss the basic idea of object – based database.	PSO 2	U
CO-4	Describe the physical storage media and file structure, compare the file organization techniques; compare Indexing & Hashing techniques.	PSO 3	U, Ap
CO-5	Discuss the concepts of Transaction and Concurrency control, classify the database system architecture, Apply NOSQL queries.	PSO 4	U, Ap
CO-1	Explain the basic concepts of database system and fundamental relational algebraic operations.	PSO 1	R, U

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. Korth Henry F., Abraham SilbershatzandSudarsan, **—Database System Concepts"**, 6th edition, 2010, McGraw Hill Higher Education , New York.

UNIT I Chapter : 1 (1.1 – 1.12)
Chapter : 2 (2.1 – 2.2, 2.5,2.6)
UNIT II
Chapter : 3 (3.1 – 3.5, 3.7, 3.8)
Chapter : 4 (4.1 – 4.5)
Chapter : 6 (6.1 – 6.4)
UNIT IV Chapter : 11(11.1 – 11.8)
Chapter : 12(12.1 – 12.10)
UNIT V Chapter : 15(15.1, 15.2, 15.4 – 15.6)
Chapter : 20(20.1 – 20.5)

2. Date C.J., **—An Introduction To Database Systems"**, 2002, Pearson Education Private Ltd., New Delhi.

UNIT III Chapter : 10(10.1 –10.4)
Chapter : 11(11.3, 11.5)
Chapter : 12(12.2, 12.3)
Chapter : 9 (9.1 – 9.6)

BOOKS FOR REFERENCE:

1. Alexis Leon& Mathews Leon, **Database Management Systems**, 2002, Vikas Publishing House private Ltd., Chennai, India.

2. Desai Bipin C., **An Introduction to Database Systems** ,2001, Galgotia Publications Ltd., New Delhi.

3. Elmasri&Navathe, **Fundamentals of Database Systems**, 2006, Pearson Education Publishing Ltd.,New Delhi.

4. Patrick O'Neil & Elizabeth O'Neil, **Database Principles, Programming and Performance**, 2001, HarCourt Private Ltd., New Delhi.

5. Ragu Ramakrishnan, JohannesGehrke, **Database Management System**, 2003, Tata McGraw Hill Publishing Company Ltd., New Delhi.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A
First Year - Semester – II

Course Title	**MAJOR CORE 10: RESOURCE MANAGEMENT TECHNIQUES**
Total Hours	**60**
Hours / Week	**4**
Code	**P20CA2MCT10**
Course type	**Theory**
Credits	**3**
Marks	**100**

General Objective:

To give detailed knowledge about the basics of Liner programming,Queuing theory Inventory models, project scheduling .

Course objectives (CO):

CO No.	**Course Objectives**
CO - 1	Understand the Linear Programming Problem and find the optimal solution
CO - 2	Understand transportation problem and applies the techniques to find solutions.
CO - 3	Understands assignment problem to determine optimum solution.
CO - 4	Understand Network scheduling and applies techniques to minimize the shortest path .
CO - 5	Understand queueing models to determine the solution**.**

UNIT I : LINEAR PROGRAMMING **12Hrs**

Introduction to Operations Research-Formulations and Graphical solution to L.P. Problem– Simplex method (excluding artificial variable techniques) (**Problems Only**)

Extra Reading /Key Words: TwoPhasemethod

UNIT II: TRANSPORTATION PROBLEM **12Hrs**

Transportation problem and its solution – Initial Basic Feasible Solutions - North west corner method – Row minima method – column minima method- matrix minima method – vogel's approximation method - Unbalanced Transportation Problem – Maximization Type Problem-– Optimum Solutions - Modi method (**Problems Only**)

Extra Reading /Key Words: Best Candidates Method (BCM)

UNIT III:ASSIGNMENT PROBLEM **12Hrs**

Assignment problem and its solution by Hungarian method. Unbalanced Assignment Problem – Maximization Type Assignment Problem (**Problems Only**)

Extra Reading /Key Words: Solving the Rectangular assignment problem and applications

UNIT IV: PROJECT SCHEDULING BY PERT- CPM **12Hrs**

Network representation-Critical Path calculations –PERT calculation. (**Problems Only**)

Extra Reading /Key Words: *Applications, limitations of network techniques*

UNIT V: QUEUEING MODELS **12Hrs**

Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ /∞), (M / M / 1) : (FIFO/ N / ∞) models. (**Problems Only**)

Extra Reading /Key Words: Little's formula Queueing theory

Note: Tests given in the Extra Reading /Key Word: must be tested only through assignment andseminars.

NOTE:

No theory – only problems.

