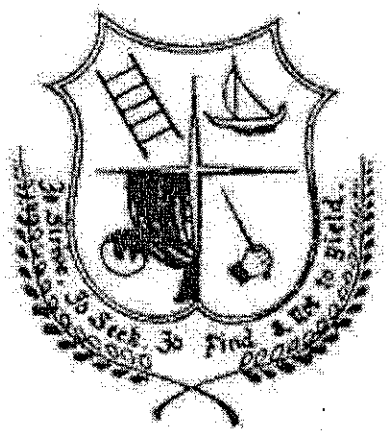
ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS)

CHENNAI-600 008

Department Of Computer Science

Self-Supporting

UG-SYLLABUS



CHOICE BASED CREDIT SYSTEM OUTCOME BASED EDUCATION

(OFFERED FROM THE ACADEMIC YEAR 2018-19)

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RULES AND REGULATIONS FOR THE PROGRAMME

The Department of Computer Science is revising syllabi with effect from the academic year 2018-2019, by introducing CBCS, Part IV, Environmental Studies and Value Education which will help to seek to build the capacity of the students and provide inputs for his or her social service and social analysis capabilities.

Every academic Year is divided into two semester sessions. Each semester will have a minimum of 90 Working days each day will have 5 Working hours Teaching is organized in to a modular Pattern of credit courses. Credit is normally related to number of hours a teacher teaches a particular subject. It is also related to the number of hours a student spends learning a subject or carrying out an activity.

REGULATIONS

1. ELIGIBILITY FOR ADMISSION

Candidates for admission to the first year of the degree of the Computer Science course shall be required to have passed the Higher Secondary Examinations conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the University of Madras. The candidate should have Mathematics as one of the subjects with or without Computer Science in Higher Secondary Examinations.

2. ELIGIBILITY FOR THE AWARD OF DEGREE

A Candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study for the period of not less than three academic years, passed the examinations of all six semesters prescribed.

3. COURSE OF STUDY

The main subject of study for Bachelor Degree shall consist of the following:

PART - I: Foundation Courses exclusive for Languages.

PART -II: Foundation English

PART -III: Core Courses, Allied Subjects I and II – Job & skill oriented entrepreneurship components.

PART -IV: Non major electives

PART -V: Activities/Sports/NCC.

4. PASSING MINIMUM

A Candidate shall be declared to have passed in each paper /practical of the main subject of study wherever prescribed, if she secured NOT LESS THAN 40% of the marks prescribed for the examination.

5. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Part I, II, III & IV

Successful candidates passing the examination and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

Candidates who pass all the examinations (Part I, II, III, IV) prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for ranking.

PROGRAMME EDUCATIONAL OBJECTIVES

On obtaining an undergraduate degree the students will be able to:

PEO1: Apply and advance the knowledge and skills acquired, to become a creative professional in their chosen field.

PEO2: Engage in self-directed continuous learning, aimed at global competency, which will promote professional and personal growth

PEO3: Develop management skills and entrepreneurial skills, by harnessing core competencies tempered by values and ethics

PEO4: Work towards achieving economic and social equity for women through application of relevant knowledge

PEO5: Contribute to promoting environmental sustainability and social inclusivity

PROGRAMME OUTCOMES (PO's)

On completion of the Programme, the learner will be able to

PO1 : To promote and apply scientific knowledge for finding sustainable solution to solve Real-time problems.

PO2 : Identify, Analyse and formulate novel ideas to yield, substantial results in the field of research utilizing the principle concepts of Programming languages combined with theortical knowledge of Computer Science.

PO3 : Relate key concepts and principles of programming languages to various applications in Software Industry.

PO4: Cultivate unparalled comprehension of fundamental concepts relevant to basic computing techniques leading to an individual progress and career advancement at the National and Global levels.

PO5: To communicate effectively their views and ideas orally/ written in English and in other related languages.

PO6: Design solutions for complex problems and design system components or processes that meet the specific needs with appropriate consideration for public health and safety, cultural, societal and environmental conditions.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

On completion of the specific programme (B.Sc Computer Science) the student will be able to:

PSO1: Ability to design and develop computer programs using the standard principles of programming for to develop a quality product in the context of changing technology.

PSO2: To meet the industrial needs by developing various innovative applications using the recent technologies by keeping pace with ethical, security and legal issues.

PSO3: To impart the knowledge on how to collect and correlate the data by applying various mathematical methodologies to solve computational tasks using appropriate algorithms.

PSO4: Ability to prepare/pursue for continuous professional development and in various Corporate Sectors.

PSO5: Ability to use knowledge in various domains to identify research gaps and provide solutions to new ideas and innovations.

PSO6: To impart the knowledge to learn the concept on how the data/information is transmitted fast and secure in the IT ruling environment.

SEMESTER I									
SEM	PART	COURSE CODE	TITLE OF THE PAPER	CREDITS	HOURS/ WK	TOTAL HOURS	CA	SE	TOTAL
I	I		Tamil/Hindi/French/Sanskrit	3	5	75	40	60	100
	II		English	3	5	75	40	60	100
	III	CP18/1C/PIC	Programming In C	5	6	90	40	60	100
			Allied - Mathematics	5	6	90	40	60	100
	III	CP18/1C/PR1	Practical I – C Lab	3	4	60	40	60	100
	IV	CP18/1N/FOM	NME – Front Office Management	2	2	30		50	50
	IV		Soft Skills	3	2	30		50	50
SEMESTER II									
II	I		Tamil/Hindi/French/Sanskrit	3	5	75	40	60	100
	II		English	3	5	75	40	60	100
	III	CP18/2C/DSC	Data Structures using C	5	6	90	40	60	100
			Allied – Mathematics	5	6	90	40	60	100
	III	CP18/2C/PR2	Practical II – Data Structures Lab	3	4	60	40	60	100
	IV	CP18/2N/MFL	NME – Macromedia Flash	2	2	30		50	50
	IV		Soft Skills	3	2	30		50	50
SEMESTER III									
III	I		Tamil/Hindi/French/Sanskrit	3	5	75	40	60	100
	II		English	3	5	75	40	60	100
	III	CP18/3C/DBS	Database Management Systems	5	6	90	40	60	100
	III	CP18/3A/STA	Allied-Statistics	5	6	90	40	60	100
	III	CP18/3C/PR3	Practical III -DBMS Lab	3	4	60	40	60	100
	IV		Environmental Studies	2	2	30		50	50
	IV		Soft Skills	3	2	30		50	50
SEMESTER IV									
IV	I		Tamil/Hindi/French/Sanskrit	3	5	75	40	60	100
	II		English	3	5	75	40	60	100
	III	CP18/4C/PYT	Open Source Software-Python	5	6	90	40	60	100
	III	CP18/4A/RMT	Allied-Resource Management Techniques	5	6	90	40	60	100
	III	CP18/4C/PR4	Practical IV-Python Lab	2	4	60	40	60	100
	IV		Value Education	2	2	30		50	50
	IV		Soft Skills	3	2	30		50	50
SEMESTER V									
V	III	CP18/5C/ASP	ASP.Net	4	5	75	40	60	100
	III	CP18/5C/SOE	Software Engineering	4	5	75	40	60	100
	III	CP18/5C/CAR	Computer Architecture	4	5	75			
	III	CP18/5C/OPS	Operating Systems	4	5	75	40	60	100
	III	CP18/5E/DMW	Elective -I :Data Mining and Data Warehousing OR	5	6	90	40	60	100

		CP18/5E/ARI CP18/5C/INS	Elective -I:Artificial Intelligence OR Elective –I:Information Security						
	III	CP18/5C/PR5	Practical V- ASP.NET Lab	3	4	60	40	60	100
SEMESTER VI									
VI	III	CP18/6C/JAV	Java Programming	4	6	90	40	60	100
	III	CP18/6C/DCN	Data Communications Networking	4	6	90	40	60	100
	III	CP18/6E/CCP CP18/6E/BDA CP18/6E/IOT	Elective II-Cloud Computing Or Elective II- Big Data Analytics OR Elective II-Internet of Things	5	7	105	40	60	100
	III	CP18/6C/MNP	Mini Project	4	7	105	40	60	100
	III	CP18/6C/PR6	Practical VI- Java Programming Lab	3	4	60	40	60	100

Total Minimum credits for the programme :139 credits

Compulsory extension activity credit : 1

V	III	CP18/SS/CPP	Object Oriented Programming in C++	2					100

EVALUATION PATTERN FOR CONTINUOUS ASSESSMENT-UG

INTERNAL VALUATION BY COURSE TEACHER/S PART I, II

AND III-THEORY PAPERS

COMPONENT	TIME	MAX.MARKS	CA MARK
TEST I	2 hrs	50 Marks(To be converted)	10
TEST II	2 hrs	50 Marks(To be converted)	10
Assignment/Seminar			10
Participatory Learning			10
		TOTAL	**40**

PART III- PRACTICAL PAPERS

COMPONENT	TIME	MAX.MARKS	CA MARK
TEST I	2 hrs	50 Marks(To be converted)	10
TEST II	2 hrs	50 Marks(To be converted)	10
TEST III	2 hrs	50 Marks(To be converted)	10
Record			10
		TOTAL	**40**

PART III – INTERNSHIP & MINI PROJECT

COMPONENT	CA MARK
Internship Documentation	10
Internship Viva Voce	10
Project Review	10
Project Documentation	10
TOTAL	**40**

PART IV-SKB/SOFT SKILLS

Nil

CA QUESTION PAPER PATTERN-UG FIRST YEAR

Knowledge Level	Section	Word Limit	Marks	Total
K 1	A-3X2 marks	50	6	50
K1. K 2	B-3x8 marks	200	24	
K2, K 3	C-1x20 marks	500	20	

CA QUESTION PAPER PATTERN-UG SECOND YEAR & THIRD YEAR

Knowledge Level	Section	Word Limit	Marks	Total
K 1	A-3X2 marks	50	6	50
K1. K 2	B-3x8 marks	200	24	
K2, K 3	C-2x10 marks	500	20	

RUBRICS FOR CONTINUOUS ASSESSMENT

Assignment	**Content/originality/Presentation/Schematic Representation and Diagram/Bibliography**
Seminar	**Organisation/Subject Knowledge/Visual Aids/Confidence level/presentation-Communication and Language**
Field Visit	**Participation/Preparation/Attitude/Leadership**
Participation	**Answering Questions/Clearing Doubts/Participating in Group Discussions/Regular Attendance**
Case Study	**Finding the Problem/Analysis/Solution/Justification**
Problem Solving	**Understanding Concepts/Formula and Variable Identification/Logical Sequence/Answer**
Group Discussion	**Preparation/Situation Analysis/Relationship Management/Information Exchange/Delivery Skills**
Flipped/Blended Learning	**Preparation/Information Exchange/ Group interaction/Clearing doubts**

- FIRST FOUR RUBRICS SHOULD BE INCLUDED.
- OTHERS ARE OPTIONAL BASED ON TEACHING-LEARNING METHODOLOGY ADOPTED FOR THE PROGRAMME OF STUDY

END SEMESTER EVALUATION PATTERN-UG

THEORY PAPERS

PART I/II/III **SEMSTER I/II/III/IV/V/VI**

DOUBLE VALUATION BY COURSE TEACHER AND EXTERNAL EXAMINER MAXIMUM

MARKS: 100 TO BE CONVERTED TO 60

PASSING MARK: 40

PRACTICAL PAPERS

PART III **SEMSTER I/II/III/IV/V/VI**

DOUBLE VALUATION BY COURSE TEACHER AND EXTERNAL EXAMINER MAXIMUM

MARKS: 100 TO BE CONVERTED TO 60

PASSING MARK:40

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

PART IV

MAXIMUM MARKS :50

SINGLE VALUATION

Practical question paper will be framed by the course

teacher/faculty. PASSING MARK: 20

INTERNSHIP & MINI PROJECT

MAXIMUM MARKS : 100 TO BE CONVERTED TO 60

Project Viva Voce will be conducted to inspect the work done by the student and it will be evaluated by the External Examiner and Internal Examiner.