Course Outcomes(CO):

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO 1	Understand the linear programming problem to seek solutions to problems.	**PSO - 1**	**R**
CO 2	Classify the types of assignment problem to solve problems.	**PSO - 2**	**U**
CO 3	Evaluate the technique of Hungerian on assignment problem	**PSO- 5**	**A**
CO 4	Understand the network scheduling through PERT/CPM methods.	**PSO-1**	**U**
CO 5	Understand the characteristics of Queueing models	**PSO -2**	**R**

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

Operation Research, P.R.Vittal & V.Malini, (Reprint 2014) Margham Publications, Chennai.

UNIT I: Chapter 2, 3, 4

UNIT II: Chapter 10

UNIT III: Chapter 11

UNIT IV: Chapter 14

UNIT V: Chapter 13

BOOKS FOR REFERENCE:

1. Gupta P.K., Hira S. (2005), **OPERATIONS RESEARCH,** S. Chand & Co. Limited, NewDelhi.
2. Hamady A. Taha (2002), **OPERATIONS RESEARCH AN INTRODUCTION,** Pearson Education Publishing Limited,New Delhi.
3. Mariappan P.(2001), **OPERATIONS RESEARCH METHODS & APPLICATIONS,** New Century Book House Private Limited..
4. Panneer Sevvam (2003), **OPERATIONS RESEARCH**, Prentice Hall of India Private Limited, New Delhi.
5. Sharma J.K.(2007), **OPERATIONS RESEARCH THEORY & APPLICATIONS**, Macmillan India Limited,Chennai.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major Core 11 – Organizational Behaviour
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA2MCT11
Course Type	Theory
Credits	4
Marks	100

General Objective:

To enable the students to understand the basic concepts of organizational structure and its behavior.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	Understand the concept of Organization, Background and Foundation of Organizational Behavior.
CO-2	Remember, Understand the models of Man, Personality and learning, Analyse the behavior of individuals groups in organizations.
CO-3	Understand the concepts of Attitude, Motivation & Work stress, Apply Stress Management in the Personal life.
CO-4	Understand the concepts of Interpersonal behavior, group dynamics & group decision making, Analyse & Evaluate the different leadership styles and Apply them in life situation.
CO-5	Understand the Organization theory, organization structures, Analyse the various organization structures, centralization & decentralization.

UNIT I 12 Hrs

NATURE OF THE ORGANIZATIONAL BEHAVIOUR : Concept of Organization – Management Functions, roles, skills – Concept of Organizational Behavior – Challenges in Organizational Behavior – Background and Foundation of Organizational Behavior : Scientific Management – Fayol's Administrative Management –Bureaucracy – Hawthrone Experiments and Human Relations.

UNIT II
12 Hrs

NATURE OF HUMAN BEHAVIOUR : Concept of Behaviour – Individual Differences – Models of Man – Personality : Concept of Personality – Personality Development – Perception – Concept of Perception – Perceptual Process –Selectivity –Organization – Interpersonal Perception –Managerial Applications of Perception – Developing Perceptual Skills.

UNIT III
12 Hrs

Attitudes and values : Concept of Attitude – Attitudes and Behavior — Factors in Attitude Formation – Attitudes Relevant for Organizational Behavior –Attitude Change –Motivation and Motivational Applications: Definition – Concept of Motivation – Theories of Motivation – Designing of Reward System – Work Stress **:** Concept and Features – Causes of Stress – Effects of Stress –Stress Management.

UNIT IV
12 Hrs

Interpersonal Behaviour **:** Nature of interpersonal behavior – Transactional analysis – Ego States – Life Scripts – Life Positions –Trasactions –Stroking – Psychological games– Benefits and uses of TA – Group Dynamics **:** Concept of Group Dynamics – Types of Groups – Group Behavior– Group Decision Making – Intergroup Behavior – Leadership**:** Concept of Leadership – Leadership Theories– Leadership Styles.

UNIT V
12 Hrs

Forms of Organisation Structure : Line –Line and Staff– Functional –Divisional –Project –Matrix – Free form – Organisational Change :Nature of Organisational change – Planned Change – Resistance to Change – Organisation Development : Concept – Process of OD – OD Interventions.

Course Outcomes(CO):

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recognize, Explain the concept of Organization, Background and Foundation of Organizational Behavior.	PSO 2	R, U
CO-2	Explain the models of Man, Personality and learning; analyze the behavior of individuals and groups in organizations.	PSO 1,4	U, Ap
CO-3	Discuss the concepts of Attitude, Motivation & Work stress, apply Stress Management in the Personal life.	PSO 2	U, Ap
CO-4	Describe, Analyse the concepts of Interpersonal behavior, Explain group dynamics & group decision making, compare the different leadership styles and apply them in life situation.	PSO 4	An
CO-5	Explain the Organization theory; Compare thevarious organization structures, Differentiate centralization & decentralization.	PSO 3	An
CO-6	Develop good personality as an effective employee in an organization	PSO 3	Ap

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. ” **Organisational Behaviour**” L.M.Prasad., Sultan Chand and Sons, New Delhi, Fourth Edition 2008

UNIT I	**:**	Chapters 1 and 2
UNIT II	**:**	Chapters 3,4 and 5
UNIT III	**:**	Chapters 7,9,10 and 22
UNIT IV	**:**	Chapters 12,13 and 16
UNIT V	**:**	Chapters21,25 and 26

BOOKS FOR REFERENCE:

1. S.S. Khanka **“Organizational Behavior**”, Sultan Chand and Company, New Delhi, 2002.

2. K.Aswathappa, “**Organizational behavior**”**,** 5th Edition, Tata McGraw Hill, New Delhi.

3. Abraham B. Rami Shani and James b. Lau, “**Behavior of Organizations –An Experimental Approach**”, 2000, Richard D Irvin, Inc Publishing.

4. Schermerhorn, “**Organisational Behavior**”, 2001, Nineth edition, Wiley John and sons.

5. Stephen P. Robbins, “**Organizational Behavior**”, 2002, 10th Edition, Prentice Hall Publishing.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major Elective 1 – Fog Computing
Total Hours	60
Hours/Week	4 Hrs/Wk
Code	P20CA2MET01
Course Type	Theory
Credits	2
Marks	100

GeneralObjectives:

To impart the Basic Concepts of Cloud Computing and understand the Technologies and Architectures of CloudComputing.

Course Objectives(CO):

CO No.	Course Objectives
CO-1	remember the fundamental concepts of Fog.
CO-2	understand the architecture and components of Fog.
CO-3	analyze the protocols of Fog.
CO-4	understand the data management and Fog security principles.
CO-5	apply the case studies related to Fog Computing.

UNITI **12 Hrs**

INTRODUCTION TO FOG COMPUTING: FogComputing-Definition-Characteristics- Application Scenarios - Issues -Fog Computing and Internet of Things– Fog ComputingComponents
- Fog Computing and Cloud Computing- Simple Case Studies (STLS and Wind Farm) - High-Level and Software Architecture.

Extra Reading (Keyword): Distinguishing Fog with Cloud Computing.

UNITII **12 Hrs**

Fog Computing Fundamentals: Introduction – Background and Motivation of Fog Computing – Fog Computing Basics – Fog Computing Services.

IoT Resource Estimation Challenges and Modeling in Fog: Fog Resource estimation and its challenges.

Extra Reading (Keyword): Designing Framework.

UNITIII **12 Hrs**

Tackling IoT Ultra Large Scale Systems: Fog Computing in Support of Hierarchical Emergent Behaviors : Introduction – Fog Computing – Hierarchical Emergent Behaviors, a Fresh Approach for ULSS - Two Autonomous Vehicles Primitives CaseStudy.

The Present and Future of Privacy-Preserving Computation in Fog Computing: Introduction – Block Chain – Multi-Party Computation – Multi-Party Computation and Block Chain.

Extra Reading (Keyword): Protocol usage.

UNITIV **12 Hrs**

Self-aware Fog Computing in Private and Secure Sphere: Cloud, Fog and Mist Computing Networks-Self-aware Data Processing - **Case study:** Health monitoring – Patient Safety monitoring and training support – Smart house.

Urban IoT Edge Analytics: Design challenges – Edge-assisted Architecture – Information Acquisition and Compression – Content-aware wireless networking – Information availability.

Extra Reading (Keyword): Implementation of Security principles.

UNITV **12 Hrs**

Control-as-a-Service in Cyber-Physical Energy Systems over Fog Computing: Power Grid and Energy Management - Energy Management Methodologies - Cyber-Physical Energy Systems - Internet-of-Things and Fog Computing - Control-as-a-Service - Residential Cyber-Physical Energy System.

Leveraging Fog Computing for Healthcare IoT: Introduction – Healthcare Services in the Fog Layer – Data management – Event Management – Resource Efficiency – Device management – Personalization – Privacy and Security – System Architecture of Healthcare IoT.

Extra Reading (Keyword): Implementation of real time applications as services.

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

Course Outcomes:

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss the fundamental concepts in Fog.	PSO 1	R, U
CO-2	Analyze the architectures available in Fog.	PSO 2	R,U
CO-3	Knowand explain the Protocols related to Fog.	PSO 2	U
CO-4	Comprehend the Data Management and Security Principles.	PSO 3	Ap
CO-5	Examine the case studies of Fog.	PSO 4	U
CO-6	Acquire the knowledge of fog computing and use of IoT in fog computing	PSO 1	R, U

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

For UNITI

1 Amir VahidDastjerdi and RajkumarBuyya,**—Fog Computing: Helping the Internet of Things Realize its Potential‖**, University ofMelbourne.

2 FlavioBonomi,RodolfoMilito,PreethiNatarajanandJiangZhu,**-FogComputing:APlatform for Internet of Things and Analytics‖**, Big Data and Internet of Things: A Roadmap for Smart Environments, Studies in Computational Intelligence 546, DOI: 10.1007/978-3-319-05029-4_7, © Springer International Publishing Switzerland2014.