PASSING MARK: 40

SEMESTER I COURSE PROFILE-PROGRAMME OF STUDY

COURSE CODE	TITLE OF THE PAPER	CREDITS	HOURS/ WK	TOTAL HOURS	L-T-P	CA	SA	TOTAL
	Tamil/Hindi/French/ Sanskrit	3	5	75		40	60	100
	English	3	5	75		40	60	100
CP18/IC/PIC	Programming In C	5	6	90	4-2-0	40	60	100
	Allied - Mathematics	5	6	90		40	60	100
CP18/IC/PR1	Practical I – C Lab	3	4	60	0-0-4	40	60	100
CP18/IN/FOM	NME-Front Office Management	2	2	30	2-0-0		50	50
	Soft Skills	3	2	30	2-0-0		50	50

Credits gained during Semester I: 24

SEMESTER I

PROGRAMMING IN C

Total Hours: 90 **COURSE CODE: CP18/IC/PIC**

CREDITS: 5 **L-T-P:** 4 -2- 0

COURSE OBJECTIVES:

1. To make the students know the Structures of C Language.
2. To enable the students to write programs using the concepts of C.
3. To learn how to write loops and decision statements using C
4. Ability to work with arrays of complex objects
5. Students will be able to develop, design and code programs and applications in C

COURSE OUTLINE:

UNIT I:

History, Importance and Basic Structure of C Programs – Character set – C Tokens – Keywords and Identifiers – Constants – Variables – Data Types – Declaration of Variables and Storage Class – Assigning Values to Variables - Defining Symbolic constants – Declaring a Variable as Constant and Volatile – Operators – Expressions – Operator Precedence – Type Conversions – Managing Input and Output Operations – Reading, writing Character – Formatted Input and Output.

UNIT II: (MOOC)

Programming Tools – Algorithm – definition – characteristics – examples – Flow Chart – Definition – symbols – examples. Decision Making and Branching – Simple IF, ELSE IF, Nesting of IF.. ELSE, ELSE IF ladder, Switch, ?: Operator, Goto Statement. Decision Making and Looping – WHILE, DO, FOR, Jumps in Loops.

UNIT III: (MOOC)

Arrays – One Dimensional Arrays – Declaration, Initialization. Two Dimensional ArraysInitialization – Multi Dimensional Arrays - Character Arrays and Strings – Declaring and Initializing String Variables – Reading, Writing Strings – Arithmetic Operations on Characters – Putting Strings together – Comparison of Two Strings – Table of Strings. User defined Functions – Elements of User defined functions – Definition of functions – return values and their types – Function Calls – Function Declaration – Category of Functions - Nesting of Functions – Recursion – Passing Arrays and Strings to Functions – The Scope, Visibility and Lifetime of Variables.

UNIT IV:

Structures – Defining a Structure – Declaring Structure Variables – Accessing Structure members – Structure Initialization – Copying and Comparing Structure Variables – Operations on Individual Members – Arrays of Structures – Structures within Structures – Structures and Functions – Unions – Size of Structures. Pointers – Introduction – Accessing the Address of a Variable – Declaring and initializing Pointer Variables – Accessing Variables through its Pointer – Chain of Pointers – Pointer Expressions – Pointer Increments and Scale Factor – Pointers and Arrays, Array of Pointers – Pointers as Function Arguments – Functions Returning pointers – Pointers to Functions and Structures.

UNIT V:

File Management in C – Defining, Opening and Closing a File – Input/Output Operations on Files – Error Handling During I/O Operations – Random Access to Files – Command Line Arguments.

RECOMMENDED TEXTBOOKS:

1. E. Balagurusamy, Programming in ANSI C, 4th edition, Tata McGraw Hill Publications.
2. Stephen G.Kochan, Programming in C 3rd edition ,Tata McGraw Hill Publications.

REFERENCE BOOKS:

1. Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.
2. Introduction to C programming, 2nd Edition ,Reema Thareja,Oxford Press.
3. Gottfried B.S., Programming with C, Second Edition, TMH Pub. Co. Ltd., New Delhi, 1996.
4. Kernighan & Ritchie, The C Programming Language,2nd edition,Pearson ed.
5. C programming language Brian W Kernighan, Dennis Ritchie 2nd edition,2005

JOURNALS:

1. National research paper on C language -IJIRT
2. International Journal of Computer Science and Programming Language

E-LEARNING RESOURCES:

1. https://fresh2refresh.com/c-programming/c-basic-program/
2. https://users.cs.cf.ac.uk
3. https://www.codesdope.com/c-structure/
4. https://www.tutorialcup.com/cprogramming/decision-making-and-loops.html
5. https://fresh2refresh.com/c-programming/c-file-handling/

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Apply the basic fundamentals of C programming.
CO 2	Explain various loops and decision making statements to solve the problem.
CO 3	To apply different operations on arrays and use functions concepts to solve the given problem.
CO 4	Use of pointers, structures and unions.
CO 5	To Analyze file operations in C programming.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
CO4	3	2	2	3	3	1
CO5	3	2	1	2	0	0
AVERAGE	3	1.8	1.8	1.8	2	0.2

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-2/3x20 marks	500	40		Compulsory One question from each unit

SEMESTER I PRACTICAL I

–C LAB

Total Hours: 60

COURSE CODE: CP18/1C/PR1

CREDITS: 3

L-T-P: 0-0-4

COURSE OBJECTIVES:

1. Understand the basic structure of C programming declaration, variables and data types.
2. To write their own programs using all the concepts learned in the theory.

PRACTICAL LIST :

1. Write a C program to implement Simple if statement.
2. Write a C program to implement if... else statement.
3. Write a C program to implement switch..case statement.
4. Write a C program to implement the while loop.
5. Write a C program to implement the do..while loop.
6. Write a C program to to implement for loop
7. Write a C program to implement arrays
8. Write a C program to implement functions concept
9. Write a C program to implement the concept of Structures.
10. Write a C program to implement pointers concept

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Apply the basic fundamentals of Decision making and looping concepts of C programming.
CO 2	Compute C programs using Arrays
CO 3	To apply different user defined data types to solve the given problem.
CO 4	Compute C programs using Structures.
CO 5	Use of pointers concepts

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
CO4	3	2	2	3	3	1
CO5	3	2	1	2	0	0
AVERAGE	3	1.8	1.8	1.8	2	0.2

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

SEMESTER I

FRONT OFFICE MANAGEMENT

Total Hours: 30 **COURSE CODE:** CP18/1N/FOM

CREDITS: 2 **L-T-P:** 0-0-2

UNIT I :

Ms-Word: Creating, opening, saving and closing documents – entering text, inserting, moving, copying text- search and replace text – paragraph format – spell check – working with tables – Mail Merge.

UNIT II :

Ms-Excel : Worksheet – cell – range – data entry – formulae creation – fill command- insertion, deletion of cell and row – functions – logical – statistical and mathematical – creation of charts.

UNIT III :

Creation of a slide – graphs –word art – animation – different view of slides.

RECOMMENDED TEXTBOOKS:

1."Microsoft Word 2007", Bible –Herbert L Tyson- Herb Tyson – 2007.

2. Micrsoft Excel 97 Developer's Hand Book – Eric Wells.

REFERENCE BOOKS:

1."Microsoft office word 2007 step by step"- joyce Cox.

E-LEARNING SOURCES:

1. WWW.EASYNOTES.COM
2. WWW.ISCHOOL.UTEXAS.EDU
3. WWW.ITDESK.INFO

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Identify and use the different formats for a document preparation.

CO 2	Apply different mathematical functions and formulas using spreadsheets.
CO 3	Prepare different slides using animation effects.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
AVERAGE	3	2.2	2	2.3	2.3	0

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical paper questions will be framed by the course teacher .

SEMESTER II COURSE PROFILE-PROGRAMME OF STUDY

COURSE CODE	TITLE OF THE PAPER	CREDITS	HOURS/ WK	TOTAL HOURS	L-T-P	CA	SA	TOTAL
	Tamil/Hindi/French/ Sanskrit	3	5	75		40	60	100
	English	3	5	75		40	60	100
CP18/2C/DSC	Data Structures Using C	5	6	90	4-2-0	40	60	100
	Allied - Mathematics	5	6	90		40	60	100
CP18/2C/PR2	Practical II – Data Structures Lab	3	4	60	0-0-4	40	60	100
CP18/2N/MFL	NME-Macromedia Flash	2	2	30	2-0-0		50	50
	Soft Skills	3	2	30	2-0-0		50	50

Credits gained during Semester II: 24

SEMESTER II

DATA STRUCTURES USING C

Total Hours:90 **Course Code : CP18/2C/DSC**

Credits : 5 **L-T- P: 4- 2- 0**

COURSE OBJECTIVES:

To enable students

1. To introduce the fundamental concepts of linear and non-linear data structures and emphasize its importance in solving real world problems.
2. To formulate new solutions for programming problems and improve existing code using the concepts of various linear and nonlinear data structures.
3. To impart skills in developing and implementing efficient data structure algorithm using C programming.
4. To choose and apply appropriate data structures for a specified application.

COURSE OUTLINE:

UNIT I :

Introduction to Data Structures - Basic Terminology, Definition, Data Structure Operations, Arrays-Definition, Inserting and Deleting, Pointer Array. Sorting-Bubble sort, Merge sort, insertion sort and selection sort. Searching-Linear search, Binary Search.

UNIT II:

Linked list – Definition, Representation of linked list. Types of linked list - Singly Linked List, Doubly Linked List. Operations on Singly Linked List -Insertion, Deletion, Search and Display.

UNIT III:

(MOOC-NPTEL) Stack-Definition, Array representation of Stack, Operations on Stack-Infix, Prefix and Postfix notations, Arithmetic Expression, Evaluation of Postfix Expression, Conversion of an arithmetic expression from Infix to Postfix. Applications of Stack-Quick Sort.

UNIT IV:

Queue - Definition, Array representation of Queue, Types of Queue- Simple Queue, Circular Queue, Double Ended Queue (Deque), Priority Queue. Operations on Simple Queues -Insertion, Deletion, Search and Display.

UNIT V:

Trees – Definition, Binary Tree, Complete Binary Tree, Representation of Binary Tree - Sequential and Linked Representation. Traversal of Binary Tree - Preorder, Inorder and Postorder. Binary Search tree-Definition, Operations on Binary Search Tree- Searching, Inserting and Deleting. Graphs- Definition, Directed and Non directed Graph, Representation of graph-Sequential and Linked Representation, Dijisktra algorithm.

BOOKS RECOMMENDED:

1. Seymour Lipschutz, Data Structures with C,1st Edition, Schaum's Outline Series in Computers, Tata McGraw Hill
2. E. Balagurusamy, Data structures using C, Tata McGraw Hill Reprint,2015
3. A.K Sharma, Data structures using C,Pearson Education,2013

REFERENCE BOOKS :

1. R. Krishnamoorthy and G. Indirani Kumaravel ,Data Structures Using C, Tata McGraw Hill-2008.
2. M. A. Weiss, Data Structures and Algorithm Analysis in C, Pearson Education,2013.
3. Ellis Horowitz , Sartaj Sahni and Susan Anderson Freed, Fundamentals of Data Structures in C, Silicon press,2nd edition,2007.
4. Robert Kruse and Clovis L Tondo, Data structures and Program Design in C, Prentice Hall,2012.
4. Tanaenbaum A.S,Langram Y,Augestein J, Data Structures using C,Pearson Education, 2004.

JOURNALS :

1. International Journal of Data Structures
2. International Journal of Science and Research
3. Indian Journal of Science and Technology
4. Journal of Computer and System Sciences

E-LEARNING SOURCES:

1. https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues
2. http://www.c4learn.com/data-structure/stack-operations
3. https://stacktips.com/tutorials/c/sorting-methods-in-data-structures
4. https://www.programiz.com/dsa/linked-list
5. http://btechsmartclass.com/data_structures/binary-tree-traversals.html

COURSE OUTCOMES:

CO Number	CO Statement
CO1	Discuss various array operations, sorting and searching techniques in formulating new solutions to solve the real world problems.
CO2	Analyze different types of linked list and its operations to meet the user specified software needs.
CO3	Demonstrate the application of stack operations, evaluation and conversion of expression in designing software procedures based on changing needs.
CO4	Asses the ability to design, evaluate queue operations and its implementation in multi domain applications.
CO5	Exposure to development of problem solving applications utilizing the learned concepts of tree and graph data structures.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	2	3	2
CO3	3	3	3	3	3	2
CO4	3	2	3	3	3	2
CO5	3	3	3	2	3	3
AVERAGE	3	2.8	2.8	2.6	3	2.4

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1, K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-2/3x20 marks	500	40		Compulsory One question from each unit

SEMESTER II

PRACTICAL II- DATA STRUCTURES LAB

Total Hours: 60 **Course Code : CP18/2C/PR2**

Credits:3 **L-T-P : 0-0-4**

COURSE OBJECTIVE:

To write their own program using data structure concepts learned in the theory.

PRACTICAL LIST:

1) Write a C program to Insert and Delete an item in Linear Array.

2) Write a C program to perform the following Operation Addition, Subtraction, Multiplication and Transpose in Matrix.

3) Write a C program to implement Bubble Sort using Arrays.