3 FlavioBonomi, Rodolfo Milito, Jiang Zhu, SateeshAddepalli,**—Fog Computing and Its Role in the Internet of Things‖**,MCC'12, August 17, 2012, Helsinki, Finland. Copyright 2012 ACM 978-1- 4503-1519-7/12/08...$15.00.

4 Shanhe Yi, Cheng Li, Qun Li,**—A Survey of Fog Computing: Concepts, Applications and Issues‖**,Mobidata'15, ACM 978-1-4503-3524-9/15/06, DOI:10.1145/2757384.2757397, June 21, 2015, Hangzhou,China..

For UNITS II, III, IV, V

5 Amir M. Rahmani ,PasiLiljeberg, Preden, Axel Jantsch, **-Fog ComputingintheInternet of Things - Intelligence at the Edge‖**, Springer International Publishing,2018.

BOOKS FOR REFERENCE:

1. Ivan Stojmenovic, Sheng Wen, **"The Fog Computing Paradigm: Scenarios andSecurity Issues",** Proceedings, Federated Conference on ComputerScience and Information Systems, pp. 1–8, 2014.
2. Hazar, Yanru Zhang, Nguyen H. Tran, DusitNiyato, and Zhu Han, **"Multi – Dimensional payment Plan in Fog Computing withMoral",**IEEE,2016.
3. FarhoudHosseinpour,JuhaPlosila,HannuTenhunen,**"An Approach for Smart management of Big Data in the Fog Computing Context",**IEEE 8th InternationalConference on Cloud Computing Technology andScience,2016.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major Elective 1 – Green Computing
Total Hours	60
Hours/Week	4Hrs/Wk
Code	P20CA2MET02
Course Type	Theory
Credits	2
Marks	100

General Objectives:

To acquire knowledge to adopt green computing practices and minimize negative impacts on the environment.

Course Objectives(CO):

CO No.	Course Objectives
CO-1	Understand the dimensions and goals of Green IT.
CO-2	Discuss the green enterprise architecture with environmental intelligence.
CO-3	Analyze the Grid framework with the collaboration of cloud computing.
CO-4	Understand the concept of Green compliance.
CO-5	Apply Green IT strategies and applications of home appliances.

UNIT I **12 Hrs**

Green IT: An Overview: Introduction-Environmental Concerns and Sustainable Development- Environmental Impacts of IT- Green IT- Holistic Approach to Greening IT- Greening IT- Applying IT for Enhancing Environmental Sustainability-Green IT Standards and Eco Labelling of IT- Enterprise Green IT Strategy.

Green Devices and Hardware: Introduction-Life Cycle of a Device or Hardware- Reuse, Recycle and Dispose.

Green Software: Introduction-Energy-Saving Software Techniques

Extra Reading(Key words): **Real time applications of material recycling.**

UNIT II **12 Hrs**

Sustainable Software Development: Introduction - Current Practices - Sustainable Software- Software Sustainability Attributes-Software Sustainability Metrics- Sustainable Software Methodology- Defining Actions.

Green Data Centres: Data Centres and Associated Energy Challenges-Data Centre IT Infrastructure-Data Centre Facility Infrastructure-Implications for Energy Efficiency-IT Infrastructure Management-Green Data Centre Metrics-Data Centre Management

Strategies.

Extra Reading(Key words): **Energy challenges and benefits of a green data centres.**

UNIT III **12 Hrs**

Green Cloud Computing and Environmental Sustainability: Introduction-What is Cloud Computing? - Cloud Computing and Energy Usage Model-Features of Clouds Enabling Green Computing-Towards Energy Efficiency of Cloud Computing-Green Cloud Architecture.

Enterprise Green IT Strategy: Introduction-Approaching Green IT Strategies-Business Drivers of Green IT Strategy-Business Dimensions for Green IT Transformation-Organizational Considerations in a Green IT Strategy-Steps in Developing a Green IT Strategy-Metrics and Measurements in Green Strategies.

Extra Reading(Key words): **Green Enterprises Architecture**

UNIT IV **12 Hrs**

Sustainable Information Systems and Green Metrics: Introduction-Multilevel Sustainable Information- Sustainability Hierarchy Models-Product Level Information-Individual Level Information-Functional Level Information-Organizational Level Information.

Sustainable IT Services: Creating a Framework for Service Innovation: Introduction-Factors Driving the Development of Sustainable IT- Sustainable IT Services (SITS)- SITS Strategic Framework-Sustainable IT Roadmap- SITS Leadership and Best Practices.

Extra Reading(Key word):**Sustainability Tools and Standards**

UNIT V **12 Hrs**

Green Enterprises and the Role of IT: Introduction-Organizational and Enterprise Greening- Information Systems in Greening Enterprises-Greening the Enterprise-IT Usage and Hardware-Inter- organizational Enterprise Activities and Green Issues-Enablers and Making the Case for IT and the Green Enterprise.