4) Write a C program to implement Merge Sort using Arrays

5) Write a C program to Search an element in the Array using Linear Search.

6) Write a C program to Search an element in the Array using Binary Search.

7) Write a C program to Insert, Delete and Display element from Singly Linked List.

8) Write a C program to implement Stack using Arrays.

9) Write a C program to implement Stack using Pointers.

10) Write a C program to implement Quick Sort using Arrays.

11) Write a C program to Evaluate Postfix Expression.

12) Write a C program to convert Infix notation to Postfix notation using Stack.

13) Write a C program to implement Queue using Array.

14) Write a C program to implement Queue using Pointers.

15) Write a C Program for the creation of a Binary Tree.

16) Write a C program for Inorder, Preorder and Postorder Binary Tree Traversal.

17) Write a C program to Add and Delete Nodes from Adjacency List.

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Using the concept of arrays in data structures
CO 2	Evaluate an expression
CO 3	Learn the concept of Tree Traversal algorithms

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
AVERAGE	3	2.2	2	2.3	2.3	0

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

SEMESTER II

MACROMEDIA FLASH 8

Total Hours: 30 **Course Code : CP18/2N/MFL**

Credits:2 **L-T-P : 0-0-2**

UNIT I :

Introduction to Flash – Flash Concepts – Working with Graphics – Working with Colors in Flash.

UNIT II :

Transforming and Aligning Graphics – Working with Text – Symbols and Library.

UNIT III :

All about Animation – All about Tweening.

BOOKS RECOMMENDED:

1. "Flash 8 in Simple Steps" – Shalini Gupta, Adity Gupta.

2. "Flash in a Flash Web Development" – Anushka Wirasnha.

ONLINE SOURCES:

1. http://helpx.adobe.com/flash.html
2. www.teacherclick.com/flash8/t_18_1.htm

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Understand the flash concepts .
CO 2	Utilise different graphics for the picture imported or created.
CO 3	Prepare different animation effects.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
AVERAGE	3	2.2	2	2.3	2.3	0

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical paper questions will be framed by the course teacher .

SEMESTER III COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER III								
COURSE CODE	TITLE OF THE PAPER	CREDITS	HOURS/ WK	L-T-P	TOTAL HOURS	CA	SA	TOTAL
	Tamil/Hindi/French/Sanskrit	3	5		75	40	60	100
	English	3	5		75	40	60	100
CP18/3C/DBS	Database Management Systems	5	6	4-2-0	90	40	60	100
CP18/3A/STA	Allied-Statistics	5	6	3-3-0	90	40	60	100
CP18/3C/PR3	Practical III -DBMS Lab	3	4	0-0-4	60	40	60	100
	Environmental Studies	2	2		30		50	50
	Soft Skills	3	2		30		50	50

Total credits gained during Semester III :24

SEMESTER III

DATABASE MANAGEMENT SYSTEMS

Total Hours:90 **COURSE CODE: CP18/3C/DBS**

CREDITS: 5 **L-T-P: 4-2- 0**

COURSE OBJECTIVES:

To enable students

1. To acquire the basics of databases and database management systems.
2. To design simple database models using Entity-Relationship Modelling and Normalize it.
3. To learn and understand SQL, PL/SQL.

COURSE OUTLINE:

UNIT I:

Database : Definition, Component of Database, Database Organisation, Database system, Components of dbms, Operations Performed on Database Systems, DA, DBA, Function and responsibilities of DBA's. Data Base Language: DDL, DSDL, VDL, DML, 4GL.

UNIT II:

(MOOC-NPTEL) Entity Relationship (ER) Model: Introduction, Basic E-R concepts (entities, relationship,Attributes, constraints), Normalization, Normal Forms: First Normal Form, second Normal Form, Third Normal Form, Boyce-codd Normal Forms (BCNF).

UNIT III:

History of SQL, Categories of SQL commands, Data Retrieval with SELECT: selecting all rows from a table, filtering rows with WHERE clause, SQL operators, Boolean Operators, Using Parentheses in Logical Expressions, GROUP BY clause, HAVING clause, JOINS, ORDER BY Clause.

UNIT IV:

Expanding Queries with set Operations, Data Manipulation Language Commands: COMMIT and ROLLBACK, INSERT, UPDATE, DELETE. SQL Functions: Scalar Character functions, Scalar Date functions, Scalar Mathematical functions, Conversion functions, Group functions. DUAL Table.

UNIT V:

Brief History of the PL/SQL Language, Procedural constructs of PL/SQL, Data types, Cursor in PL/SQL:Declaring explicit cursors, Methods and Attributes of Explicit Cursors, Using the For Loop with Explicit cursors, cursors variable, implicit cursors.

RECOMMENDED TEXTBOOKS:

1. Database Systems(concepts, Design and Application), S.K.Singh, Pearson Edition, 2009.

2. Oracle Forms Developer's Handbook, Albert Lulushi, Pearson Edition, 2000.

REFERENCE BOOKS:

1. Database Management System, Gerald V.Post III Edition, 2001.
2. Raghu Ramakrishnan, Database Management Systems, WCB/McGraw Hill, 1998.
3. Introduction to Database Management, M.L.Gilenson, Wiley Student Edition, 2012.
4. SQL and PL/SQL for Oracle 11g, Dr.P.S.Deshpande, DreamTech Press, 2011.
5. Data base System concepts, Abraham Silberschatz, Henry F.Korth, S.Sundarshan, McGraw-Hill Education, 2013.

JOURNALS:

1. International Journal of Database Management Systems(IJDMS)
2. Journal of Database Management(JDM)

E-LEARNING RESOURCES:

1. http://www.db-book.com
2. http://www.computerweekly.com>tutorial>Database Normalization
3. http://www.mysql.com
4. http://oracle-base.com>articles>plsql-web-toolkit-9i
5. http://oracle-base.com>articles>plsq-web-toolkit-9i

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Develop the terminology, features, classifications, and characteristics embodied in database systems
CO 2	Developing the normalization theory and apply such knowledge to the normalization of a database
CO 3	Applying create, populate, maintain, and query statements in the database
CO 4	Developing and manipulating database concepts with various functions.
CO 5	Developing the procedural constructs with PL/SQL Statements.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	-	1	-	-
CO2	3	-	2	-	1	-
CO3	2	1	3	3	-	-
CO4	3	3	2	1	2	3
CO5	3	2	2	2	2	3
AVERAGE	2.8	1.6	1.8	1.4	1	0.6

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

SEMESTER III

STATISTICS

Total Hours:90 **COURSE CODE:CP18/3A/STA**

CREDITS:5 **L-T-P: 3-3- 0**

COURSE OBJECTIVES:

To enable students

1. To learn the fundamental concepts of statistical methods.
2. To solve in the different methods for numerical analysis.
3. To examine the past data and use mathematical equations.

COURSE OUTLINE:

UNIT I:

Definition of Statistics – Classification – Meaning and Types of Classification – Types of Series – Frequency Distribution : Individual Observation – Discrete Frequency Distribution – Continuous and Cumulative Frequency distribution – Two way (Bivariate) Frequency Distribution.

UNIT II:

Measures of Central Tendency – Arithmetic Mean, Median, Mode (Individual, Discrete, Continuous and Cumulative Series) – Quartiles, Deciles, Percentiles, Geometric Mean, Harmonic Mean (Discrete, Continuous and Cumulative Series).

UNIT III:

Dispersion – Methods of measuring Dispersion – Range – Inter-quartile Range – Mean Deviation – Standard Deviation.

UNIT IV:

Probability – Event – sample spaces – Classical Approach (Priori Probability) – axiomatic approach to probability – Theorems of Probability(Addition, Multiplication) – Baye's theorem. Binomial, Poisson, Fitting of Distributions (Binomial,Poisson, Normal).

UNIT V:

Correlation and Regression (using direct method, deviation taken from arithmetic mean, deviation taken from assumed mean) – Rank Correlation.chi square test:chi square test of goodness of fit, chi square as a test of independence.

RECOMMENDED TEXTBOOKS:

1. RSN Pillai & Bhagavati, Statistics, SChand Publications, 2008 .
2. Ron Larson & Betsy Farber, Elementary Statistics, Pearson 7th edition, 2018.

REFERENCE BOOKS:

1. Elements Of Mathematical Statistics, S.C.Gupta & V.K. Kapoor, Sultan Chand Publications Edition, 2014.
2. Dr.P.R.Vittal, Allied Mathematics, Margham Publications, 2012.
3. P.Kandasamy, K.Thilagavathy, Gunavathy K, Numerical Methods, S CHAND & Co, 2015.
4. Ken Black- Applied Business Statistics –Wiley 2012.
5. Probability and Statistics , Murray Spiegel, John Schiller, R.Alu Srinivasan, Debasree Goswami, Tata McGrawhill, 2017.

JOURNALS:

1. International Journal of Mathematics and statistics.
2. Journal of Probability and statistical Association.

E-LEARNING RESOURCES:

1. http://data36.com/statistical-average-mean-median-mode
2. http://www.mathsisfun.com/data/standard-deviation.html/
3. http://www.randomservices.org/random
4. http://42explore.com/statistics.html/
5. http://www.khanaacademy.org/math/statistics-probabaility

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Able to anlayze the data with the tally sheet to give perfect outcome and designed to impact knowledge regarding concepts.
CO 2	To develop a strategic approach in organizing data and to understand the relationship between numbers in a data set through calculations.
CO 3	Able to find the variance, range of a dataset.
CO 4	Able to examine the past data and use mathematical equations involving data to determine the likelihood of an independent event occurring.
CO 5	Accurate way to determine the probability of a given outcome and make comparisons between the datasets

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	1	1	3	2	2	-
CO2	-	1	3	-	3	1
CO3	-	-	3	2	3	-
CO4	-	-	3	3	3	1
CO5	-	-	3	3	3	1
AVERAGE	0.2	0.4	3	2	2.8	0.6

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x20 marks	500	40		Compulsory One question from each unit

SEMESTER III

PRACTICAL III – DBMS Lab

Total Hours: 60 **Course Code : CP18/3C/PR3**

Credits: 2 **L-T-P: 0-0-4**

COURSE OBJECTIVES:

To enable students to

1. Be familiar about the basic concepts of database
2. Input screen menu-driven query processing and pleasing reports
3. Create PL/SQL block

PRACTICAL LIST

1. Create a table name called Student with the field sno, sname, sex, mark1,mark2,mark3, total and perform the following:
   i) Display the table
   ii) Display the student name those obtain the total above 250
   iii) Update sno where sname= Aarthi
2. Create a Employee table and perform various operations using operators
3. Write a PL/SQL block to perform Basic Arithmetic operations (ADDITION, SUBTRACTION,MULTIPLICATION,DIVISION)
4. Write a PL/SQL block to display the reverse of numbers from one to hundred.
5. Write a PL/SQL block to display Greatest Number from the given 3 numbers.
6. (i) Write a PL/SQL block to find odd or even.
   (ii)Write a PL/SQL block to check whether a student has passed or failed.
7. Write a PL/SQL block that will set the min price to 6999 when the product id is 111 and theCost is greater than 7000.
8. Write a PL/SQL block to display Employee Name Mobile number and Salary using Explicit CURSORS.
9. Create employee details table and payroll table and perform various operations by using the following method:

i) Groupby clause ii) Having clause iii) Orderby clause iv) JOIN 10.Using any two tables establish relationship with the tables and perform normalization(first , second, third and BCNF normal forms.)

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Understanding the basic term, syntax with database design modulus.
CO 2	Able to differentiate procedural and non- procedural language
CO 3	Able to apply the concept of SQL queries

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
AVERAGE	3	2.2	2	2.3	2.3	0

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

SEMESTER IV COURSE PROFILE-PROGRAMME OF STUDY

SEMESTER IV							
COURSE CODE	TITLE OF THE PAPER	CREDITS	HOURS/ WK	L-T-P	TOTAL HOURS	CA	SA
	Tamil/Hindi/French/Sanskrit	3	5		75	60	100
	English	3	5		75	60	100
CP18/4C/PYT	Open Source Software-Python	5	6	3-3-0	90	60	100
CP18/4A/RMT	Allied-Resource Management Techniques	5	6	3-3-0	90	60	100
CP18/4C/PR4	Practical IV-Python Lab	2	4	0-0-4	60	60	100
	Value Education	2	2		30	50	50
	Soft Skills	3	2		30	50	50

Credits gained during Semester IV:23

SEMESTER IV

Paper Title: Open Source Software-PYTHON

Total Hours: 90 **COURSE CODE:CP18/4C/PYT**

CREDITS : 5 **L-T-P: 3 3 0**

COURSE OBJECTIVES:

To enable students

1. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. To learn how to write loops and decision statements in Python.
5. To learn how to write functions and pass arguments in Python.