Managing Green IT: Introduction-Strategizing Green Initiatives-Implementation of Green IT- Information Assurance-Communication and Social Media.

Harnessing Semantic Web Technologies for the Environmental Sustainability of Production Systems: Introduction-Information Management for Environmental Sustainability- Examples of Managing Data.

***Extra Reading(Key word*):Regulating Green IT: Laws, Standards and Protocols**

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminar.

Course Outcomes(CO):

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall the Concept of Green IT.	PSO 1	R, U
CO-2	Discuss Green IT in relation to technology.	PSO 2	A
CO-3	Evaluate IT use in relation to environmental perspectives.	PSO 2	U
CO-4	Discuss the methods and tools to measure energy consumption.	PSO 3	Ap
CO-5	Conclude with a Green IT to sustainable development	PSO 4	An
CO-6	Develop energy-saving, sustainable software solutions	PSO 3	Ap

PSO-Programme Specific Outcomes;CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. San Murugesan, G.R. Gangadharan, **"Harnessing Green It Principles And Practices"**, A John Wiley & Sons, Ltd., Publication,2012.

Unit I : Chapter-1(1.1 – 1.9), Chapter-2(2.1 – 2.3),
Chapter-3(3.1-3.2) Unit II : Chapter- 4,5(4.1-4.7),(5.1-
5.6)
Unit III : Chapter-16, 10(16.1 – 16.6)
Unit IV : Chapters - 9, 11(9.1-9.7), (11.1-11.6)
Unit V : Chapters - 12, 14, 17(12.1-12.5), (14.1- 14.5),(17.1 – 17.4)

BOOKS FOR REFERENCE:

1. John Lamb, **"The Greening of IT"**, Pearson Education,2009.
2. Jason Harris, **"Green Computing and Green IT– Best Practices on Regulations &Industry"**, Lulu.com,2008.
3. Woody Leonhard, Katherrine Murray, **"Green Home Computing For Dummies"**, August2009.
4. Swarup K. Das, **"Cloud Computing"**,Dominant Publishers,2015.
5. PrasantaPattnaik, ManasKabat,**"Fundamentals of Cloud Computing"**, S.Chand (G/L) & Company Ltd; First edition(2014).

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major Elective 1 - Cloud Computing
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA2MET03
Course Type	Theory
Credits	2
Marks	100

General Objective:

To impart the Basic Concepts of Cloud Computing and understand the Technologies with a wide knowledge of the Virtualization concepts, Industries using Cloud Platforms and the major cloud applications.

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	remember the deployment and service models.
CO-2	understand the various technologies.
CO-3	analyze virtualization mechanisms.
CO-4	explain the various platforms of cloud in industry.
CO-5	evaluate pricing models for cloud based services

UNIT I **12 Hrs**

UNDERSTANDING CLOUD COMPUTING: Origins and Influences - Basic Concepts And Terminology - Goals And Benefits - Risks And Challenges.

FUNDAMENTAL CONCEPTS AND MODELS: Roles And Boundaries - Cloud Characteristics - Cloud Delivery Models - Cloud Deployment Models.

Extra Reading (Keyword): Real time applications.

UNIT II **12 Hrs**

CLOUD-ENABLING TECHNOLOGY: Broadband Networks And Internet Architecture **–** Data Center Technology – Virtualization Technology-Web Technology – Multitenant Technology – Service Technology.

FUNDAMENTAL CLOUD SECURITY: Basic Terms and concepts –threat agents – cloud Security Threats – Additional Considerations.

UNIT III **12 Hrs**

VIRTUAL MACHINES PROVISIONING AND MIGRATION SERVICES: Introduction and Inspiration –Background and related work – Virtual Machines Provisioning and Manageability – Virtual Machine Migration Services – Provisioning in the Cloud Context.

UNIT IV **12 Hrs**

AMAZON WEB SERVICES: Compute Services: Amazon Machine Images – EC2 instances – EC2 environment – Storage Services: S3 Key concepts. **GOOGLE APP ENGINE:** Architecture and Core Concepts – Application Life Cycle. **MICROSOFT AZURE:** Azure Core Concepts – SQL Azure – Windows Azure platform appliance – Observations.

UNIT V **12 Hrs**

SCIENTIFIC APPLICATIONS: Healthcare – Biology – Geoscience. **BUSINESS AND CONSUMER APPLICATIONS:** CRM and ERP – Productivity – Social Networking – Media Applications – Multiplayer Online Gaming.

ENERGY EFFICIENCY IN CLOUDS: Energy-Efficient and Green Cloud Computing Architecture.

Course Outcomes (CO) :

The learner

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss the fundamental concepts in cloud.	PSO 1	R, U
CO-2	Analyze the cloud enabling technologies.	PSO 2	A
CO-3	knowand explain the Virtualization mechanisms.	PSO 2	U
CO-4	Comprehend the Cloud Platforms available in Industry.	PSO 3	Ap
CO-5	know and distinguish the various applications and advanced topics of Cloud.	PSO 4	An

PSO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply; An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, "Cloud Computing : Concepts, Technology and Architecture", Prentice Hall, U.S.A., 2013.

UNIT I : Chapters 3 & 4

UNIT II : Chapters 5 & 6

2. RajkumarBuyya, James Broberg, AndrzejGoscinski, "Cloud Computing : Principles and Paradigms", John Wiley & Sons, U.S.A. , 2013.

UNIT III :Chapter 5 (5.1to 5.4 , 5.6)

3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", Elsevier Inc., 2013.

UNIT IV : Chapter 9

UNIT V : Chapters 10 & 11

BOOKS FOR REFERENCE:

1. George Reese, "Cloud Application Architectures", Shroffo'reilly, Isbn: 8184047142, 2009.

2. Michael Miller, " Cloud Computing Web Based Applications That Change The Way You Work And Collaborate Online", Pearson Education, 2009.

3. Kris Jamsa, "Cloud Computing", Jones and Bartlett Learning, 2013.

4. Swarup K. Das, "Cloud Computing",Dominant Publishers, 2015.

5. Prasanta Pattnaik, Manas Kabat,"Fundamentals of Cloud Computing", S.Chand (G/L) & Company Ltd; First edition (2014).

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	Major core 12 – Shell Programming Practical
Total Hours	60
Hours/Week	4 Hrs Wk
Code	P20CA2MCP12
Course Type	Practical
Credits	2
Marks	100

Course Objectives(CO):

The learner will be able to

CO No.	Course Objectives
CO-1	provide introduction to unix operating systems and its file systems
CO-2	To gain an understanding of important aspects related to shell and the process
CO-3	To develop the ability to formulate regular expressions and use them for pattern matching
CO-4	To provide the comphersive introduction to shell programming ,services and utilites
CO-5	Demonstrate the changing of file permission and ownership

1. Basic UnixCommands
2. C& C++ Program in Unix environment
3. Simple ShellScripts
4. Menu Driven Program
5. .Files and Directories
6. Pipes and Filters
7. Application Programs

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HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	**Major Core 13-** **Database Management Systems Programming - Practical IV**
Total Hours	**60**
Hours/Week	**4 Hrs Wk**
Code	**P20CA2MCP13**
Course Type	**Practical**
Credits	**2**
Marks	**100**

SQL

1. Table Creation And Maniplution

2. Table Maniplution Using Built-In-Functions

3. Table Manipulation Using Operators

PL/SQL PROGRAMS

4. Cursor

1. To Join Two Tables
2. To Split A Table Into Two
3. To Update A Table

5. Creation And Retrivel Of Information Without Using Cursors

STORED PROGRAMS

6. Program Using Functions

7. Programs Using Procedures

8. Programs Using Triggers

FORMS AND REPORTS

9. Creation Of Forms

10. Creation Of Reports

NOSQL (MONGO DB)

11. CRUD Operations

12. Manipulation Using Operators

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HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	OBJECT - ORIENTED PROGRAMMING WITH C++
Code	P20CA1PRT01
Course Type	Theory
Credits	5
Marks	100

OBJECTIVE

To introduce the basic concepts of Object - Oriented Programming and apply the concepts of Object - Oriented Programming using C++.

Course Objectives:

The Learner will be able to

CO No.	Course Objectives
CO-1	Understand the features of C++ supporting object oriented programming.
CO-2	Applying the basic concepts ofC++ and remember the flow of program through control statements and use user defined functions in program execution.
CO-3	Discuss and apply the concepts of Classes and Objects. Apply the concepts of Constructors, Destructors and Arrays.
CO-4	Understand and classify the various Operator overloading, String handling functions and Inheritance.
CO-5	Understand and Implement Virtual Functions, I/O operations and working files in real time applications.

UNIT I

PRINCIPLES OF OBJECT - ORIENTED PROGRAMMING: Software Crisis - Software Evolution - A Look at Procedure-Oriented Programming - Object-Oriented Programming Paradigm - Basic Concepts of OOP - Benefits of OOP - Object-Oriented Languages - Application of OOP.
OBJECT ORIENTED SYSTEMS DEVELOPMENT: Introduction - Procedure- Oriented paradigms - procedure - Oriented Development Tools - Object Oriented Paradigm - Object - Oriented Notations and Graphs - Steps in

Object-Oriented Analysis - Steps in Object-Oriented Design - Implementation - Prototype Paradigm - Wrapping up.

Extra Reading: Basic I/O and Control operations in Java.**UNIT II**

BEGINNING WITH C++: Application of C++ - A simple C++ program - More C++ statements - An example with Class - Structure of C++ Program.