UNIT I:

The Way of the Program: What is a Program? Running python-The First Program-Arithmetic Operators- Values and Types - Formal and Natural Languages-Debugging. Variables, Expressions and Statements: Assignment Statements-Variable Names-Expressions and statements-script mode-order of operations –string operations – comments – debugging.

UNIT II:

Functions: Function calls-math functions-composition –adding new functions-definitions and uses-flow of execution- parameters and arguments- variables and parameters are local- stack diagrams- fruitful functions and void functions- why functions- debugging.

UNIT III:

Conditions and recursion: floor division and modulus- Boolean expressions – logical operators – conditional execution – alternative execution – chained conditionals – nested execution – recursion – stack diagrams for recursive functions – infinite recursion-keyboard input – debugging.Fruitful functions: return values – incremental development-composition- Boolean functions – more recursion- leap of faith- one more example-checking types- debugging.

UNIT IV:

Iteration: reassignment – updating variables – the while statement – break – square roots-algorithms – debugging.Strings : A string isa sequence- len-traversal with a for loop-string slices-strings are immutable-searching-looping and counting- string methods – The in operator- string comparison – debugging.

UNIT V:

Lists: A list is a sequence-lists are mutable-taversing a list- list operations- list slices-list methods- map,filter and reduce- deleting elements- lists and strings- objects and values-aliasing- list arguments- debugging.Tuples: Tuples are immutable-tuple assignment- tuples as return values- variable-length argument tuples- lists and tuples-dictionaries and tuples.Files: Persistence-Reading and Writing, Format Operator,Filenames and Paths,Catching Exceptions,Databases,Picking,Pipes,Writing modules,Debugging

RECOMMENDED TEXT BOOK :

1. THINK PYTHON,Allen B.DOWNEY,Shroff Publishers & Distributors Pvt.Ltd
2. **Python: The Complete Reference**, Martin C Brown,TMH, 2018
3. Introduction to programming using Python, Y.Daniel Liang, Pearson,2018

REFERENCE BOOKS :

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016 Reference 2.k
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
3. **Python Made Simple, Rydhm Beri,** Jul 2019,BPB
4. Python programming A Modular Approach, Sheetal Taneja, Naveen Kumar,Pearson,2018
5. Wesley J. Chun, "Core Python Programming", 2nd Edition, Pearson Education LPE, New Delhi, 2007.
6. Mark Summer field, Programming in Python 3, Pearson Education LPE, New Delhi, 1996.

JOURNALS:

1. Journal of Global Research in Computer Science
2. A prime on Python on Life Science for Researchers. (Plos)

WEBSITES AND e-LEARNING SOURCES:

1. https://www.fullstackpython.com/best-python-resources.html
2. https://simpleprogrammer.com/get-started-learning-python/
3. http://www.greenteapress.com/thinkpython/
4. https://www.guru99.com/accessing-internet-data-with-python.html
5. https://stackoverflow.com/questions/45601052/list-links-in-web-page-with-python
6. https://realpython.com/python-lists-tuples/
7. http://openbookproject.net/thinkcs/python/english3e/iteration.html

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Outline on the basics of Python programming to design, code, and test small Python programs.
CO 2	Develop Functions in Python
CO 3	Utilize on the conditions, recursion and operators
CO 4	Analyse on the iterations on algorithms and debugging concepts.
CO 5	Use the Strings, List ,Tuples and dictionaries in Python.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	2	1	-
CO2	3	1	2	2	1	-
CO3	3	1	3	2	1	-
CO4	3	3	2	2	1	-
CO5		2	1	3	1	2
AVERAGE	2.4	1.6	2	2.2	1	0.4

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	**A-10X2 marks**	**50**	**20**	**100**	Two questions from each Unit
K1, K 2	**B-5/8x8 marks**	**200**	**40**		Atleast one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER IV

RESOURCE MANAGEMENT TECHNIQUES

Total Hours: 90 **COURSE CODE : CP18/4A/RMT**

CREDITS : 5 **L-T-P : 3 3 0**

COURSE OBJECTIVES :

1. To learn the fundamental concepts of Resource Management Technique and apply these techniques in real life situations.
2. To develop logical thinking in handling business oriented problems.
3. To analyse the given problem and identify the best technique to solve it out of different techniques available.

COURSE OUTLINE :

UNIT I :

Introduction to Resource Management Technique – Role of RMT – Introduction to Linear Programming – Formulation and Graphical Solution (2 Variables) – Canonical and Standard forms of LPP – Simplex Method – Big M Method.

UNIT II :

Introduction to Transportation Model – Methods for finding Initial Basic Feasible Solution : North West Corner Rule, Least Cost Method, Vogel's Approximation – MODI Method (Test for Optimal Solution) – Degeneracy in Transportation problem – Unbalanced Transportation Problems – Maximization case in Transportation problems.

UNIT III :

Introduction to Assignment Problem – Hungarian Method – Unbalanced Assignment Models – Maximization case and Restrictions in Assignment problems – Travelling Salesman problem.

UNIT IV :

Introduction to Sequencing Problem – Processing n jobs through 2 machines –Processing jobs through 3 machines – Processing n jobs through m machines.

UNIT V :

Introduction to Project Management Techniques : PERT and CPM – Network

Construction – Critical Path Method with Floats – PERT Method.

RECOMMENDED TEXT BOOKS :

1. Resource Management Techniques, Prof.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, A.R.Publications.
2. Operations Research, D.S.Hira, V.K.Kapoor, 9th Edition, Sultan Chand & Sons
3. Operations Research, P.K.Gupta, Manmohan, 14th Edition, Sultan Chand & Sons

REFERENCE BOOKS :

1. Problems in Operations Research, P.R.Vittal & V.Malini, Margham Publications
2. Operations Research an Introduction, Hamdy A.Taha, Eighth Edition, Pearson Publications
3. Operations Research, S.Kalavathy, Fourth Edition, Vikas Publishing
4. Operations Research. Dr.T.P.Singh 2nd Revised Edition, Udh Publishers
5. Operations Research Theory and Applications, J.K.Sharma, 5th Edition, MACIN Publications

JOURNALS :

1. International Journal of Operational Research (IJOR)
2. Indian Journal of Pure and Applied Mathematics

E-LEARNING RESOURCES :

1. https://www.zweigmedia.com/RealWorld/tutorialsf4/framesSimlex.html
2. https://www.docsity.com/en/transporation-model-operation-research- handsout/169627/
3. http://www.yourarticlelibrary.com/ergonomics/operation-research/assignment- problem-in-linear-programming-introduction-and-assignment-model/34712
4. http://ecoursesonline.ias-ri.res.in/mod/resource/view.php?id=90031
5. http://www.interventions.org/pertcpm/

COURSE OUTCOMES :

CO Number	CO STATEMENT
CO1	Formulate and solve Linear Programming Problem in different situations like production, distribution of goods and economics that needs decision.
CO2	Interpret and apply various transportation methods to solve the issues regarding transfer of goods to obtain the maximum profit.
CO3	Explore the usage and applications of assignment problem to obtain optimal solution for business decision problems.

CO4	Determine the effectiveness of solving sequencing problem to synchronize with the latest trends and demands from the industry.
CO5	Construct network diagrams and implement PERT and CPM methods to plan, schedule and control project activities to meet the needs of corporate sector.

MAPPING : COURSE OUTCOME WITH PROGRAM SPECIFIC OUTCOME

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	3	2	3	0
CO2	2	2	3	2	3	1
CO3	1	1	3	3	3	1
CO4	0	0	3	3	3	3
CO5	1	1	3	3	3	3
AVERAGE	1.2	1.2	3	2.6	3	1.6

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY :

Lecture (Chalk and Talk – OHP – LCD)
Problem Solving – Group Discussion
Quiz – Seminar
Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

SEMESTER IV PRACTICAL

IV – PYTHON Lab

Teaching Hours: 60 hrs | Course Code : CP18/4C/PR4

CREDITS: 2 | L T P: 0- 0- 4

COURSE OBJECTIVES:

To enable students to

1. Become familiar with the usage of functions and arguments.
2. To learn the concepts of looping techniques
3. To implement the exceptions in programming structure

PRACTICAL LIST

1. Implementing functions without arguments using python.
2. Implementing functions with arguments using python
3. Implementing operators,variables and string operations using python
4. Implementing recursion using python
5. Implementing loop concepts using python
6. Implementing list operations using python
7. Implementing files using python
8. Implementing exceptions using python

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Understanding the basic syntax of python concepts.
CO 2	Understanding the string operations
CO 3	Able to develop and create small applications using Python programs

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	0
CO2	3	2	2	3	3	0
CO3	3	2	2	3	3	0
AVERAGE	3	2.2	2	2.3	2.3	0

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

SEMESTER V COURSE PROFILE-PROGRAMME OF STUDY

COURSE CODE	TITLE OF THE PAPER	CREDITS	HOURS/ WK	TOTAL HOURS	L-T-P	CA	SA	TOTAL
CP18/5C/ASP	ASP.NET	4	5	75	3-2-0	40	60	100
CP18/5C/SOE	Software Engineering	4	5	75	3-2-0	40	60	100
CP18/5C/CAR	Computer Architecture	4	5	75	3-2-0	40	60	100
CP18/5C/OPS	Operating Systems	4	5	75	3-2-0	40	60	100
CP18/5E/DMW CP18/5E/ARI CP18/5E/INS	Elective -I :Data Mining and Data Warehousing OR Elective -I:Artificial Intelligence OR Elective –I Information Security	5	6	90	3-3-0	40	60	100
CP18/5C/PR5	Practical V- ASP.NET Lab	3	4	60	0-0-4	40	60	100

Credits gained during Semester V:24

SEMESTER V

ASP.NET

Total Hours:90 **COURSE CODE: CP18/5C/ASP**

CREDITS: 4 **L-T-P: 3-2-0**

COURSE OBJECTIVES:

1. To understand the in-depth the architecture and internals of ASP.NET functioning 2.To use ASP.NET Controls and build the dynamic web page
3. To Implement client side validations using validation controls framework
4. To learn about ASP.NET server side controls, how to handle Events of controls
5. To learn about how to protect the data and to develop the mobile ASP.NET

COURSE OUTLINE:

UNIT I:

ASP.NET language structure : Page structure, Page, Compiler Directives.HTML Server Controls : Anchor control, Table, Form and Form input, Input Control. Basic web server controls – Label, Textbox, Button, Link Button, Image Button Control,Checkbox Control, Radio Button control, Hyperlink Control, Image control.

UNIT II:

Data list web server controls :Checkbox list control, Radio button list control, Dropdown list control, List box control, Data grid control and Repeater control.Other web server controls – Calendar control, Ad rotator control, and Validation controls.

UNIT III:

Request and Response Objects – Request Object, Response Object. System. Data & System.Data.OLEDB Namespace – OLEDB Connection class, Command class, Transaction class, Data Adapter class, Dataset class.

UNIT IV:

Email - Error Handling.

UNIT V:

Security. ASP.NET Mobile Web SDK- Developing mobile ASP.NET, Getting the ASP.NET mobile web SDK, Mobile Web controls.

RECOMMENDED TEXTBOOKS:

1. Asp.Net Developer's Guide, Greg Buczek, Tata Mc-Graw-Hill,Edition 2002
2. The Complete Reference ASP.NET, Marthew MacDonald, Tata Mc-Graw-Hill, Edition 2001

REFERENCE BOOKS:

1. Programming Microsoft Asp.Net 2.0, Dino Eposito, WP Publishers and Distributors Pvt. Limited, 2nd Edition 2005.
2. Asp.net 2.0 website programming, problem-design-solution, Macro bellinaro wiley, Wiley publishing inc, Indiana Edition 2006
3. Asp.net unleashed, Stephen walther, Sams publishing, 2nd Edition 2003
4. Programming asp.net, Jesse liberty,dan Hurwitz, O'reilly , 2nd Edition2003
5. Microsoft Asp.Net 3.5: Step by Step, George Shepherd, Microsoft press,Edition 2008

JOURNALS:

1. http://www.ijarcsms.com
2. https://ieeexplore.ieee.org

E-LEARNING RESOURCES:

1.http://www.informit.com/articles/article.aspx?p=1641288&seqNum=2

2.https://www.go4expert.com/articles/aspnet-basic-controls-t34131/

3.https://www.oreilly.com/library/view/programming-asp-net/0596001711/ch04.html

4.https://support.microsoft.com/en-in/help/306459/asp-net-server-controls-overview

5. https://asp.net-tutorials.com/misc/sending-mails/

COURSE OUTCOMES:

CO Number	CO Statement
CO 1	Analyse the basic structure of page, the function and properties of the html and basic web server control.
CO 2	Apply the Function and the properties of data list web server control, validation control
CO 3	Build the objects to work with the data base
CO 4	Develop the techniques to handle the errors and email
CO 5	Design and Develop the Mobile ASP.NET application

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	1	2	2

CO 2	3	2	2	3	3	1
CO 3	3	3	3	3	3	3
CO 4	3	3	2	3	2	3
CO 5	3	2	3	2	3	3
Average	3	2.6	2.6	2.4	2.6	2.4

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk- LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar-

Peer Learning-

QUESTION PAPER PATTERN-UG*

Knowledge Level	**Section**	**Word Limit**	**Marks**	**Total**	**Special Instructions if any**
K 1	**A-10X2 marks**	**50**	**20**	**100**	Two questions from each Unit
K1. K 2	**B-5/8x8 marks**	**200**	**40**		Atleast one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SOFTWARE ENGINEERING

Total Hours:5 **COURSE CODE: CP18/5C/SOE**

CREDITS: 4 **L-T-P: 3-2- 0**

COURSE OBJECTIVES:

1. To acquaint the basic concepts and major issues of software engineering
2. Become an efficient software engineer.
3. To Understand the Software Engineering Practice & Process Models.
4. To Understand Design Engineering,Web applications and Software Project Management.