TOKEN, EXPRESSIONS AND CONTROL STRUCTURES: Tokens - Keywords - Identifiers - Basic data types - User-defined Data Types - Derived Data Types - Symbolic Constants - Type Compatibility - Declaration of Variables - Dynamic Initialization of Variables - Reference Variables- Operators in C++ - Scope Resolution Operator - Member Dereferencing Operators - Memory Management Operators - Manipulators - Typecast Operator - Expressions and Implicit Conversions - Operator Overloading - Operator Precedence - Control Structure.

FUNCTIONS IN C++: Function Prototyping - Call by Reference - Return by Reference - Inline functions - Default Arguments - Const Arguments - Function Overloading - Friend and Virtual Functions.

Extra Reading: Develop multidimensional array programs

UNIT III

CLASSES AND OBJECTS: C structures revisited - Specifying a class - Defining Member Functions - a C++ program with class - Making an Outside Function Inline - Nesting of Member Functions – Private Member Functions - Arrays within a Class - Memory Allocation for Objects - Static Data Members -Static Member Functions - Arrays of Objects - Objects as Function Arguments - Friendly Functions - Returning Objects - Const Member Functions - Pointers to Members.

CONSTRUCTORS AND DESTRUCTORS: Constructors - Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments - Dynamic Initialization of Objects - Copy Constructors - Constructing Two-Dimensional Arrays - Destructors.

Extra Reading: Implement the concept of Arrays and multi-dimensional arrays in real time problems.

UNIT IV

OPERATOR OVERLOADING AND TYPE CONVERSIONS: Defining Operator Overloading - Overloading Unary Operators - Overloading Binary Operators - Overloading Binary Operators using Friends - Manipulation of Strings Using Operators - Rules for Overloading Operators - Type Conversions.

INHERITANCE: Defining Derived Class - Single Inheritance - Making a Private Member Inheritable Inheritance - Multi-level Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes - Constructors in Derived Class - Member Classes.

Extra Reading (Key terms): comparing different kinds of Inheritance.

UNIT V

POINTERS, VIRTUAL FUNCTIONS AND POLYMORPHISM: Pointers to objects -This pointer - Pointers to Derived Classes - Virtual Functions Pure Virtual Function.

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 their Manipulations - Sequential Input and Output Operations - Random Access - Command Line Arguments.

Extra Reading: Implement the system and file concepts.

Note: Texts given in the Extra reading /Key words must be tested only through **Assignment andSeminar.**

Course Outcomes:

The learner will be able to

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand the features of C++ supporting object oriented programming	PSO 1, PSO 2	U
CO-2	Develop C++program for simple applications	PSO 2	An
CO-3	Analyze different data types, arrays and constructors	PSO 2	U
CO-4	Analyze different data types and arrays	PSO 5	An
CO-5	Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism	PSO 1	Ap
CO-6	Understand advanced features of C++ specifically stream I/O	PSO 2, PSO 3	U
CO-7	Create files and perform file operations using C	PSO 1, PSO5	R, An

PO – Programme Outcomes; CO – Course Outcome; R- Remember; U- Understand; Ap – Apply;

An – Analyse; E- Evaluate; C – Create

PRESCRIBED TEXT:

1. Balagurusamy E., **Object Oriented Programming with C++**, Sixth Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi.

UNIT I
Chapters: 1, 17
UNIT II
Chapters: 2, 3, 4
UNIT III
Chapters: 5, 6
UNIT IV
Chapters: 7, 8
UNIT V
Chapters: 9, 10, 11

BOOKS FOR REFERENCE:

1. Eric Nagler, **Learning C++**, 2003, Jaico Publishing House, Mumbai.

2. Herbert Schildt, **C++ The Complete Reference**,2001, Tata McGraw Hill Publishing Company Ltd, New Delhi.

3. KayshavDattatri, **C++ Effective Object-Oriented Software Construction**, 2000, Prentice Hall of India Private Ltd., New Delhi.

4. NabajyotiBarkakati, **Object Oriented Programming in C++**, 2000, Prentice-Hall of India Private Ltd., New Delhi.

5. YashavantKanetkar, **Let Us C++**, 2005, BPB Publications, New Delhi.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A
First Year - Semester – II

Course Title	C++ PROGRAMMING – Practical I
Code	P20CA1PRT02
Course Type	Practical
Credits	5
Marks	100

General Objective:

Student writes application programs using C++ for solving real time problems.