COURSE OUTLINE:

UNIT I:

The nature of software: defining- software application domains. Software Engineering: defining the discipline-The software process. Process models: The waterfall model, incremental process models, evolutionary process model, concurrent models. Characteristics of a software engineer, the software team.

UNIT II:

Requirements Engineering- eliciting requirements-developing use cases. Design concepts: design process- design concepts- design model. Architectural design: software architecture- architectural decisions and design. What is a component?- designing class-based components- conducting component level design.

UNIT III:

Quality management: Software quality- Review techniques: informal reviews-formal technical reviews. Software quality assurance: formal approaches to SQA. Testing process – content testing - user interface testing - component, navigation, configuration, security and performance testing.

UNIT IV:

Software Configuration Management: software configuration management- The SCM repository - the SCM process- configuration management for web and mobile apps.

UNIT V:

Managing software projects: The management spectrum - people - product – process – project. Process and project metrics: metrics for software quality. Emerging trends in software engineering: identifying soft trends.

RECOMMENDED TEXTBOOKS:

1. R.S.Pressman, "Software Engineering – A Practioner's Approach", McGraw Hill, 8th Edition, 2019.
2. Richard Fairley –Software Engineering concepts- TMH Edition 1997.
3. R.E Fairely, "Software Engineering Concepts", Tata McGraw Hill Publication 2001

REFERENCE BOOKS:

1. Ian Sommerville, "Software Engineering", Addison Wesley, 9th Edition, 2001.
2. Rajib Mal, "Fundamental of Software Engineering", 2nd Edition, PHI, New Delhi, 2005.
3. 3. N. E. Fenton, S. L. Pfleenger, "Software Metrics", Thomson Asia, Singapore. 2004.
4. Robert C.Seacord, " Secure Coding in C and C++", Pearson Education, 2nd edition, 2013
5. Julia H. Allen, Sean J. Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, " Software Security Engineering : A guide for Project Managers", Addison-Wesley Professional, 2008
6. Mark Dowd, John McDonald, and JustingSchuh: Teh Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities, Addison Wesley, 2007
7. N. E. Fenton, S. L. Pfleenger, "Software Metrics", Thomson Asia, Singapore. 2004.

JOURNALS:

1. International Journal of Computer and Software Engineering
2. Indian Journal of Computer science and Engineering

E-LEARNING RESOURCES:

1. http://www.researchgate.net/
2. http://link.springer.com/chapter/10.1007/978
3. http://www.literateprogramming.com/sdtypes.pdf
4. http://www.softwaretestinghelp.cpm/web-application-testing/
5. http://softwareengineeringdaily.com

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Able to deploy the social applications
CO 2	Able to design new software and use them to grow the business with specification techniques.
CO 3	Able to develop a model and representation of a new system.
CO 4	Able to guide the implementation tasks, including detailed design, coding, integration and Testing.
CO 5	Able to know the Testing techniques with defects finding approach

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	-	3	3	3
CO2	3	2	2	3	2	3
CO3	3	3	-	3	3	3
CO4	3	3	2	3	3	3
CO5	2	3	2	2	3	3
AVERAGE	2.8	2.8	1.2	2.8	2.8	3

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk- LCD)

Problem Solving-Group Discussion-Role Modelling

Quiz-Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1, K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

SEMESTER V COMPUTER ARCHITECTURE

Total Hours: 75 **COURSE CODE:CP18/5C/CAR**

Credits: 4 **L T P:** 3- 2 -0

COURSE OBJECTIVES:

1. To enable the students to know the components of a system
2. To learn the data representation and the way arithmetic operations are performed.
3. To learn the architecture and the interfacing logic of the processor.
4. To enable the students to learn about the interfacing concepts.

COURSE OUTLINE:

UNIT I:

Digital Logic Circuits- Digital Components : Integrated Circuits, Decoders, multiplexers, registers.

UNIT II:

Data Representation – Data Types, Complements, Fixed point representation, Floating point representation. Other Binary Codes and Error Detection Codes.

UNIT III:

Central Processing Unit: General register organization,Instruction formats, Addressing modes,data transfer and manipulation,Program control.

UNIT IV:

Processing: Parallel Processing, Pipelining.

UNIT V:

Input- Output Organization – Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA.

RECOMMENDED TEXT BOOKS:

1. M. Morris Mano ,Computer System Architecture,3rd Edition , PEARSON Publication
2. Nicholas P Carter, Computer Architecture and Organisation",2nd Edition, Schaum'S Outline.TMH.

REFERENCE BOOKS:

1. HAMACHER ,Computer Organization 4 Nov 2011 ,5th Edition
2. SIMA ,Advanced Computer Architectures: A Design Space Approach, 1e Pearson's Edition
3. Andrew S. Tanenbaum Structured Computer Organization,6th Edition
4. Kai Hwang, Naresh Jotwan, Advanced Computer Architecture,2nd Edition.
5. **John P. Hayes ,Computer Architecture and Organization,3rd Edition**

JOURNALS:

1. American Journal of Computer Architecture
2. The International *Journal* of Architectural Computing

E-LEARNING RESOURCES:

1. http://www.researchgate.net/
2. https://www.gettingsmart.com
3. https://digitaldefynd.com
4. https://learn.saylor.org
5. https://www.javatpoint.com › computer-organization-and-architecture-

tutorial. **COURSE OUTCOMES:**

CO Number	CO STATEMENT
CO 1	Able to learn the circuits and the components of the system
CO 2	Able to learn the conversion of data into other representation
CO 3	Learning the working process of the CPU.
CO 4	Learning the concept of pipelining and parallel processing
CO 5	Able to know the transfer techniques and interfaces

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	-	3	3	3
CO2	3	2	2	3	2	3
CO3	3	3	-	3	3	3
CO4	3	3	2	3	3	3
CO5	2	3	2	2	3	3
AVERAGE	2.8	2.8	1.2	2.8	2.8	3

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk- LCD)

Problem Solving-Group Discussion-Role Modelling

Quiz-Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

OPERATING SYSTEMS

Total Hours:5 **COURSE CODE: CP18/5C/OPS**

CREDITS: 4 **L-T-P: 3 -2- 0**

COURSE OBJECTIVES:

To enable the students to

1. To know how OS works.
2. To learn about Processes and Scheduling algorithms
3. To Study Computer Security issues and Operating Tools
4. To understand the Principle of Deadlock

COURSE OUTLINE:

UNIT I :

Introduction: Definition - What operating systems do? : User View, System View–Computing Environments: Traditional Computing, Mobile Computing, Distributed Systems, Client-Server Computing, Peer-to-Peer Computing, Virtualization, Cloud Computing, Real-Time Embedded Systems – OS structure: Services. Process Concept –Process scheduling– Inter-process Communication. Process Scheduling: Basic Concepts, scheduling criteria – Scheduling Algorithms.

UNIT II:

Synchronization: Background, the Critical-section problem – Semaphores – classical problems of synchronization. Deadlock: System Model- Characterization- Deadlock prevention- Deadlock Avoidance-Detection- Recovery.

UNIT III:

Memory Management: Background: Basic Hardware, Address Binding, Logical Versus Physical Address Space, Dynamic Loading, Dynamic Linking and Shared Libraries– Swapping- Contiguous Memory Allocation –Segmentation- Paging.

UNIT IV:

Virtual Memory: Background - Demand paging – Page Replacement – Thrashing. File System: File concepts.

UNIT V:

The Linux System –Linux History- Design Principles – Kernel Modules – Process management – Scheduling –File Systems.

RECOMMENDED TEXTBOOKS:

1. Abraham Silberschatz, Peter.B.Galvin, Gerg Gagne, "Operating system concepts", 9th Edition, John Wiley & sons, 2015.
2. Operating System Concepts and Techniques by M. Naghibzadeh," FIRST EDITION", 2011.

REFERENCE BOOKS:

1. Operating systems A concept based approach Dhananjay M Dhamdhere, 3rd edition, TATA McGraw HILL, 2012.
2. Advanced concepts in operating systems, Mukesh Singhal & Niranjan Shivratri, 1St Edition, TATA McGraw HILL, 2001.
3. Operating Systems, Achyut S.Godbole and Atul Kahate, 3rd edition, TATA McGraw HILL, 2010.
4. Operating Systems, Stuart E Madnick and John J Donovan, TATA McGraw HILL, 2001.
5. H.M.Deitel, An Introduction to operating system, 2nd Edition, Addison Wesley, 1990.

JOURNALS:

1. International journal of Trend in scientific research and development (IJTSRD)– Operating systems a case study
2. Journal of Operating Systems Development & Trends (JoOSDT)

E-LEARNING RESOURCES:

1. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/1_Introduction.html
2. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/7_Deadlocks.html
3. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/8_MainMemory.html
4. https://study.com/academy/lesson/page-replacement-definition-algorithms.html
5. https://www.computerhope.com/issues/ch001638.html

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Outline the structure and functionalities of an OS & the concepts of process.
CO 2	Explain different problems related to process synchronization and deadlock.
CO 3	Describe the concept of paging and segmentation for memory management.

CO 4	Apply different Page replacement algorithm.
CO 5	Analyze different aspects of Linux.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	2	3	2	3	2
CO2	1	2	3	0	1	3
CO3	1	2	3	2	2	3
CO4	2	1	3	2	1	2
CO5	3	1	3	2	1	2
AVERAGE	**2**	**1.6**	**3**	**1.6**	**1.6**	**2.4**

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk- LCD)

Problem Solving-Group Discussion-Role Modelling

Quiz-Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	**A-10X2 marks**	**50**	**20**	**100**	Two questions from each Unit
K1. K 2	**B-5/8x8 marks**	**200**	**40**		Atleast one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER V

ELECTIVE I-DATA MINING AND DATA WAREHOUSING

Total Hours: 6 **COURSE CODE: CP18/5E/DMW**

Credits:5 **L-T-P: 3 3 0**

COURSE OBJECTIVES:

1. To introduce the concepts of data warehouse and data mining this gives complete description about the architecture, application, design and its implementation.
2. To handle real time data sets using various data mining techniques.
3. To demonstrate the roles that data mining and data warehousing plays in various fields for solving practical problems.
4. To analyze the data, identify the problem and choose the relevant algorithms to apply.

COURSE OUTLINE:

UNIT I :

Data Warehousing: Introduction- Definition- Multidimensional Data Model- OLAP Operations-Warehouse Schema- Data Warehousing Architecture- Warehouse Server- OLAP Engine- Data Warehouse Backend Process.

UNIT II:

Data mining : Introduction- Definition- KDD vs. Data Mining- DBMS vs. DM- Data mining Techniques-Issues and Challenges in DM-Data mining Application Areas.

UNIT III:

Association Rule : Introduction- Definition- Apriori algorithm- Partition Algorithm-Pincer Search algorithm- Dynamic Itemset Counting algorithm-FP – Tree Growth Algorithm.

UNIT IV:

Clustering Techniques: Introduction-Partition clustering: PAM-CLARA-CLARANS Hierarchical clustering: BIRCH-DBSCAN-CURE-ROCK-Decision Tree: Introduction- Definition-Tree construction principle-Advantages and Disadvantages- Decision Tree Construction Algorithm.

UNIT V:

Web Mining: Content-Structure-Usage mining-Text Mining-Temporal Data mining: Definition-Types of Temporal Data-Temporal Data Mining Tasks-Temporal Association Rules-Spatial Data mining: Definition-Spatial Mining Tasks.

RECOMMENDED TEXTBOOKS:

1. Arun k Pujari, "Data Mining Techniques",University Press,3rd edition,2004.
2. J.Han, M.Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann publishers,3rd edition,2011.

REFERENCE BOOKS:

1. Paulraj Ponniah, "Data Warehousing Fundamentals", John Wiley Edition.
2. M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.
3. G. K. Gupta, "Introduction to Data Mining with case studies", Eastern Economy Edition, Prentice Hall of India,2008.
4. R. Kimball, "The Data Warehouse Toolkit", John Wiley.
5. E.G. Mallach, "Decision Support and Data Warehouse systems", TMH.

JOURNALS:

1. Journal of Informatics and Data Mining.
2. International Journal of Data Warehousing and Mining.
3. Data Mining and Knowledge Discovery.

E-LEARNING RESOURCES:

1. https://www.teradatapoint.com/data-warehousing-olap
2. https://www.zentut.com/data-mining/data-mining-techniques
3. https://searchbusinessanalytics.techtarget.com/definition/association-rules-in-data-mining
4. http://dwgeek.com/various-data-mining-clustering-algorithms-examples.html/
5. https://www.slideshare.net/hemantbeast/web-mining-text-mining

COURSE OUTCOMES:

CO NUMBER	CO STATEMENT
CO1	Design data warehousing with multidimensional data modeling and apply OLAP operations to devise efficient cost effective methods for maintaining data warehouse.
CO2	Analyze a wide range of emerging newly adopted methodologies and technologies to facilitate the knowledge discovery.
CO3	Characterize the kinds of patterns that can be discovered by association rule and applying proper data mining algorithms to build analytical application.
CO4	Demonstrate application of various Clustering algorithms to benefit the user experiences towards research and innovation integration.
CO5	Evaluate different mining techniques in various applications like social, scientific and environmental context.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	2	3	3	3	2
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	2
CO5	2	3	2	2	3	2
AVERAGE	2.8	2.8	2.6	2.6	3	2.4

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk- LCD)

Problem Solving-Group Discussion-Role Modelling

Quiz-Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

SEMESTER V

Elective I –ARTIFICIAL INTELLIGENCE

Total Hours:6 **COURSE CODE:CP18/5E/ARI**

Credits: 5 **L T P: 3-3-0**

COURSE OBJECTIVES:

1. To search and discover intelligent characteristics of existing AI
2. To design and implement a futuristic AI application.
3. To enable the students to learn the concepts of learning process of machines.
4. Ability to learn the concepts of artificial neural networks.

COURSE OUTLINE:

UNIT I:

Introduction – Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II:

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing -Optimal Decisions in Games -Alpha--Beta Pruning -Stochastic Games .

UNITIII:

First Order Predicate Logic – Prolog Programming - Unification -Forward Chaining - Backward Chaining - Resolution –Knowledge Representation - Ontological Engineering - Categories and Objects –Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV:

(MOOC-NPTEL) Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees - Regression and Classification with Linear Models - Artificial Neural Networks - Nonparametric Models - Support Vector Machines - Statistical Learning - Learning with

Complete Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning.

UNIT V:

AI applications – Language Models - Information Retrieval - Information Extraction – Natural Language Processing - Machine Translation – Speech recognition – Robot – Hardware – Perception – Planning – Moving.

RECOMMENDED TEXTBOOKS:

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 3rd Edition, 2009
2. Bratko, I., Prolog Programming for Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th edition, 2011.
3. David L. Poole , Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

REFERENCE BOOKS:

1. M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones andBartlett Publishers, Inc; 1 edition, 2008
2. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009
3. Nils J. Nilsson, the Quest for Artificial Intelligence, Cambridge University Press, 2009.
4. William F. Clocksin, and Christopher S. Mellish, "Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
5. Vinod Chandra S.S and Anand Hareendran .S ,Artificial Intelligence and Machine Learning

JOURNALS:

1. IEEE journals on Pattern Analysis and Machine Intelligence
2. International Journal of Neural Systems
3. IEEE Journals on Neural Networks and Learning Systems

E-LEARNING RESOURCES:

1. http://brain.cs.unr.edu/publications/NevPropManual.pdf
2. http://www.aaai.org/AITopics/html/neural.html
3. https://www.cleverism.com › artificial-intelligence-complete-guide

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Learnt about the artificial intelligence problem and the characteristics of the problem space
CO 2	Demonstrate the fundamentals of heuristic search techniques and reasoning for problem solving
CO 3	Compute the leaning using Predicate Logic and Prolog Programming
CO 4	Learning the concepts of artificial neural networks and how to train the network.
CO 5	Applying the knowledge of artificial intelligence in designing applications

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	1	3	3	3
CO2	3	1	2	3	3	3
CO3	3	2	1	3	3	3
CO4	3	2	2	3	3	3
CO5	2	2	2	3	3	3
AVERAGE	2.8	2	**1.6**	**3**	**3**	**3**

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-OHP-LCD)

Flipped Learning/Blended Classroom-E Content, Videos

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	**A-10X2 marks**	**50**	**20**	**100**	Two questions from each Unit
K1. K 2	**B-5/8x8 marks**	**200**	**40**		Atleast one question from each unit

K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER V

ELECTIVE –I INFORMATION SECURITY

Total Hours: 6 **COURSE CODE:CP18/5E/INS**

Credits: 5 **L T P: 3- 3 -0**

COURSE OBJECTIVES :

1. To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.
2. To create a basic security policy using cryptography and some key encryption techniques used today.
3. Develop an understanding of security policies as well as protocols to implement such policies .
4. To learn about physical security threads and how to protect information using physical security controls.

COURSE OUTLINE:

UNIT I :

Why Information Security? : Introduction – Growing IT Security Importance and New Career - Opportunities – Becoming and Information Security Specialist - Contextualizing Information Security – Information Security Principles of Success: Introduction – Twelve Principles.

UNIT II :

Security Management : Introduction – Security Policies Set the stage for Success –Four Types of Policies – Development and Management of Security Policies –Policy Support Documents Suggested Standards Taxonomy – SecurityArchitecture and Models : Introduction – Defining the Trusted Computing Base-Protection Mechanisms in a Trusted Computing Base – System SecurityAssurance Concepts – Trusted Computer Security Evaluation Critieria.

UNIT III :

Information Technology Security Evaluation Criteria – Federal Criteria forInformation Technology Security – The Common Criteria – Confidentiality andIntegrity Models –Law, Investigations and Ethics : Introduction – Types ofComputer Crime – How Cyber Criminals Commit Crimes – The Computer and the Law – Intellectual Property Law – Privacy and the Law – ComputerForensics-The Information Security Professionals Code of Ethics –Other Ethics Standards.

UNIT IV :

Physical Security Control : Introduction – Understanding the Physical SecurityDomain Physical Security Threats – Providing Physical Security – OperationsSecurity : Introduction –Operations Security Principles – Operations Security Process Controls – Operations Security Controls in Action.

UNIT V :

Access Control Systems and Methodology : Introduction – Terms and Concepts – Principles of Authentication – Biometrics – Single Sign-On – Remote User Access and Authentication –Cryptography : Introduction – Applying Cryptography to Information Systems – Basic Terms and Concepts – Strength of Cryptosystems – Putting the Pieces to Work – Examining Digital Cryptography.

RECOMMENDED TEXT BOOKS:

1. Mark Merkow and Jim Breithaupt ,Information Security : Principles and Practices by, PearsonEducation, 2007.

2 Michael E. Whitman and Herbert J.Mattord, Principles of Information Security CENGAGE learning custom publishing, Jan 2012.

3. Surprakash Tripathi, Introduction to Information Security and Cyber Law Dreamtech Press, jan 2014.
4. - Athul Kahate, Cryprography and Network Security McGraw-Hill , 2019.

REFERENCE BOOKS:

1. Mastering your Introduction to Cyber Security by Michael C.Redmond , booklocker.com publication, 2018
2. Security in Computing 4th Edition by Charles Pfluger, Prentice Hall Of India, 2015.
3. Cryptography and Network Security, 3rd Edition by Forouzan, McGrawhill India Education,2015
4. Introduction toNetwork Security by Neal Krawetz, Engage learning publication, jan 2007
5. Computer Security: Art and Science by Matt Bishop, Pearson Education, 2006.

JOURNALS:

1. JOURNALS OF INFORMATION SECURITY - SCIRP
2. INTERNATIONAL JORNAL OF INFORMATION SECURITY - SPRINGER

E-LEARNING SOURCES:

1. www.Sans.Org/Informtion Security
2. https://uwaterloo.ca/information system & technology
3. https://ww.ostechnical.om

4. https://www.sciencedirect.com
5. https://agio.com

COURSE OUTCOMES:

CO NUMBER	CO STATEMENT
CO1	Identify the importance of the Information Security and their Principles
CO2	Applying the principles of Information Security in various real time applications and utilise the different policies , taxonomy , models and the criteria to secure information.
CO3	Identify different cybercrimes and protect information using the law, ethics, standards and criteria.
CO4	Utilise the physical security controls, principles and operations to protect data from physical threads.
CO5	Apply cryptography technique to secure information and apply different current methodologies to protect data from unauthorised person.

MAPPING - COURSE OUTCOME WITH SPECIFIC OUTCOME

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	1	-
CO2	1	3	1	2	1	-
CO3	-	3	2	1	2	3
CO4	1	3	2	1	3	3
CO5	2	3	3	3	3	3
AVERAGE	1.4	3	2	1.8	2	1.8

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD)

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-2/3x20 marks	500	40		Compulsory One question from each unit

SEMESTER V PRACTICAL

V – ASP.NET Lab

Total hours:60 **Course Code : CP18/5C/PR5**

Credit:3 **L T P: 0- 0- 4**

COURSE OBJECTIVES:

1. To learn the basic concepts of asp.net 2. To design web pages.

PRACTICAL LIST:

1. Write ASP.NET program using basic HTML controls.
2. Write ASP.NET program using basic Web server controls.
3. Write ASP.NET program using data list Web server controls.
4. Write ASP.NET program using calendar control.
5. Write ASP.NET program using Ad rotator control.
6. Write ASP.NET program to display your college details and register an application form using validation controls.
7. Write ASP.NET program to read two integer values from the user and check for error handling.
8. Write ASP.NET program to manage the library information.
9. Write ASP.NET program to create an electricity bill for a customer. The customer detail includes the customer id, name, address, previous reading and current reading, and calculate the amount to be paid.
10. Write ASP.NET program to display the personal details of five employees and on selection to display each employee information.

COURSE OUTCOMES:

CO No.	CO Statement
CO 1	Develop the software using various programming technologies
CO 2	Evaluate user requirements for software functionality required to decide whether the language can meet user requirements

CO 3	Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	1
CO2	3	2	2	3	3	2
CO3	3	2	2	3	3	0
AVERAGE	3	1.6	2	2.3	2.3	1

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

SEMESTER VI									
VI	III	CP18/6C/JAV	Java Programming	4	6	90	40	60	100
	III	CP18/6C/DCN	Data Communications Networking	4	6	90	40	60	100
	III	CP18/6E/CCP CP18/6E/BDA CP18/6E/IOT	Elective II-Cloud Computing Or Elective II- Big Data Analytics Or Elective II –Internet of Things	5	7	105	40	60	100
	III	CP18/6C/MNP	Mini Project	4	7	105	40	60	100
	III	CP18/6C/PR6	Practical VI- Java Programming Lab	3	4	60	40	60	100

Credits gained during the Semester VI: 20

SEMESTER VI JAVA

PROGRAMMING

Total Hours: 90 COURSE CODE:CP18/6C/JAV

Credits:4 L T P: 3- 3 -0

COURSE OBJECTIVES:

1. To learn the fundamental concepts of programming style.
2. Understand the concepts of OOP's principles
3. To make the students to know about exception and how to handle it
4. Understand the concepts of string functions
5. Learn the applet programming and design GUI based applications

COURSE OUTLINE:

UNIT I :

An overview of Java – Data Types Variables and Arrays- Operators - Control Statements.

UNIT II:

Introducing Classes –A closer look at methods at Classes- Inheritance

UNIT III :

Packages and Interfaces – packages- access protection- importing packages-Interfaces. Exception handling: Fundamentals-types-uncaught Exceptions-Using try and catch –Multiple catch-Nested try statements –Throw-Throws-finally-Java built-in exception. Multithreaded programming: The Java Thread model-Synchronization.