Course Objectives:

CO No.	Course Objectives
CO-1	Recall the syntax of Inline functions and Control structures and solve problems using C++
CO-2	Rememberthesyntax of Classes and Objects, Constructors and solve problems using C++
CO-3	Create programs for arrays and strings using C++
CO-4	Develop programs for Functions, Operator overloading in C++
CO-5	Write programs for creating a file and perform I/O operation on files

EXERCISES

1. Write a C++ program using Inline function.
2. Write a C++ program using Default Arguments.
3. Write a C++ program using Function Overloading.
4. Write a C++ program using Nested Functions.
5. Write a C++ program using Constructor and Destructor.
6. Write a C++ program using Single, Two Dimensional Array.
7. Write a C++ program using Unary Operator overloading.
8. Write a C++ program using Binary Operator overloading.
9. Write a C++ program using the concept of Inheritance

i) Single
ii) Multilevel
iii) Multiple
iv) Hierarchical
v) Hybrid

10. Write a C++ program to implement the working with File Operations.

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A

First Year - Semester – II

Course Title	COMPUTER GRAPHICS
Code	P20CA2PRT03
Course Type	Theory
Credits	5
Marks	100

General Objective:

To introduce students with fundamental concepts and theory of Computer Graphics

Course Objectives (CO)

The learner will be able to

CO No.	Course Objectives
CO-1	Demonstrate the working principle of various video display devices such as CRT, LCD and LED systems and categorize the input and output devices used in graphics systems.
CO-2	Examine the specification of basic geometric structures such as points, Lines, Circles and Curves.
CO-3	Apply the various attributes that control the appearance of the displayed primitives.
CO-4	Apply two dimensional transformations and clipping techniques in 2D scenes.
CO-5	Recognize the three dimensional display methods and compare parallel and perspective projections.

UNIT I:

Overview of Graphics Systems: Video display devices: Refresh cathode-ray tubes – Raster-scan displays – Random Scan Displays – Colour CRT Monitors – Direct-View Storage Tubes – Flat-Panel Displays – Three-

Dimensional Viewing Devices – Stereoscopic and virtual reality systems – Raster Scan Systems: Video Controller – Raster-Scan Display Processor – Random Scan Systems – Graphics Monitors and Workstations – Input Devices: Keyboards - Mouse – TrackBall and Space Ball – Joysticks – Data Glove – Digitizers – Image Scanners – Touch Panels – Light Pens – Voice Systems – Hard Copy Devices.

Extra Reading (Keywords): CRT, LCD, LED

UNIT II:

Output Primitives: Points and Lines – Loading the Frame Buffer – Line Function – Circle –Properties of Circles – Curve functions – Fill-Area Functions – Character Generation.

Extra Reading (Keywords): Ellipse Algorithm, Spline Curves

UNIT III:

Attributes of Output Primitives: Line Attributes: Line Type – Line Width – Pen and Brush Options – Line Color – Curve Attributes – Color and Grayscale Levels: Color Tables – Grayscale – Area-Fill Attributes: Fill Styles – Pattern Fill – Soft Fill – Character Attributes: Text Attributes – Marker Attributes – Bundled Attributes: Bundled Line Attributes – Bundled Area – Fill Attributes – Bundled Text Attributes – Bundled Marker Attributes – Inquiry Functions.

Extra Reading (Keywords): Color Table, Fill Styles

UNIT IV:

Two - Dimensional Geometric Transformations: Basic Transformations: Translation – Rotation – Scaling – Matrix Representations and Homogenous Coordinates – Composite Transformations: Translations – Rotations – Scaling. Other Transformations: Reflection – Shear – Transformations between Coordinate systems – Affine Transformations – Transformation functions – Raster Methods for transformations.

Extra Reading (Keywords): Shear, Window, View port

UNIT V:

Three Dimensional Concepts: Three – Dimensional Display Methods: Parallel Projection – Perspective Projection – Depth Cueing – Visible Line and Surface – Identification – Surface Rendering – Exploded and Cutaway views – Three – dimensional and stereoscopic views – Three – dimensional Graphics packages.

Extra Reading (Keywords): Depth Cue, Convergence

CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Develop a facility with the relevant mathematics of computer graphics	PSO 1, PSO 2	U
CO-2	Able to write basic graphics application programs including animation	PSO 2	An
CO-3	Able to design programs to display graphic images to given specifications	PSO 2	U
CO-4	Draw orthographic projections of lines, Planes and solids	PSO 5	An
CO-5	Obtain development of surfaces	PSO 1	Ap
CO-6	Prepare isometric and perspective views of simple solids	PSO 2, PSO 3	U

Text Book:

Donald Hearn & M. Pauline Backer "Computer Graphics", 2006, Prentice Hall of India, New Delhi

(For Candidates admitted from the academic year 2020 -21 Onwards)

HOLY CROSS COLLEGE (AUTONOMOUS)TIRUCHIRAPALLI - 620002.

PG DEPARTMENT OF COMPUTER SCIENCE

M.C.A
First Year - Semester – II

Course Title	COMPUTER GRAPHICS- PRACTICAL II
Code	P20CA2PRP04
Course Type	Practical
Credits	5
Marks	100

1. Designing Greeting card
2. Designing an Invitation
3. Designing a Logo, Business Card
4. Designing a Identity Card
5. Designing a Book Wrapper
6. Coloring a Black and white photo
7. Creating a Rangoli design
8. Creation of a Floral Design
9. Creating a Web Banner
10. Designing a Book Mark and Business Card
11. Creation an Invitation for the International Conference
12. Creation of Brochure / Flyer for academic activities