UNIT IV :

String handling- String constructors- Character Extraction-String Comparison-Searching Strings-Modifying strings- data conversion using value of( ) – changing the case of characters within a string - Joining Strings, additional string methods - String Buffer: Methods and Constructors. Java.util: The Legacy classes and Interfaces – The enumeration interfaces – vector – stack – dictionary. Java-util Part 2: More Utility Classes-Calendar.

UNIT V:

The Applet Class: Two Types of Applets-Applet Basic-Applet Architecture-An Applet Skeleton-Simple Applet Display Methods-Requesting Repainting-Using the Status Window-The HTML Applet Tag-Passing Parameters to Applets-getDocumentBase() and getCodeBase()-Event Handling-Introducing AWT-Working with Windows, Graphics and Text : AWT classes - Window Fundamentals-Working with Frame Windows-Creating a Frame window in an AWT-Based Applet-Creating a Windowed Program-Displaying Information Within a Window-Introducing Graphics-Working with Color-Setting the paint Mode-Working with Fonts-Using Awt controls, Layout Managers and Menus.

RECOMMENDED TEXT BOOKS:

1. P.Naughton and H.Schildt, Java (The Complete Reference), Ninth Edition.
2. Core java for Beginers ,Rashmi Kanta Das,3rd Edition,Vikas Publications

REFERENCE BOOKS:

1. K.Arnold and J.Gosling, The Java Programming Language, Second Edition.
2. Cay S.Horstmann, Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley.
3. Deitel and Deitel, "Java – How to program", Addison Wesley Press
4. E. Balaguruswamy Programming with JAVA - A Primer McGraw Hill Professional 2015
5. Robert Sedgewick& Kevin Wayne Introduction to Programming in Java Addison Wesley 2017

JOURNALS:

1. International journal of Science and Engineering
2. Elsevier journal –Science of Computer Programming

E-LEARNING SOURCES:

1. https://beginnersbook.com › 2013/12 › java-strings
2. https://caveofprogramming.com › java-string-working-with-strings-in-java
3. https://www.javatpoint.com › exception-handling-in-java
4. https://www.sitesbay.com › java › java-applet
5. https://www.journaldev.com

COURSE OUTCOMES:

CO No.	CO Statement
CO 1	Write, compile, and execute Java programs that may include basic data types and control flow constructs
CO 2	Learnt the concept of oops principles and its usage
CO 3	To understand importance of Multi-threading & different exception handling mechanisms.

CO 4	To learn the concepts of handling String and StringBuffer functions
CO 5	To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	1	3	3	3
CO2	3	1	2	3	3	3
CO3	3	2	1	3	3	3
CO4	3	2	2	3	3	3
CO5	2	2	2	3	3	3
AVERAGE	2.8	2	1.6	3	3	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-OHP-LCD)

Flipped Learning/Blended Classroom-E Content, Videos-

Problem Solving-Group Discussion-Role Modelling

Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

SEMESTER VI

DATA COMMUNICATION NETWORKING

Total Hours: 90 **COURSE CODE:CP18/6C/DCN**

Credits:4 **L T P:** 3- 3 -0

COURSE OBJECTIVES :

1. To study about the physical arrangement of networks, types an modes of networks, data conversions and transmission medium.
2. To understand the functions and working of different layers of network.
3. To know about the inter-connection and types of devices and network security.

COURSE OUTLINE :

UNIT I :

Introduction : Data Communications – Networks – Protocol and Standards – The OSI Model – Layers in the OSI Model – Digital and Analog Transmission : Analog-to-Digital Conversion – Digital-to-Analog Conversion.

UNIT II :

The Physical Layer and Media : Transmission Media – Guided Media – Unguided Media : Wireless – Transmission impairment – Performance – Multiplexing – TDM – FDM – Switching – Circuit Switched Networks – Structure of a switch.

UNIT III :

Data Link Layer – Error Detection and Error Correction : Block Coding – Cyclic Redundancy Check – Checksum – Flow and Error Control – Channelization – Bluetooth – Architecture.

UNIT IV :

Frame Relay : Architecture – Frame Relay Layers – Congestion Control and Quality of service : Data Traffic – Congestion Control – Quality of Service – Network Layer Delivery, Forwarding and Routing : Unicast Routing Protocols – Distance Vector Routing – Link State Routing.

UNIT V :

Transport Layer : TCP – TCP Services – TCP Features – Segment – TCP Connection – Application Layer – Domain Name System : Name space – Domain Name Space – TELNET – Electronic Mail – File Transfer Protocol (FTP).

RECOMMENDED TEXT BOOKS :

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, Tata McGraw Hill, 2006.
2. Data and Computer Communication, William Stallings, 8th Edition, Pearson Education, 2003
3. Computer Networking, James F.Kurose, Keith W.Ross, Fourth Edition, Pearson Publications.

REFERENCE BOOKS :

1. Computer Networks, Andrew S.Tannenbaum, Third Edition, Pearson Professional Education.
2. Data and Computer Communications, William Stallings, Eighth Edition, Pearson Education.
3. Computer Networks, Larry Peterson, Bruce Davie, 5th Edition, Morgan Kaufmann Series
4. Computer Networks, Sarika Gupta, Gaurav Gupta, First Edition, Khanna Book Publishing.
5. Data Communication and Networking, Forouzan, 5th Edition, Tata McGraw Hill

JOURNALS :

1. Journal of Network Communications and Emerging Technology (JNCET)
2. International Journal of Networking and Computing

E-LEARNING RESOURCES :

1. https://searchnetworking.techtarget.com/definition/OSI
2. http://www.cs.virginia.edu/~jorg/teaching/cs457/slides/physical.pdf
3. http://www.eecs.umich.edu/courses/eecs373.w05/lecture/errorcode.html
4. http://ecomputernotes.com/computernetworkingnotes/routing/routing-algorithms
5. https://www.sciencedirect.com/topics/computer-science/transport-layer-protocol

COURSE OUTCOMES :

CO Number	CO STATEMENT
CO1	Impart knowledge in basics of data networking and the layers of OSI model
CO2	Introduce different types of transmission media to connect the computers in various departments to and concepts of switching used for data communication
CO3	Understand the functions of data link layer to ensure that the data has been transmitted across the layers error free.
CO4	Analyse various routing protocols to determine optimal network data transfer paths between network nodes with good quality of service.
CO5	Build an understanding about functions of transport layer and the concept on how information is transmitted fast and secure across various systems.

MAPPING : COURSE OUTCOME WITH PROGRAM SPECIFIC OUTCOME

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	0	2	2	1	0	2
CO2	0	2	3	2	1	3
CO3	0	2	3	0	2	2
CO4	0	2	2	1	1	3
CO5	1	1	1	3	2	3
AVERAGE	0.2	1.8	2.2	1.4	1.2	2.6

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY :

Lecture (Chalk and Talk – OHP – LCD)

Flipped Learning Blended Classroom – E Content, Videos

Problem Solving – Group Discussion

Quiz – Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	**Section**	**Word Limit**	**Marks**	**Total**	**Special Instructions if any**
K 1	**A-10X2 marks**	**50**	**20**	**100**	Two questions from each Unit
K1. K 2	**B-5/8x8 marks**	**200**	**40**		Atleast one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER VI ELECTIVE II-

CLOUD COMPUTING

Total Hours: 105 **COURSE CODE:CP18/6E/CCP**

Credits:5 **L T P:** 4- 3 -0

COURSE OBJECTIVES:

1.To know the basic concepts of cloud

computing. 2.To know the services of cloud

computing

3.To appreciate the emergence of cloud as the next generation computing paradigm

COURSE OUTLINE:

UNIT I:

Introducing Cloud Computing:Web 2.0 and the Cloud-Distinguishing Cloud Types-Exploring Uses of the Cloud-Introducing Scalability-Introducing Virtualization-Collecting Processing Power Through Grid Computing.Software as a Service(SaaS) –Getting Started with SaaS- Understanding the Multitenant Nature of SaaS Solutions-Understanding OpenSaaS Solutions- Understanding Service Oriented Architecture(SOA). Platform as a Service(PaaS):IT Evolution Leading to the Cloud-Benefits of PaaS Solutions-Disadvantages of PaaSSolutions.Infrastructure as a Service(IaaS):Understanding IaaS-Improving Performance Through Load Balancing-System and Storage Redundancy-Utilizing Cloud-Based NAS Devices-Advantages of IaaS Solutions- Server Types Within an IaaS Solution.

UNIT II:

Identity as a Service(IDaaS):Understanding Single Sign-On(SSO)-Understanding OpenID- Mobile ID Management.Data Storage in the Cloud:Examining the Evolution of Network Storage-Understanding Cloud Based Data Storage-Advantages and Disadvantages of Cloud Based Data Storage-Getting Past the Fear of Cloud Based Data-Cloud Based Backup Systems-Understanding File Systems-Industry Specific Cloud Based Data Storage-Cloud Based Database Solutions- Cloud Based Block Storage.Collaboration in the Cloud:Collaborating in the Clouds-Questions to Ask About Collaborative Tools-Web Based Collaboration Began with Web Mail-Instant Messaging Isn't What it used to be-Cloud-Based Phone and Fax Systems-Revisiting File Sharing-Collaborating via Web Logs(Blogs)-Collaborative Meetings in the Cloud-Virtual Presentations and Lectures-Using Social Media for Collaboration-Using Cloud Based Calendar Management-

Using Streaming Video Content to Collaborate.Virtualization:Understanding Virtualization-The History of Virtualization-Leveraging Blade Servers-Server Virtualization- Desktop Virtualization-Desktop Solutions on Demand-Virtual Networks-Data Storage Virtualization-Not All Applications Are Well Suited for Virtualization-Why Virtualize?

UNIT III:

Cloud Offerings:Introduction-Information Storage, Retrieval, Archive and Protection – Cloud Analytics-Testing Under Cloud-Information Security-Virtual Desktop Infrastructure-Storage Cloud.

UNIT IV:

Cloud and SOA:Introduction-SOA Journey to Infrastructure-SOA and Cloud-SOA Defined-SOA and IAAS-SOA Based Cloud Infrastructure Steps-SOA Business and IT Services.

UNIT V:

Mobile Computing: Evolution of mobile computing-Introducing the mobile players-pages, Apps and widgets-Revisiting the role of HTML5-mobile development considerations.
The Future of the cloud: How the cloud will change operating systems-Location-aware applications-Intelligent fabrics, paints and more-the future of cloud TV-future of cloud based smart devices-cloud and mobile

RECOMMENDED TEXTBOOKS:

1. Kris Jamsa,Cloud Computing SaaS, PaaS, IaaS,Virtualization, Business Models,Mobile, Security, and More, Jones and Bartlett India Pvt Ltd,2014.
2. Dr.KumarSaurabh, Cloud Computing,Second Edition,Wiley India Pvt Ltd,2011.

REFERENCE BOOKS:

1. John.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press,2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly, 2009.
4. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
5. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, Cloud Computing: Concepts,Technology and Architecture, Prentice Hall, 2013.

JOURNALS:

1. International Journal of Cloud Computing
2. Indian Journal of Science and Technology

E-LEARNING RESOURCES:

1. http://www.elearning/earning.com>cloud computing
2. http://www.ripublication.com>irph
3. http://www.acecloudhosting.com
4. http://www.interaction-design.org
5. http://www.cet.edu.in

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Able to know the platforms of Iaas, Saas and Paas.
CO 2	Able to give the identity as service, providing the effectiveness in collaboration and understand the server as a resource.
CO 3	Able to give security for all social applications.
CO 4	Able to know the different Architectural procedures as a service.
CO 5	Able to know the mobile application in recent Technologies.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	-	3	3	3
CO2	2	3	-	3	3	3
CO3	2	3	-	3	3	3
CO4	2	-	-	2	2	2
CO5	2	2	2	-	-	-
AVERAGE	2.2	2.2	0.4	2.2	2.2	2.2

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-OHP-LCD)

Peer Learning

Field Visits

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-2/3x20 marks	500	40		Compulsory One question from each unit

SEMESTER VI

ELECTIVE II-Big Data Analytics

Total Hours: 105 **COURSE CODE:CP18/6E/BDA**

Credits:5 **L T P:** 4- 3 -0

COURSE OBJECTIVES:

1. Understand the Big Data Platform and its Use cases
2. Provide an overview of Apache Hadoop
3. Understand Map Reduce Jobs
4. Provide hands on Hadoop Eco System
5. Apply analytics on Structured, Unstructured Data.

COURSE OUTLINE:

UNIT I:

Types of digital data: classification of digital data. Introduction to big data: characteristics of data-Evolution of big data-Definition of big data – Challenges with big data- What is big data? - Other characteristics of data which are not definitional traits of big data- Why big data- Are we just an information consumer or do we also produce information?- Traditional business intelligence versus big data-a Typical data warehouse environment-A typical hadoop environment-What is new today-What is changing in the realms of big data.

UNIT II:

Big data analytics: where do we begin- What is big data analytics – What big data analytics isn't – Why this sudden hype around big data analytics – Classification of analytics – Greatest challenges that prevent business from capitalizing on big data- Top challenges facing big data- Why is big data analytics important- What kind of technologies are we looking towards to help meet the challenges posed by big data- Data sciences- Data scientist – Terminologies used in big data environments- Basically available soft state eventual consistency-Few top analytics tools. The big data technology landscape: NoSQL – Hadoop.

UNIT III:

Introduction To Hadoop: Introducing Hadoop – The Treasure Trove , Why Hadoop - Why Not RDBMS - RDBMS Versus Hadoop- Distributed Computing Challenges – History Of Hadoop – Hadoop Overview – Use Case Of Hadoop – Hadoop Distributors- HDFS-Processing Data With Hadoop-Managing Resource And Applications With Hadoop Yarn-Interacting With Hadoop Ecosystem.

UNIT IV:

Introduction to MARPREDUCE programming: Introduction-Mapper-Reducer-Combiner-Partitioner-Searching-Sorting-Compression.

UNIT V:

Introduction to machine learning: Introduction to machine learning-Machine learning definition, Machine learning algorithms- Regression model, Clustering, Collaborative Filtering, Association rule mining, Decision tree.

RECOMMENDED TEXT BOOKS:

1. Big data and analytics – Seems Acharya and Subhashini Chellapan – Willey India Pvt.Ltd.,2018.
2. Big Data Analytics 2nd Edition – Radha Shankarmani,M.Vijayalakshmi,Wiley India Pvt Ltd.,2018

REFERENCE BOOKS:

1. Big data – Principles and best practices of scalable real time data systems – Nathan Marz , James Warren- Dream Tech Press.
2. Big data, Anil Maheshwari, Mc Graw Hill,2018
3. Big Data Fundamentals concepts,Drivers & Techniques,Thomas eri,Wajid Khattak and Paul Buhler,2019
4. Big Data Analytics,Raj Kamal/Preeti Saxena, Mc Graw Hill,2017.
5. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.

JOURNALS:

1. International Journal of Big Data Management Systems(IJBDM)
2. Indian Journal of Science and Technology

E-LEARNING SOURCES

1. https://www.ngdata.com/big-data-analysis-resources/
2. https://www.qubole.com/big-data-analytics/
3. https://www.guru99.com/what-is-big-data.html
4. https://www.sas.com/en_in/insights/big-data/hadoop.html
5. https://www.edupristine.com/blog/hadoop-mapreduce-framework
6. https://www.coursera.org/learn/big-data-machine-learning

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Outline to provide an overview of an exciting growing field of big data analytics.
CO 2	Identify the hype around big data and its classifications.
CO 3	Use the tools required to manage and analyze big data like Hadoop.
CO 4	Use the tools required to manage and analyze big data like mapreduce.
CO 5	Discuss to integrate machine learning libraries and mathematical and statistical tools with modern technologies like hadoop and mapreduce.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	-	1	3	3	3
CO2	1	-	2	3	3	3
CO3	2	1	3	3	3	3
CO4	-	1	3	3	3	3
CO5	-	-	3	3	3	3
AVERAGE	1	0.4	2.4	3	3	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

Lecture (Chalk and Talk-LCD) Blended

Classroom-E Content, Videos Problem

Solving-Group Discussion Quiz-

Seminar

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	A-10X2 marks	50	20	100	Two questions from each Unit
K1. K 2	B-5/8x8 marks	200	40		Atleast one question from each unit
K2, K 3	C-4/6x10 marks	500	40		Compulsory One question from each unit

SEMESTER VI

INTERNET OF THINGS

TOTAL HOURS : 105 **COURSE CODE : CP18/6E/IOT**

CREDITS : 5 **L-T-P : 4-3-0**

COURSE OBJECTIVES :

1. To make the graduates to get updated with a basic knowledge of electronics and Microprocessors.
2. To learn the concepts of IOT.
4. To learn different protocols used in IOT.
5. To learn the concepts of smart city development in IOT.
6. To learn how to analysis the data in IOT

COURSE OUTLINE :

UNIT I :

Internet of Things : An Overview : Internet of Things – IoT Conceptual Framework – IoT Architectural view – Technology behind IoT – Sources of IoT. Design Principles of Connected Devices : Introduction – IoT/M2M Systems Layers and Designs Standardization – Communication Technologies. Design Principles for Web Connectivity : Introduction – Web Communication Protocols for Connected Devices.

UNIT II :

Internet Connectivity Principles : Introduction – Internet Connectivity – Internet-Based Communication – IP Addressing in the IoT. Data Acquiring, Organising , Processing and Analytics : Introduction – Data Acquiring and Storage – Organising the data – Transactions, Business Processes, Integration and Enterprise Systems.

UNIT III:

Data Collection, Storage and Computing Using a Cloud Platform : Introduction - Cloud Computing Paradigm for Data Collection, Storage and Computing – Everything as a Service and Cloud Service Models – IoT Cloud-Based Services using the Xively, Nimbits and other Platforms.

UNIT IV :

Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks : Introduction– Sensor Technology – Participatory Sensing, Industrial IoT and Automotive IoT – Actuator – Sensor Data Communication Protocols – Radio Frequency Identification Technology – Wireless Sensor Networks Technology. IoT Privacy, Security and Vulnerabilities Solutions : Introduction – Vulnerabilities, Security Requirements and Threat Analysis – Use Cases and Misuse Cases – IoT Security Tomography amd Layered Attacker Model.

UNIT V :

Business Models and Processes Using IoT : Introduction – Business Models and Business Model Innovation – Value Creation in the Internet or Things – Business Model Scenarios for Internet of Things – IoT Case Studies.

RECOMMENDED TEXT BOOKS :

1.Raj Kamal,Internet of Things Architecture and Design Principles,McGraw

Hill 2017 2.Hanes David ,Salgueiro Gonzalo ,Grossetete Patrick , Barton Rob ,

IoT Fundamentals:

Networking Technologies, Protocols and Use Cases for the Internet of Things by Pearson

REFERENCE BOOKS :

1.Arshdeep Bahga, Vijay Madisetti ,Internet of Things (A Hands-on-Approach) 1st Edition .

2. Peter Waher, Mastering Internet of Things: Design and Create Your Own IoT Applications Using Raspberry Pi 3,2018.

3.Colin Dow,Internet of Things Programming Projects: Build Modern IoT Solutions with the Raspberry Pi and Python

4.Andrew Minteer,Analytics for the Internet of Things (IoT),2017.

5. Adeel Javed,Building Arduino Projects for the Internet of Things: Experiments

JOURNALS :

1. Engineering Cyber Physical Human Systems

2. International Journal of Internet of Things and Cyber-Assurance

E-LEARNING RESOURCES :

1.https://www.inderscience.com

2. https://www.iaras.org

3. https://www.inderscience.com/jhome.php?jcode=ijitca

4. https://www.springeropen.com/p/engineering/internet-of-things

5. https://www.journals.elsevier.com/internet-of-things

COURSE OUTCOMES :

CO Number	CO STATEMENT
CO1	To learn the architectural diagram of IOT framework
CO2	To understand how data is acquired,organized
CO3	Using cloud services they will be able to create own data centers
CO4	To understand the security in the networks
CO5	Able to create IOT applications.

MAPPING : COURSE OUTCOME WITH PROGRAM SPECIFIC OUTCOME

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	3	2	3	0
CO2	2	2	3	2	3	1
CO3	1	1	3	3	3	1
CO4	0	0	3	3	3	3
CO5	1	1	3	3	3	3
AVERAGE	1.2	1.2	3	2.6	3	1.6

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY :

Lecture (Chalk and Talk – OHP – LCD)

Problem Solving – Group Discussion

Quiz – Seminar

Peer Learning

QUESTION PAPER PATTERN-UG*

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K 1	**A-10X2 marks**	**50**	**20**	**100**	Two questions from each Unit
K1. K 2	**B-5/8x8 marks**	**200**	**40**		Atleast one question from each unit
K2, K 3	**C-4/6x10 marks**	**500**	**40**		Compulsory One question from each unit

SEMESTER VI

PRACTICAL VI – Java Programming Lab

Total Hours:60 **COURSE CODE : CP18/6C/PR6**

Credits: 3 **L T P: 0 0 4**

COURSE OBJECTIVES:

1. Write simple programs and introduce all the concepts in it.
2. Learn the concept of exception and interfaces
3. Write programs using AWT controls to implement GUI based applications

PRACTICAL LIST:

1. Write a java program to implement all Control statements
2. Write a java program to implement

   a) Constructors overloading b)method overriding c)dynamic method dispatch
3. Write a java program to implement the concept of packages
4. Write a java program to implement the concept of interfaces.
5. Write a java program to implement exception handling (Hint: use five clauses)
6. Write a java program to implement thread synchronization and multithreading concept.
7. Write a java program to implement String Handling operations (Character extraction, string Comparison, searching strings, modifying strings)
8. Write a java program to implement String Buffer class (use any five 5 methods)
9. Write a java program to implement Calendar class.(Calculate age and display the current date details)
10. Write a applet program to create a bio data using frame controls. Display the details at the end of the applet screen at the click of the button.
11. Write an applet program to implement any two Layouts.
12. Write a java program to implement Menus and submenus
14. Write an applet program to implement graphic controls, fonts and colors.

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Apply the basic fundamentals of Decision making and looping concepts of Java programming.
CO 2	Compute Java programs using String handline functions
CO 3	Construct GUI based applications using awt controls.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	3
CO2	3	2	2	3	3	2
CO3	3	2	2	3	3	3
AVERAGE	3	1.6	2	2.3	2.3	2.3

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

Practical question paper will be framed by the External Examiner from the practical question bank kept in the Department.

SEMESTER VI

MINI PROJECT

Total Hours:105 **Course Code : CP18/6C/MNP**

Credits: 4 **L T P: 0 0 7**

COURSE OBJECTIVES:

Acquire the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Use the basic knowledge of programming skills.
CO 2	Acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms.
CO 3	Prepare to learn on their own, and reflect on their learning to take appropriate actions to improve
CO 4	Analyse, identify, design and develop a project to enhance the existing problem within the scope of their study.

MAPPING-COURSE OUTCOME WITH PROGRAMME SPECIFIC OUTCOME

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	2	1	1	3
CO2	3	2	2	3	3	2
CO3	3	2	2	3	3	3
CO 4	3	3	3	3	3	3
AVERAGE	3	2	2.5	2.5	2.5	2.7

KEY: STRONGLY CORELATED-3 MODERATELY CORELATED-2 WEAKLY CORELATED-1 NO CORELATION-0

EVALUVATION PATTERN

Presentation of the project : 20 marks

Execution of the project : 10 marks

Testing and Debugging : 10 marks

Viva Voce : 20 marks

SEMESTER V

OBJECT ORIENTED PROGRAMMING IN C++

COURSE CODE: CP18/SS/CCP

CREDITS:2

COURSE OBJECTIVES:

1. To enable the students to learn the OOPS concepts
2. To learn how containment and inheritance promote code reuse in C++
3. To understand how C++ improves C with object-oriented features

UNIT I:

Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Selection control statements in C++.

UNIT II:

Data types, Expression and control statements Iteration statements in C++, Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions.Functions, Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C++.

UNIT III:

Creating classes and Abstraction: Classes objects, data members, member functions, this Pointer, Friends, Friend Functions, Friend Classes, Friend Scope, and Static Functions. Constructors and Destructors, Static variables and Functions in class.

UNIT IV:

Operator Overloading in C++, Overloading Unary Operators, Overloading binary operators. Inheritance in C++, Types of Inheritance, Pointers, Objects and Pointers, Multiple Inheritance.

UNIT V: Virtual Functions, Polymorphism, Abstract classes.

RECOMMENDED TEXT BOOKS :

1. C++ in One Hour a Day, Sams Teach Yourself (8th Edition) 8th Edition
2. C++: The Complete Reference Fourth Edition ,Herber Schildt

REFERENCE BOOKS :

2. Let Us C++ Paperback by Yashavant Kanetkar ,2nd Edition

2.Object-Oriented Programming In C++ 4th Edition,Robert Lafore

COURSE OUTCOMES:

CO Number	CO STATEMENT
CO 1	Use the basic knowledge of programming skills.
CO 2	Understand the features of C++ supporting object oriented programming
CO3	Understand how to produce object-oriented software using C++
CO4	Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
CO5	Understand advanced features of C++ specifically stream I/O, templates and operator overloading